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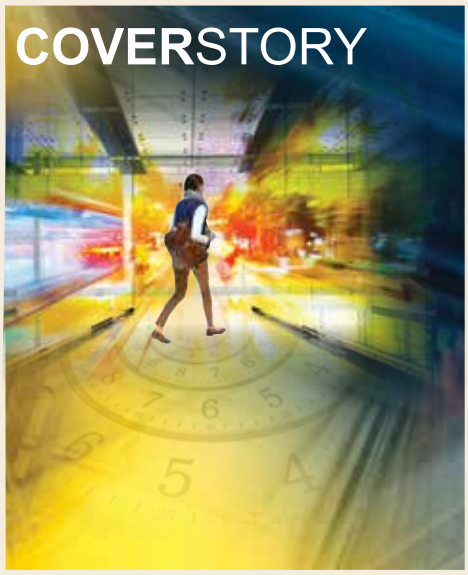
Contents

Project-based | 5
Learning: Transforming
the "Standard"
Classroom Experience
by Kim M. Smithgall



P-TECH: | 9
A Pathway to Student Success
by Pat Fontana

COLUMNS

Publisher's Page | 1

MaryEllen Elia | 3
New York State
Commissioner of Education

FYI | 14

Trade Talk | 42

P-TECH Programs Give Students | 19
a Head Start in College,
Career Readiness
by Karin Davenport

Middle School Career | 23
and Technical Education:
A New Model to Promote
Student Success
by Dawn Mastroianni

CTE Programs: | 27
Making a Difference
by Richard Jones

Early College Career | 31
Academy
by Kim Wegner

Negativity Will Prevail... | 33
Unless We Intervene
by Paul Fanuele

Sponsor Spotlight | 37
Closing the Experience
Gap to Solve the Math Crisis
by Cali Wright and Brian LeTendre

Vanguard Practices from practitioners

WINTER 2019

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A message from

Dr. Regina K. Huffman

SAANYS President 2018-2019

Growing up and going to school in the '60s, '70s and '80s seems like light years away from where we are today. Education in the 20th century provided most students with three general pathways that would lead them to lives of productivity and, by societal standards, destinations of success. College or some form of higher education, which often positioned students for professional careers, was the first chosen pathway, while others obtained vocational training where they developed a skill. Many of these students went on to launch successful companies, which supports the final pathway, entrepreneurship. Many creative and innovative students chose the road of business. Regardless of the pathway, each journey remains valuable and continues to positively impact society today.

As the 20th century was coming to a close, in 1989-90, Sir Tim Berners-Lee invented the World Wide Web, which gave birth to a promising global society and opened doors to infinite possibilities. The internet has undoubtedly revolutionized how the world communicates, collaborates, and handles daily activities and business. From an educational perspective, a paradox between traditional education and preparing students for the future was being formed.

Over roughly the last three decades, and since the inception of the World Wide Web, an obvious gap has developed between the skills students are learning and the skills they will need for future success. Kristina Johnson and Jennifer Ryan Crozier stated in the July 2018 issue of *Forbes* magazine that "tens of thousands of well-paying jobs remain unfilled due to lack of qualified applicants." It is even more astounding to note that according to the World Economic Forum, "65 percent of children entering primary school today will be employed in jobs that do not exist yet." These are strong indications that schools cannot continue to do business as usual. A change has to occur NOW.

As educational leaders in 2019, it is our responsibility to create, cultivate, and promote sustaining cultures for innovators and trailblazers in our schools. The school administrators and leaders owe it to the students who are entrusted to their care to assist them in the development and enhancement of the necessary foundational skills. It is imperative that students be equipped with effective skills in the realms of communication, collaboration, and complex problem solving. These transferable skills will help them to thrive regardless of the direction they choose in life. Programs and initiatives such as P-TECH, project-based learning (PBL), and innovative models for success are paving the way for the new pathways to be developed. SAANYS is an exemplary model for the effective uses of current technologies as well as designing and promoting professional learning opportunities. Our mission and culture support our membership in fulfilling the charge of moving students forward during this age of technological advances.

The teachers have the challenge of not only teaching content but also being intentional about incorporating learning opportunities for "digital citizenship" and "digital literacy." There is a misconception that because our students are living and growing up in a technological age, they are digitally literate. Brianna Crowley wrote an article in *Education Week*, encouraging leaders to ensure that teachers are innovative and helping students become strong digital citizens. Students need to learn to identify reliable resources and how to assess the risk of sharing information online. For teachers to be successful, they must be given some latitude with regard to innovation and creativity. They are the pioneers and must be supported and encouraged to utilize new and emerging technologies. This, aligned with methodology such as PBL, assists students in developing soft skills needed for lifelong success.

