P-TECH™

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P-TECH Case Study: Greater Southern Tier STEM Academy

August 2021

GREATER SOUTHERN TIER
STEM ACADEMY

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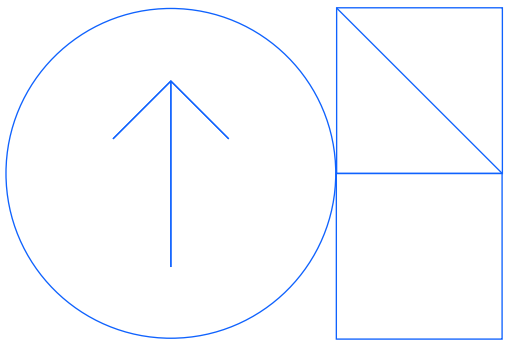

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Author: Millie O. Symns
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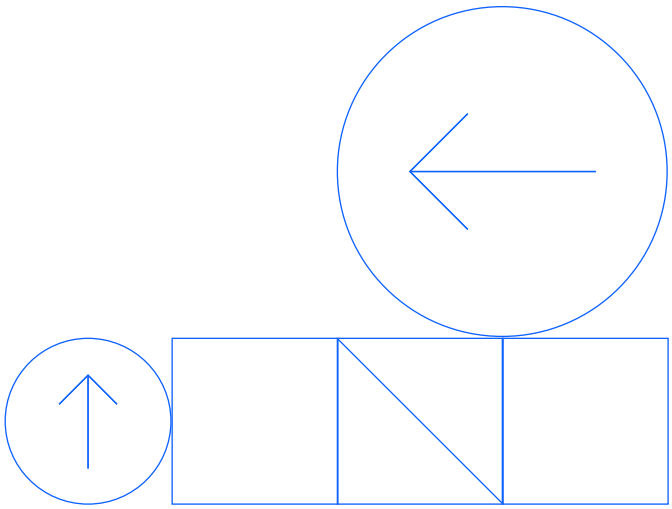
This report provides a deep dive into the execution of the P-TECH model in this school's particular context. This project has involved collaboration across multiple partners and stakeholders to make this work possible.

Special thanks to Robert Sherburne and Melissa Woodward for seeing this project through for Greater Southern Tier STEM Academy by providing school data and background.

Additionally, great thanks to the partner representatives who contributed to the project with their accounts and experiences. Without your perspectives and insights, we would not have the well-rounded case study we have today. Sincerest gratitude to:

— Students and alumni: Mackenzie Cannon, Ethan Cleary, and Nicholas Wood
— Educators and District Representatives: Emily Mehlenbacher and Sarah Vakkas
— Community College Partner Representative: Deborah Beall
— Industry Partner Representative: Christine Sharkey



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

August 2021

Background
Greater Southern Tier STEM Academy (GSTSA) is a Boards of Cooperative Educational Services (BOCES) high school in Corning, NY, that services students with shared educational programming from 12 school districts. GSTSA first implemented the P-TECH model in September 2016. Since then, there have been five cohorts who have experienced the innovative education model that addresses education access and workforce development challenges. Students have four STEM degree pathways to choose from Advanced Technical Education, Health Care, Clean Energy, and Information Technology.

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 GSTSA to take a deep dive into understanding the implementation of the P-TECH model. GSTSA provided non-identifiable student-level data with key academic metrics by academic year. Additionally, IBM interviewed nine individuals representing different parts of the P-TECH model – from students or alumni to industry partner representatives.

Recommendations
- Have more interim conversations with students about their post-high school goals to help with retention rates
- Continue to have more partnership meetings to make sure there is alignment between all partners to help with program development
- Provide more workplace learning opportunities for students, such as internships or mentorships that relate to their field of study

Results
GSTSA has done well in making this education model fit their particular context. It is no small feat to facilitate a program in which students are traveling from different counties to attend high school, all while getting students' schedules set up to attend college classes. Several people spoke about the struggle of getting a balance between the high school and community college schedule in the interviews.

The first cohort to begin the six-year program was retained up to almost 80%, with some drops at the fifth and sixth years. Many students opt into going back to the local high school to finish school with their friends or leave early to join the military. Despite the drops in retention, 34% of Cohort 1 students graduated high school with a high school diploma and AAS degree between four and five years.

Additionally, 44% of Cohort 2 graduated with high school and AA degrees, showing an upward trend in students graduating with degrees. Of the entire population that graduated, about 60% are female, which is an encouraging sign reflecting increased women's participation in STEM.

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, in August 2021, in 28 countries with about 260 schools across the network. P-TECH started in New York and has expanded to at least 10 states, as of August 2021, states, including Texas and California. For more information on P-TECH and how to bring it to your city, please visit www.ptech.org.

Over 50% of students are the first in their family to attend college

60% of AAS degree earners at female adding more women in STEM

"If you are unsatisfied, STEM might fill that boredom within you because you will always be doing something. Every day you are doing something. And if you have an idea of something you want to do, you can talk to the administration, and they can help you with that."

— **Nicholas Wood**
P-TECH Alumnus

"We tell our students and staff that we want them to be 'comfortable with being uncomfortable' – that is one of the slogans that we discuss with our students because we are so unique. If there is something we want to try, we try it. We pride ourselves in being innovative."