Administrators and school leaders are challenged with the responsibility of ensuring that teachers have the opportunity to attend appropriate ongoing professional learning. How this professional learning is performed may be novel as well. In P-TECH, students are awarded an authentic connection between high school, college, and industry. Perhaps the professional learning should take place through a partnership with a technological firm. Some teachers have gone from one classroom to another, never experiencing what the expectations are in the private sector, especially with the advancement of technology. Dr. Anne Looney from Dublin City University (DCU) spoke at the Inspirefest 2018, and talked about how their student teachers are not allowed to teach immediately after graduating from school. They have a program that partners the graduates with an industry for them to observe some of the skills their students will need in the workforce. This is done to help the future educators think outside the box and become adventurous once in the classroom. This type of experience can allow teachers to model the skills their students will need to learn and master.

Administrators also need to make sure that all stakeholders not only know what digital literacy is but what it looks like in the classroom. If the workforce is looking for students who possess complex problem-solving skills, can self-direct, and can take responsibility for their learning through independent study and collaboration, then the classroom becomes the training ground.

Are the traditional pathways still viable? Yes, to a degree. However, the administrators and teachers who serve as pioneers, innovators, and adventurers have opened the door for new and exciting pathways. For our global society to progress in the 21st century and beyond, new pathways must be developed and embraced in our schools. We must help our students obtain those transferable skills that will help them go to places where no one has dared to travel before.

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A message from

MaryEllen Elia

New York State Commissioner of Education

New York State is committed to ensuring that all students succeed and thrive in school, no matter who they are, where they live, where they go to school, or where they come from. To that end, the Board of Regents and the New York State Education Department remain committed to providing multiple pathways for students to earn a high school diploma and keep them on the path to success.

One of our original pathways is the New York State Pathways in Technology (P-TECH) Early College High School partnership initiative. The P-TECH program is a nation-leading, public-private educational partnership program that allows New York high school students the opportunity to earn credits toward an associate degree while preparing for high-skill jobs in technology, manufacturing, and healthcare-related fields.

Building on the success of the P-TECH program, over the past four years, the Board has approved a series of regulations to establish multiple, comparably rigorous assessment pathways to graduation for all students. By offering these multiple pathways, the Board recognizes the importance of engaging students in rigorous and relevant academic programs. After all, students who are engaged and interested in their studies will stay in school and graduate. It's just the right thing to do for the children of New York State.

In March 2018, the Department approved five assessments that may serve as the Language Other Than English (LOTE) pathway option for graduation. Under the LOTE pathway assessment option, students must take and pass four required Regents exams or Department-approved alternative assessments and a comparably rigorous assessment for the fifth required exam to graduate. The approved assessments are currently offered in Chinese, French, Italian, and Spanish.

In June 2016, the Board of Regents approved rules that allow certain students with disabilities to meet the academic requirements to earn a local diploma without passing every Regents exam that is otherwise required for graduation. Most students with disabilities can meet the state's learning standards for graduation; it is our responsibility to be sure that we provide them with every opportunity to demonstrate their ability.

And at its December 2017 meeting, the Board expanded the superintendent determination safety net for students with disabilities. The amended regulation now permits students with disabilities who have passed their Regents-level courses, but are unable to earn a minimum score of 55 on the ELA or math Regents exam, to seek a superintendent determination by completing the requirements of the CDOS Commencement Credential.

Last year, the Department implemented a new system to collect and report on the data regarding the number of students who earn a diploma through one of the new multiple pathways to graduation. We are pleased to see that this year, school districts reported that more than 11,200 students earned a diploma through one of the new pathways. This is a 13 percent increase over last year.

According to our recently announced 2018 graduation rates, the most popular pathway was the STEM Science pathway with 40 percent of these 11,200 students, followed by the STEM Math pathway with 19 percent, and the CTE with 15 percent. Fourteen percent of pathway graduates were reported as earning the CDOS pathway diploma, while 7 percent and 3 percent were reported as earning the Humanities Alternative and Arts pathways respectively.

These numbers are what we expected. Most students still graduate through the traditional Humanities pathway while a small number of students earn their diploma through specialized content areas. We anticipate that as school districts work to implement our ESSA equity agenda, and additional cohorts of students have the opportunity beginning in ninth grade to pursue these pathways, we will continue to see a growth in use of the pathways.

We will not stop there. In our quest to ensure equity across the state, we will look to identify where we need to increase opportunities to support successful students. Part of this effort will be to explore which schools and districts offer opportunities for multiple graduation pathways, participation in the My Brother's Keeper programs, access to high-level coursework, early college high school programs, and P-TECH programs.