— **Robert Sherburne**
Director of Career and Technical Education (former Principal)

School Information And History

School History
Quick Facts Table:

School Name	Greater Southern Tier STEM Academy
Location	Corning, NY
Open Date	September 2016
School Type	NYS BOCES public school (serve 12 school districts)
Student population	Over 50% of students are the first in their family to attend college
Model type	School-within-a-school
Grade levels	Chapters 1 – 6 (Grades 9 – 14)
Community College Partner	Corning Community College (CCC)
College Pathway(s)	Advanced Technical Education, Health Care, Clean Energy, Information Technology
Industry Partner(s)	Corning Incorporated

Corning, NY, is a small city in Steuben County, about a four-hour drive northwest of New York City. Sites to see in the town south of the Finger Lakes include the surrounding nature, historic buildings, and the Corning Museum of Glass. Although the top two major industries for employment in Corning, NY, are manufacturing and health care, the city struggles to recruit and keep its residents in the local industries[1]. P-TECH at Greater Southern Tier STEM Academy is there is help combat that core issue.

Greater Southern Tier STEM Academy (GSTSA) is a Boards of Cooperative Educational Services (BOCES) high school in Corning, NY, that services students with shared educational programming from 12 school districts[2]. GSTSA operates on two campuses: the main high school campus and the college campus. In partnership with Corning Community College, GSTSA offers four associate degree pathways for students to choose from Advanced Technical Education, Health Care, Clean Energy, and Information Technology. In addition, GSTSA is partnered with Corning Incorporated as their leading industry partner for real workplace learning experiences such as career days, job shadowing, and internships.

To participate in the P-TECH program at GSTSA, students apply in eight-grade from participating school districts via an application and form filled out by parents or guardians. Like other P-TECH programs, there are no testing or grade requirements to be eligible for the programs – simply a willingness to take part in this P-TECH journey. The recruitment team evaluates the completed applications, and acceptance letters go out in May. Every spring, an average of 35 students are selected to be in the following Fall cohort. These students are required to attend a “Summer Bridge” program before they start as ninth-graders.

As a P-TECH program, GSTSA takes great pride in pushing the bounds of being an innovative secondary school combining the worlds of high school and college education with real-world workplace learning opportunities. With guidance from school counselors and administrators, students are in charge of their educational experience as soon as day one of the program. Students heavily exercise choice in how they want their education to go, from the program to the day-to-day projects. The school supports the students and staff with the innovative ideas they come up with and are always willing to try something new – it is all a part of the learning and growing process.

Starting anything new takes some time to learn what works and what needs adjusting to fit your context. GSTSA took the lessons learned from other P-TECH programs in New York and assessed what they needed for their program. In October 2015, GSTSA learned that they got the grant to do their P-TECH program and formed five sub-committees to organize the structure of the work. Each of the following subcommittees was interdisciplinary and incorporated all stakeholders in the program:

1. **Industry engagement —** Creating plans on how to get industry partners engaged with high school students for their career development
2. **Curriculum and design —** Planning the high school to college pathway curriculum for students
3. **Logistics and sustainability —** Working on plans to run a smooth operation of the program and ideas for making it sustainable
4. **Recruitment and admissions —** Focused on ways to recruit the students into the new program and ways to keep them involved
5. **Public relations and marketing —** Focused on advertising the program and its benefits for prospective students and parents

The program operated differently in its first year than it does now. As with all new initiatives, there were unexpected situations that arose. One early issue was recruiting the "right students" for the program. All students are welcome to participate in P-TECH, especially students from low-income or underserved backgrounds. Still, students need to be willing to partake in STEM college course-taking to take full advantage of P-TECH. GSTSA did well in communicating the great benefits for P-TECH but wasn't always clear on what the program entailed.

With a different marketing strategy now in place, prospective students now know all the program details, from what is expected of them to what supports they will receive. Another challenge was figuring out a high school schedule that works with the college course schedule. High school students being integrated into an existing college schedule takes close logistical coordination with the community college partner. High school students as college students need to be supported differently than regular college students. After trying out different solutions and many steering committee meetings between partners, GSTSA now has scheduling sequences that work seamlessly with the college and address the differentiated needs of each student.

Learn more about the early stages of implementing the P-TECH model from someone who has been there from the beginning. Meet Sarah Vakkas, the Assistant Superintendent.

Case Study Approach

Over several months, IBM worked in partnership with GSTSA to take a deep dive into understanding the implementation of the P-TECH model. GSTSA 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 nine 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.

[1] Data on major industries based on 2018 Census Bureau ACS. Source: Data USA, https://datausa.io/profile/geo/corning-ny

[2] School districts included the following: Elmira, Addison, Bath, Bradford, Campbell-Savona, Canisteo-Greenwood, Corning-Painted Post, Elmira Heights, Horseheads, Odessa-Montour, Spencer-Van Etten, Watkins Glen and Waverly. Source: https://www.gstboces.org/stemacademy/

Sarah Vakkas

Assistant Superintendent

Sarah Vakkas is a compassionate pioneer of secondary education and workforce development. She has lead the way of direction on implementing P-TECH at Greater Southern Tier STEM Academy Sarah is currently the Assistant Superintendent for Instruction at the Greater Southern Tier BOCES. She works with 21 school districts and three BOCES campuses to support instructional opportunities for over 30,000 students in the region. Sarah also currently co-chairs Social Emotional Learning Statewide, providing professional learning to support all New York State districts for the past three years. Sarah also has been an educator for the past 20 years with previous positions such as School Counselor, Department Coordinator, Director of Special Education, and Director of Instruction.