Each of these initiatives can help close our achievement gaps so we would like to see where these opportunities exist and where more needs to be done to ensure all students have these opportunities.

To be clear, the multiple pathways are not about changing our graduation standards, they are about providing different avenues – equally rigorous – for students to demonstrate what they know so they can graduate with a meaningful diploma. As we all know, some students excel in areas that were not reflected in the five tests; now they have meaningful ways to demonstrate their knowledge in other areas that are still directly applicable to succeeding in life.

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> — Nancy Hennessy, MEd, past president of IDA and co-author of Module 6 of LETRS® in a letter to Kent Johnson, CEO of Highlights for Children

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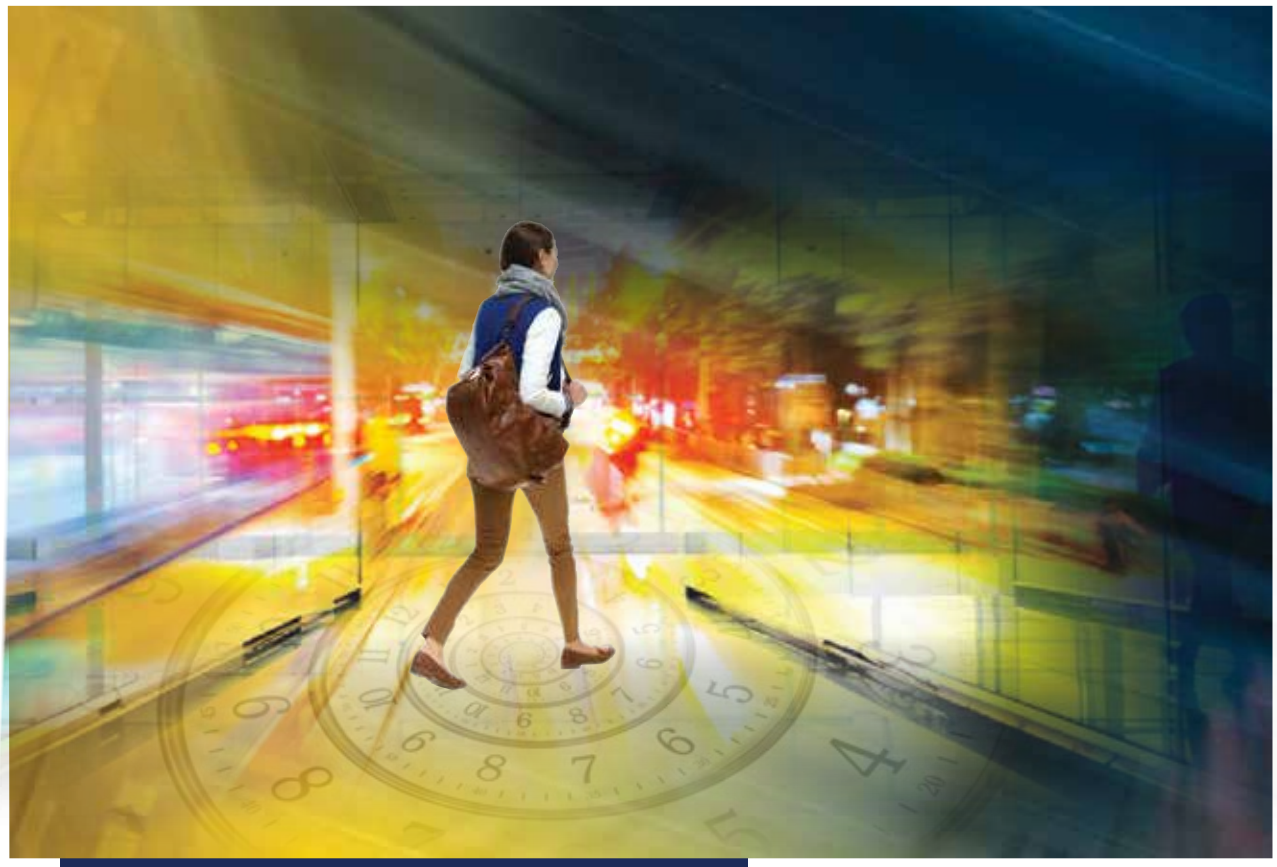

PROJECT-BASED LEARNING:

Transforming the "Standard" Classroom Experience

By Kim M. Smithgall

On a recent fall day in the Adirondacks, a New York State Department of Environmental Conservation (DEC) officer, local business owners, and a police officer listened intently as a group of activists presented a case for bringing wolves back into the Adirondack Park. Another group argued against reintroducing the animals into the park's habitat. The presenters discussed how wolves might impact the environment, as well as the human population in the area; they also detailed Yellowstone National Park's 1985 wolf reintroduction program, which they learned about by Skyping with a Yellowstone park ranger and through extended research.