How did you go about planning and implementing the P-TECH model?
I started in my current role in July (2015), and we received approval for the grant in October. We had 11 months to build the program for students to attend in September 2016. To begin, we broke off into five different subcommittees to get all the pieces of the program designed. These were industry engagement, curriculum and design, logistics and sustainability, recruitment and admissions, and public relations and marketing. To this day, we continue to meet with some of the subcommittees. Between the principal and I, we chaired these committees. Our committees executed the visioning of what this program was going to be from an industry perspective, to the curriculum, to the classroom, and then to recruitment and admissions. All while publicizing the program and developing a budget that would sustain the program and support our district partners.

Additionally, it was important to hire the right people. The principal was first and then finding teachers with dual certifications so that they could teach multiple areas was our goal. Luckily there were so many people who believed in P-TECH and we found internal teachers to join our team with experience in STEM engineering principles.

What were some challenges in implementing the P-TECH school model?

We realized quickly that parent buy in was crucial. We learned that it was important for us to engage students and parents earlier in the process. We found that we needed a way to remind students and parents about the why of P-TECH. Specifically, why they chose this opportunity in eighth-grade. Students had to rise to the challenges presented to them while in P-TECH and we found several students not wanting to stick it out when they hit a roadblock or academics became hard. We needed the parents behind us to inspire the students to continue this journey with us. To do this, we created opportunities where parents were brought into our P-TECH family and reminded of the vision behind the program. We knew that we had to infuse reminders of the vision of the program throughout our student events and within the Parent Teacher Association (PTA)

What are you most proud of in this work with the P-TECH program?
When I see our students performing at such a high professional standard, there is nothing better than that. To know that these experiences they've been given at P-TECH have contributed to positive professional abilities in interacting with both their peers and adults, making them more employable. I'm just so proud! These students are becoming the professionals in our communities to contribute to our region in the future.

P-TECH in 3 words:

Reinventing secondary education

School Data And Results

Reporting Population

	Start Year	Total
Cohort 1	2016	29
Cohort 2	2017	36
Cohort 3	2018	36
Cohort 4	2019	35
Cohort 5	2020	34
	Grand Total	**170**

Demographics and Background

For this case study project, we focused on observing the progress of all cohorts of students entering chapter 1 (ninth-grade) between Fall 2016 to Fall 2021. The first P-TECH cohort included 29 students, and following cohort enrollments have gradually increased over the years with new recruiting efforts over time. Matching the surrounding student population, most students are White (93%), and over half the students are first in their family to attend college. Additionally, almost half (47%) of the student's identity is female.

Eighth Grade Math Scores by Cohort

	Cohort 1		Cohort 2		Cohort 3		Cohort 4		Cohort 5		Total
	n	%	n	%	n	%	n	%	n	%	Average
Total	29	100%	36	100%	36	100%	35	100%	34	100%	
Gender											
Female	12	41%	14	39%	18	50%	20	57%	16	47%	47%
Male	17	59%	22	61%	18	50%	15	43%	18	53%	53%
Race											
Black or African American	3	10%	1	3%	2	6%	2	6%	2	6%	6%
White	26	90%	35	97%	33	92%	33	94%	32	94%	93%
Latinx or Hispanic	—	—	—	—	1	3%	—	—	—	—	3%
First-Generation Status											
No	21	72%	13	36%	9	25%	16	46%	14	41%	44%
Yes	8	28%	23	64%	27	75%	19	54%	20	59%	56%

Eight-Grade State Exam Levels

In New York State, public school students take a standardized exam in the eight-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 open to 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.

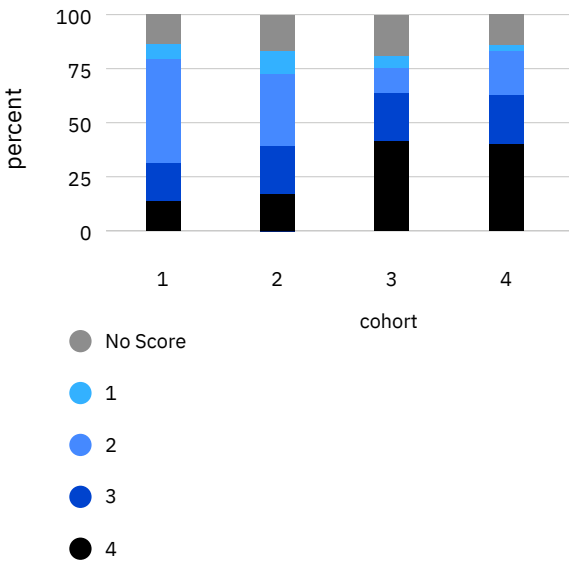
For the GSTSA P-TECH student population, in the earlier cohorts, more students on the eighth-grade math exam entered in as levels 1 and 2 compared to later cohorts where there is an increase in more students starting in levels 3 and 4. This change can be due to differences in recruiting tactics. Given the college pathway options, it is possible that GSTSA naturally started to attract more students who did well in math and were interested in STEM.

Eighth Grade Math Scores by Cohort

Math Scores	Cohort 1		Cohort 2		Cohort 3		Cohort 4	
	n	%	n	%	n	%	n	%
No Score	4	14%	6	17%	7	19%	5	14%
1	2	7%	4	11%	2	6%	1	3%
2	14	48%	12	33%	4	11%	7	20%
3	5	17%	8	22%	8	22%	8	23%
4	4	14%	6	17%	15	42%	14	40%
Total	**29**	**100%**	**36**	**100%**	**36**	**100%**	**35**	**100%**

Note: No scores were available for Cohort 5.

Eighth Grade Math Scores

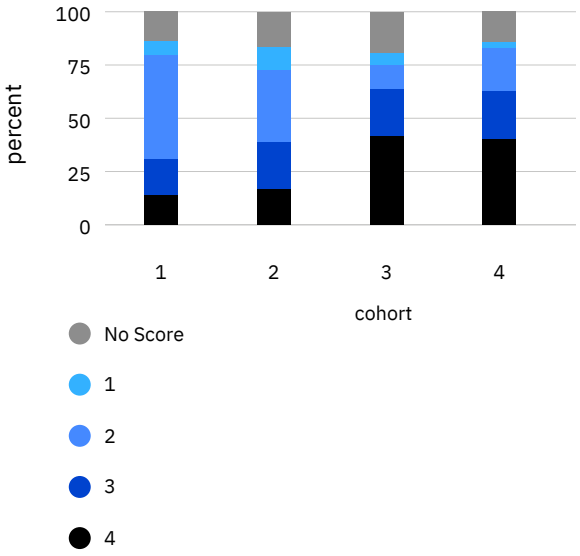


Eighth Grade ELA Scores by Cohort

ELA Scores	Cohort 1		Cohort 2		Cohort 3		Cohort 4	
	n	%	n	%	n	%	n	%
No Score	5	17%	5	14%	9	25%	6	17%
1	2	7%	4	11%	—	—	1	3%
2	10	34%	13	36%	10	28%	7	20%
3	10	34%	10	28%	14	39%	10	29%
4	2	7%	4	11%	3	8%	11	31%
Total	**29**	**100%**	**36**	**100%**	**36**	**100%**	**35**	**100%**

Note: No scores were available for Cohort 5.

Eighth Grade ELA Scores



Meet some of the current students, alumni and educators of the GSTSA P-TECH Program.
Meet Nicholas Wood – one the students from cohort 1 who gives a first glimpse of what success post the P-TECH program can look like for GSTSA students.

Meet two current students in the program – Mackenzie Cannon and Ethan Cleary. Both are driven to achieve their career goals and making the most of their time in the program.

And lastly meet an administrator, Robert Sherburne, and educator, Melissa Woodward, you both have tremendous pride in their students and the program.

Nicholas Wood

P-TECH Alumnus

Nicholas is a recent P-TECH graduate from Horseheads, NY. Before learning about the school, he knew he wanted to be an engineer but did not know how to move towards that goal. Nicholas learned about the P-TECH program when he was in middle school. In 2015, the school was just an idea – there was no staff hired yet, and he showed a video of another P-TECH school. Seeing a clear path to his engineering goal, Nicholas applied, interviewed, and got into the program. In the time spent at the school, Nicholas participated in student council, toured facilities, and completed a workplace challenge to help solve a real workplace problem. Nicholas graduated within four years with his high school diploma and associate's degree in mechanical technology (CAD design).

After graduation, the goal was to go straight into starting his career for local industry, but the global pandemic of COVID-19 halted that plan. Taking some time to shift gears on his goals and reflect on what he wanted to do, Nicholas applied and then was accepted into the Electrical and Computer Engineering Technology program at the New York Institute of Technology. He plans to complete his bachelor's degree and find the right future career opportunity for him.

What challenges did you face participating in this program?
The main challenge for me was finishing in four years. The main guidance counselor at the time, she wasn't budging on my goal, she said that I couldn't do it because I hadn't taken geometry in 8th grade... So she said it was too difficult for me and wouldn't let me try. She left, and the new person who came in said yes, you can do it, but it is going to be difficult... She gave me the opportunity, and then I took 8 classes at once and I didn't have a day off for the entire year, but I finished early.

What are you most proud of in your time in the P-TECH program?
I think finishing my degree in 4 years is up there because I was told that I couldn't do it. By a lot of people, even my peers said I wouldn't be able to because all the classes I had to take, so that was a big moment. I also talked to a lot of industry partners and I felt really proud of that because they talked to me like I have been there for a while. When I did my interview with Corning Inc., I felt like I am 17 going to be 18, and I am applying to work at this Fortune 500 company, and they wanted me here. They wanted to hire me. They sent an email to somebody else saying they wanted to interview me, and I felt really good about that. It was awesome to have people and companies in the area, people I hadn't even met, hear about me want to interview me... All these top people wanted to hire me, and I was like, 'Wow! I am a child still; I am not even 18 yet and these adults want me in their company.'

P-TECH in 3 words:

Future
Change
Redefining

Mackenzie Cannon

Current Student

Mackenzie Cannon is a driven student in her third year at Greater Southern Tier STEM Academy. When not at school, she is following her passion of working with animals on her grandparents' dairy farm in Odessa, NY. Mackenzie is working towards her future of becoming a veterinarian pursuing her AAS degree in Environmental Science. Her dream school is to go to Cornell University to continue her veterinary education.

What does being a P-TECH student mean to you?
I feel like it's challenging but it's worth it because you're accomplishing two things at once being that you're accomplishing your high school and getting an associate degree at the same time.

Can you tell me about a workplace learning experience you have had in the program?
The school offers opportunities, but I really have been setting up my own. I did a job shadowing at a veterinary clinic just earlier this week. I went into a vet clinic and I got to sit in on a couple of surgeries on these animals and just see what the clinic was like. And I actually just recently set up a summer job there. I'll be working at this over the summer and getting some experience on being a veterinarian. You get a lot of experience at different clinics just knowing what it's like. That's why I kind of reached out and was trying to get these experiences.

P-TECH in 3 words:

Worth the challenge

Ethan Cleary

Current Student

Ethan Cleary is a passionate student with a curious mind fascinated by advances in technology, especially electronic devices. His favorite hobby includes participating primarily in programming on a local FTC robotics team. He hopes to take the skills he is developing in the P-TECH program on his journey to further his higher education and ultimately be employed as a robotics engineer. His ultimate dream is to work on space related projects in the aerospace industry, such as to developing parts of rover or life support systems.

What are some challenges you have faced and how have you overcome then (or currently working through them)?
So, I'd say one of the biggest challenges for someone coming into P-TECH, this includes myself as well, is just the amount of teamwork that you're going to be doing, at least in my program specifically is a lot more than you could ever hope to do in a traditional school setting. And so, it does seem kind of daunting at first.

And if you don't already have like good social skills and are able to present well, coming into this school you'll find it to be a little bit challenging. But our classes are set up in a way that you keep building on those skills throughout your time. So, that was a bit of a challenge in the beginning of my time but have gotten way better.

At first, you're just sort of like standing there with your paper to your face reading off lines. And now I feel super comfortable pretty much in every topic – not just reading off your paper but knowing your content as you're presenting it. Even presenting to business partners. Presenting to adults was always terrifying but now it's a lot, lot better.

Do you feel like what you are learning now is preparing you for your future goals? How so?
100 percent! The college experience right now as a whole – getting used to the hours and taking classes, the self-responsibility of everything – all of this is super important for me as time moves on.

I plan on graduating from P-TECH in the four years. I technically have two more years left after a couple of months now. Afterwards, I plan on applying to colleges for a four-year engineering program. That's going to be probably electrical or mechatronics.

After I get like a bachelor's degree education, then I'm face with the decision do I keep going with my momentum and grab a Master's while I'm like in the education mindset or do I take a break and work for a few years and then work myself up to a Master's degree.

So, I know what my end goal is going to be. I'm just not entirely sure how I'm going to get there.

P-TECH in 3 words:

Life changing opportunity

Robert Sherburne

Director of Career and Technical Education, Alternative Education and P-TECH

Robert brings his experience and expertise as a life-long educator to his as the new Director of Career and Technical Education. Formerly, Robert was the Principal for Greater Southern Tier Academy for four years of the P-TECH program. Every day, as a principal, was a new challenge by taking a hands-on approach to his work connecting with staff, and motivating students. In the dynamic atmosphere of the school, he is trying new things and being innovative every day, from trying out different teaching practices, working with industry partners, and adapting to remote learning needs for students. Roberts takes pride in the family atmosphere at the school.

How has the program impacted your day-to-day role compared to being at a traditional high school?
I am in between both campuses as Principal. I get to be involved with all the staff, the students. I like to motivate and challenge the students as they participate in this program. Even with the staff, because we are such an innovative and unique school, I like to be present.

My day includes trying to be at two places at one time, which is always fun but ensuring our vision and mission are happening every day.

What are you most proud of in your work in this P-TECH program?
Oh, there is a lot! I am proud of having our first program completers last year, and these students did it happened during a pandemic. We created a cool video for them, but we also made signs for their yard and visited everyone's house, which was only seven, so not as many as other cohorts that graduated. We got on our school bus, blasted music, and really celebrated them. Their reactions as we were on their front lawn, dancing around and playing music for their success, really showed appreciation for their last years of work, and for us to try new things felt worth it.

P-TECH in 3 words:

Innovative
inspiring
dynamic

Melissa Woodward

School Counselor

Melissa is a passionate school counselor at Greater Southern Tier STEM Academy who is into her third year in experiencing the P-TECH School Model. Unlike her past role as a counselor in more traditional high schools, Melissa gets to be involved in more scheduling and planning student's complex schedules between high school and college to make the program work. She takes a student-centered differentiated approach to make sure each students' needs are addressed and they are getting the most out of the program. This involves her being in constant communication with the deans and department chairs at Corning Community College.

What are some challenges you have faced with the program and how did you overcome them?
It hard to think of one big challenge. I would say the day-to-day has its challenges. It is a matter of tackling those small challenges and growing from them. Our program is new and we are still learning every year, so we a used to trying things out, seeing what happens and learning from them.

What are you most proud of in your work in this P-TECH program?
I am proud of the opportunity that our program provides these students. They get a fully financed college experience while in high school that includes a laptop, books, supplies, and other fees. I am proud to see the students come in and persevere in the program. When I see the student no giving up and follow through with the program, that feels good.

P-TECH in 3 words:

Challenging
opportunity
innovative

Academic Results

Enrollment and Attrition Patterns
The P-TECH model is a school-within-a-school model, which allows for smaller cohorts of students. At GSTSA, cohorts are between 30 - 40 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. About 79% of students in Cohort 1, who started the program in 2016, were retained at the four-year mark of the program[3]. There was a significant drop-in retention rate in the fifth year, with less than half of students (41%) retained. For cohort 2, there appears to be a similar trend of losing students by the fourth year of the program, with a retention rate of 64%.

These dips in retention coincide with the start of the global pandemic at the mid to end AY 2019-2020 and AY 2020-2021. Students discharged between their fourth and sixth year in the programs are typically students who either go off to the military or choose to go back to their home district to graduate high school with their peers. Overall, the trend does show over time with cohorts that students are staying on to the program.

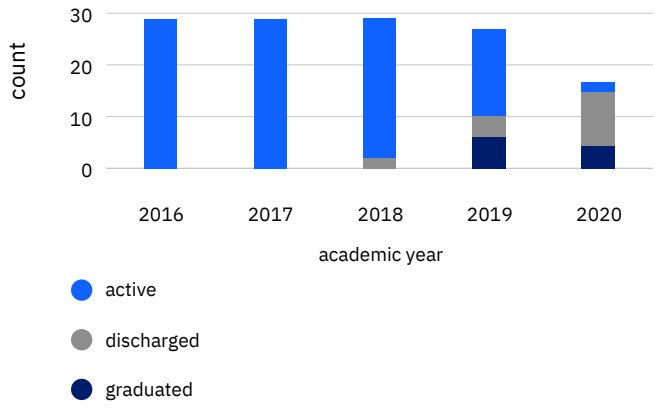
High School and College Academics
In the GSTSA P-TECH program, students often start taking their first academic college course in their second year. Students transition to splitting their time between the high school and college campus in their third year, taking between 15 to upwards of 30 credits. 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 GPA above 80 and a college GPA of around 2.8[4].

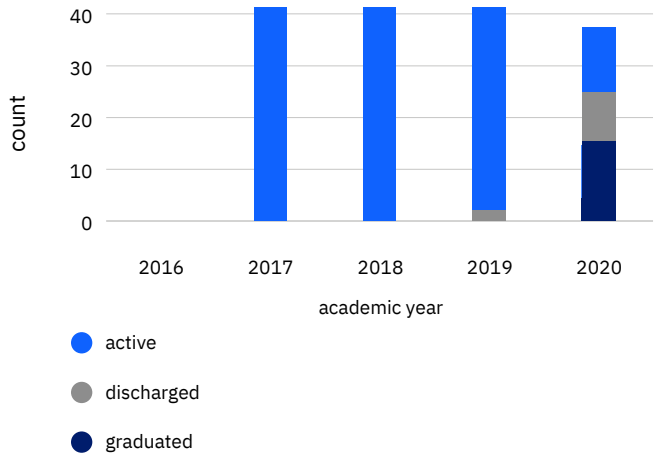
[3] Retention rate is the proportion of students that remained active orgraduated over the total cohort count of students that entered in the ninth-grade.

[4] Median high school and college GPAs are provided for a more accurate representation of grades since the data is heavily skewed.

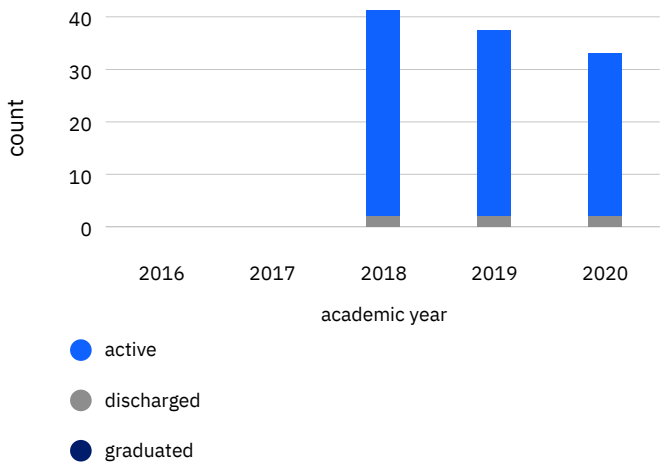
Cohort 1 Persistence and Attrition



Cohort 2 Persistence and Attrition



Cohort 3 Persistence and Attrition



Note: Cohorts 4 and 5 are younger cohorts with just a year or two of information. A vast majority of the students are still actively enrolled.

Median High School and College GPA by Cohort

	High School Grade	College GPA
Cohort 1	83	2.87
Cohort 2	81	2.87
Cohort 3	85	2.64
Cohort 4	88	2.97
Cohort 5	83	—

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, ten students (34% of Cohort 1) graduated high school with a high school diploma and AAS degree between four and five years. This is an excellent achievement, considering the program starting from scratch and 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 45 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, 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[5].

Median High School and College GPA by Cohort

Total Credits Earned	Cohort 1		Cohort 2		Cohort 3		Cohort 4	
	n	%	n	%	n	%	n	%
None	3	10%	2	6%	6	17%	10	29%
1 - 15	1	3%	5	14%	3	8%	25	71%
16 - 30	6	21%	5	14%	8	22%	—	—
31 - 45	3	10%	2	6%	19	53%	—	—
46 - 59	1	3%	6	17%	—	—	—	—
60+	15	52%	16	44%	—	—	—	—
Total	**29**	**100%**	**36**	**100%**	**36**	**100%**	**35**	**100%**

Note: Cohort 5 are excluded since students have yet to take any college courses because they are in Chapter 1 (9th grade) at the time of this report.

From that first cohort, GSTSA learned what works for their students and community and now. For the second cohort, despite a pandemic, 16 students (44% of Cohort 2) graduated with both their high school and AA degree – increasing the degree earning rate by 5% within one year. Additionally, of the entire population that graduated, about 60% are female. This provides potential evidence that the program is steadily decreasing the gaps of females earning degrees in STEM.

It is expected that there will be a steady increase over time of students earning degrees while in high school as efforts to provide even more support for students improve.

[5] 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

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 what IBM calls a "new collar" career and a jump start to their working adult lives.

For this P-TECH Case Study, we interviewed nine 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.

Figuring out what works
Multiple people spoke about the "growing pains" of implementing the school model. Since P-TECH highly relies on partnerships to support underserved students, it takes time to figure out what works for everyone. The K-12 education system has one way of operating, and the high education system has another– in part due to the populations and student development.

One of the major components that most models need to figure out is how to interweave the needs of providing support where the students are developmentally with the rigors and processes of going to college with other traditional college students. Participants mentioned the struggle to get the students ready for the college expectations and work with professors to make their pedagogy more accessible without undermining the delivery of the lessons. Others also mentioned the early struggles of finding the "right people" for the job – teaching or mentoring for a career. A few staff changes were made for students for the first cohort of students, which made for a disjointed education in some subjects. To learn more, meet Christine Sharkey, the President of Community Engagement at Corning Incorporated who reflects on the early days of the P-TECH model implementation.

Today there is a sense of cohesion and flow with the partnership all because of the commitment of the community college partners in having stakeholder meetings with the school partner and industry partners. To learn more, meet Deborah Beall, the Associate Dean of Professional Studies at SUNY Corning Community College who reflects on the P-TECH program's impact on the college community.

Change in teaching strategies One of the many things that makes the P-TECH model unique as an education model and initiative is that high school education is primarily project-based learning. Students take a direct hands-on approach to their education rather than simply lecturing and repeating back information they memorized for an exam. To learn more, meet Emily Melenbacher, a social studies educator reflects on her role in the model and expressed how much she has learned and added to her professional development through the experience of being in the P-TECH program.

COVID-19 Transition
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[6].

For GSTSA, the way the P-TECH model was implemented seemed to allow for a more seamless transition to remote learning and fewer opportunities for growing disparities. Before the pandemic, students and teachers were already working on an online platform called Schoology, where all lessons and materials were assessable. All students had access to technology, such as a laptop, for their students. Students were used to a form of hybrid or remote learning because that is how the school functioned. Additionally, partners did well in adapting to remote education and working with providing virtual classes and work-based learning opportunities when possible.

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

Christine Sharkey

President, Community Engagement
at Corning Incorporated

Christine Sharkey is a big promoter and cheerleader of the P-TECH model. After meeting with then-Education Commissioner John King in 2011 and learning about P-TECH, she organized the first group from her region to visit the Brooklyn P-TECH, the first school to adopt the P-TECH model. After a few years of planning, negotiations, and logistics, the school launched with Corning Incorporated and other industry partners committed to the program. As the President of Community Engagement at Corning, Christine continues her involvement with the school to ensure workplace readiness for graduates.

How did you envision the program would develop? Any challenges along the way?
When we went to Brooklyn, we got a glimpse of what a day looks like without seeing the behind the scenes. So certainly we thought it was all rainbows and unicorns, but in reality, running a successful P-TECH program is much more challenging. When you are taking kids who are first in their family to go to college or ones who don't have a strong family support system at home, that brings a whole set of challenges that we were not fully prepared for. Sometimes lack of stability at home caused students to relocate outside our P-TECH geography. Or in those early years, students didn't understand what they were signing up for. We hate to lose kids from the program, but we did, in fact, have some move on.In many ways, in the P-TECH environment, there is nowhere to hide, and some students blossom in that environment while others, quite frankly, do not.

Because by definition you are taking students who are facing unique circumstances, you have to be prepared to be very flexible and responsive to those needs. It was all new, and you're laying the next set of rails as the train is moving full speed down the tracks! I am incredibly proud of the job the teachers, administrators and partners have done at our P-TECH to do just that - both at the high school level and at the college level as our local community college really embraced this model and these kids.

What advice would you give another industry partner who is hoping to play a role in a new P-TECH school?
I think you have to carve out the niche that is right for you. We have some industry partners who may work with just one or two students – providing them opportunities on every school break and summer. For others, it may be sending employees into the classroom for career panels, resume and interview skills training, or how to manage your time and priorities. We've had several invite students on factory tours. With a number of small and large manufacturers in our region, finding good people is always a challenge. Giving these students a firsthand view of a manufacturing floor with high tech CAD, clean rooms, controls and robotics can plant important seeds of interest and change long-held misperceptions. Industry partners see P-TECH not just as preparing workforce ready graduates but also a way to keep young people in our area.

Additionally, there are a lot of logistics that needed to be figured out. When it comes time for students to start taking college courses, they need to split their time between the high school and college campus. GSTSA is in Horseheads, NY, about 18 miles (30 mins by car) away from Corning Community College (CCC). Starting out in the model, it was a task to figure out transportation and scheduling. The distance between schools also added to the difficulty in creating a unified school experience. Current and alumni mentioned "the shock" when it came time to start taking college courses. They may have been technically academically prepared to take the classes but felt a little underprepared for the college environment and expectations. Seeing these stressors firsthand, especially with the first cohort, GSTSA made it a point to provide more structure and support in the student's development to be prepared and know what to expect when they start taking college courses.

P-TECH in 3 words:

Workforce life readiness

Deborah Beall

Associate Dean, Professional Studies at SUNY Corning Community College

Deborah is a compassionate and dynamic educator who has been a part of Greater Southern Tier's P-TECH program since the inception of the idea. She has played multiple roles in the P-TECH program from being a teacher and advocate to administration. As the Associate Dean in Professional Studies at SUNY Corning Community College, Deborah has been on the transition team – of staff and faculty from both the high school and college – to ensure a seamless transition for students from their high school to college curriculum coursework. Additionally, she is responsible for the Community and Public Health Education pathway within the P-TECH program at Greater Southern Tier. She takes pride in helping students from all backgrounds be successful and providing them with a jump start to their career and lives.

How has this partnership been beneficial, if at all, to the college community?
Well, in our community, it's astonishing, especially in STEM fields, how many jobs go unfilled. And for a town that has a Fortune 500 STEM employer, Corning Incorporated, to reach out to us and say, "I can't fill these jobs. I need your graduates yesterday," to have a STEM pipeline is huge. So we are starting that and beginning to see the graduates start to fill those jobs, which in turn has increased, I can speak for my program, the Community and Public Health Education, a large number of those students are the STEM Academy students. I mean that's huge!

The most exciting thing I saw year 2 of the STEM Academy and year 1 of the Community and Public Health Education program, we had our health education grand opening highlighting Henrietta Lack's story,... where her biological cells were pivotal to understanding so much in medical research. But she died without knowing that her cells were being studied and her family never benefitted from that. I mean, there are so many dimensions we can jump into from that: diversity issues, community health, so much more...So, we asked the 9th grade English teacher if she could incorporate that book into her curriculum, which allowed the students to really get excited about it and they worked with our theater, nursing, and community public health education students, to envision a way to bring that story to life as part of our grand opening at the health education center. I mean it was so exciting to see. They actually got to meet members of her family, which is huge. And that was year one! That kind of synergistic collaboration has really made the enrollment triple in that program with most of them being these STEM Academy students. At a time in a pandemic when we're going to need those graduates more than ever to manage health impact.

What advice would you give to a new college community partner thinking about partaking in a new P-TECH partnership?
The transition team has been pivotal, and you must have that group. And I would say really be part of it from the beginning. You know get right in there from the beginning. Don't take a hands-off approach. I think the most dangerous pitfall is "us versus them." To do it right, it must be a true collaboration. So, having key members representing both.

P-TECH in 3 words:

Innovative
Challenging
Rewarding/
Risky

Emily Mehlenbacher

Social Studies Instructor

Emily is a passionate and dedicated educator who was born to be a teacher, with what she jokingly calls her "teachery voice." She has over ten years of teaching experience and is in her fourth year teaching at Greater Southern Tier. She is currently teaching 9th and 10th-grade global history geography and 11th grade US history and government. She also teaches college-level government to the 10th grade and provides academic support to the 3rd – 5th-year students at the college level as the Student Council Advisor. Additionally, Emily supports an active Parent Teacher Organization at the high school.

How has this role with the P-TECH program met your expectations (if at all)?
I work a lot harder now than I did before, but I do so much better work than I did before... Before I was a social worker, surrogate nurse, school mom working with kids that were really struggling in every sense of the word, but I didn't have a lot of the "teacher hat" role. There weren't extensive papers to grade or how to do extra credit questions or things like that... I didn't foresee the big change in workload. I take home papers and grade them nightly. It is definitely a full-time commitment to stay on top of everything here.

I thought I had my pedagogy really hammered out and when I came here, not that I still don't use those things that I learned throughout the first portions of my career, I just added so much more to them in ways that I never expected. I learned that I need to stop teaching for learning to happen, which was a really powerful realization. And really hard in the beginning to step back and give them the reigns and watch them go, but again so powerful for the outcomes.

What are some challenges you faced and overcame in time in the P-TECH program?
I think the biggest challenge was letting go of the reigns a little bit. Not being so much in charge of the learning process. It really is an entire shift in mindset especially for teachers. Teachers usually have the type of personality where they are extremely organized and micromanaged, that's just a character trait I guess, and this flips that on its side where you can't do that anymore.

Aside from that, we have had challenges trying to figure out how this model works in our rural area. Transportation and campus location has been an issue. We have two separate campuses now, but we have a fantastic community college that partners with us. It has been a challenge maintaining a unified school environment with two buildings...And we have had a lot of challenges in learning how to deal with professors at the college level with different expectations. Our students are used to having things being laid out for them with lots of supports...different course structures and breakdowns and [the students] really struggled with that in the beginning.

What else do you think people should know about the P-TECH program (that you haven't said already)?
I think it is important to know that this is a new program, which I think it is scary for some people to think. It new– but it's such a good new in such a good way. This model of learning just makes sense. It just works. I have so many parents and people come through back in the olden days when we had open houses and look at our model of teaching and say "Gosh, if I could have learned this way when I was a kid, I would have done so many different things. My life would have been so different. I would have actually enjoyed coming to school. And that is a pretty powerful model I think to have. Our bus drivers say at the end of the day – we have 13 different bus drivers in our circle – and all the kids come skipping out the door. And they're like, "This is the happiest little school we have ever seen and no kid comes out of that door without a giant smile on their face. [They] talk about physics the whole way home." It just...it just works. I just want the world to know it works. I want to see regular high schools incorporate more of what we do.

P-TECH in 3 words:

Innovative
collaborative
inspiring

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 Great Southern Tier STEM Academy 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.

These early results show GSTSA is achieving the mission of the P-TECH model of providing students with the opportunity to experience high quality education while gaining some workplace learning experience. Students are excelling through school, meeting college readiness benchmarks and earning college credits.

In these first few years, there were some valuable feedback and lessons learned:

1. It is important to find the right people to hire for P-TECH. The program needs dedicated leaders who believe in the mission.
2. They best ways to reach the students’ needs is to differentiate instruction and college pathways so students can be successful in the program.
3. Invest in some time to develop strategies for keeping students past the four-year mark.

We hope the results and lessons learned from data and anecdotes provide an example of the power of the P-TECH model and inspire to create a program in your local region.