The arguments were powerful, well researched, and professionally presented, and the activists were perfectly comfortable answering follow-up questions and engaging in persuasive conversations.

Lobbyists? Hired professional speakers? Nope. They were sixth-graders from Northville Central School District.

The students – from Jayme Bevington's English class – were participating in the culmination of a project-based learning (PBL) activity. These types of real-world presentations characterize the final step in many, if not all, PBL projects.

REAL-WORLD **LEARNING**

"If I was giving an explanation of project-based learning to someone not familiar with the concept, I might say it's a way of teaching where students do projects that are complex, in-depth, and take time in order to solve a real-world problem or answer some kind of interesting question," said John Larmer, editor in chief at the Buck Institute for Education, which provides PBL training for educators, instructional coaches, and school leaders.

In other words, with PBL, students are gaining knowledge and skills while they investigate, study, and respond to a problem, challenge, or open-ended question. It's an approach where students take the lead in their learning, while teachers guide them. PBL projects can last anywhere from a few days for mini-projects to several weeks or more.

For Bevington's students, the wolf theme seemed to be a natural fit for a PBL project.

"I was really looking for something to get the kids engaged and a topic that would be familiar to them. Our district is in the Adirondacks and the students were excited about the idea of studying wolves," she said. "We studied multiple perspectives – for example, how Native Americans felt about wolves and the symbolism of wolves in their culture, along with the ecosystem of the Adirondacks. We also looked at scientific data related to the Adirondacks, researched incidences of wolf attacks on humans, and examined the finances of what it would cost to bring wolves back to the Adirondacks."

Integrating multiple content areas is a common approach in PBL projects, not only allowing different academic standards to be covered, but also appealing to students' differing interests. It certainly worked out well in Northville, even with PBL being fairly new in the district. "This project really meant something to the students. They're familiar with the area and the Adirondacks and reintroducing wolves is something that could happen right in their backyards," Bevington commented. "They took ownership of the project because it was so close to home for them. They became the experts – much more so than if they researched some random topic."

INCREASED **STUDENT ENGAGEMENT**

A significant increase in student engagement seems to be the universal first answer when asking educators about the advantages of incorporating project-based learning into today's educational settings.

This has certainly been the case at Sloatsburg Elementary School, which is part of the Suffern Central School District. Stakeholders participating in strategic planning for the district indicated that they wanted students to have more authentic learning opportunities, so Sloatsburg Principal Joe Lloyd and teacher Ken Wojehowski embarked on a very interesting journey to make that happen by introducing PBL (read about their adventures in a blog post at https://bit.ly/2zAxf5C).

The two visited PBL schools and invested countless hours in professional learning. Wojehowski, who had been well known for bringing innovative activities into his classes, went from a 21-year career as a physical education teacher to the newly created position of project-based learning specialist. He worked closely with fifth-grade teacher Brad Sahlstrom on the school's first PBL project, which incorporated geometry standards and argumentative writing. Within that project, Wojehowski and Sahlstrom created a storyline that prompted students to improve the economy in the Sloatsburg community.

"The students worked in small groups and, within our storyline, were tasked by the Sloatsburg mayor to develop plans to revitalize the community," Wojehowski explained. "They had to gather statistics and discuss the kinds of businesses and jobs that might work well for the area."

At the start of the project, the class also traveled to a construction site to talk with a local developer. "He brought us around a building site, discussed the advantages of being located near a train station, and answered students' questions. The kids brought their journals and made notes. They were really excited about the experience," Wojehowski recalled, adding that other guest speakers came into Sahlstrom's class to work with students, including an architect and an engineer. "They came in at just the right time in the project for students to benefit the most."

The students built 2D and 3D models showing their revitalization plans and made presentations about the plans. The geometry came into play when students had to review blueprints with the local builder and get a building permit for their projects.

"We even disguised one of our geometry tests as a building permit test with the local building inspector," Wojehowski said. "The inspector checked all of the student work to ensure they could get a building permit. The students who didn't get the permit were told they couldn't advance in the project until they did – just like the real world."

"We're looking for those natural opportunities to bring experts in from the field and make learning come to life," Lloyd said. "It's pretty cool stuff. Imagine as a kid being able to talk to an expert in the field you're studying."

As students work through their PBL projects, they're gaining such 21st-century skills as collaboration and communication – skills that will help them be successful throughout their lives. PBL's open-ended questions also allow for multiple "right" answers, thus encouraging students to think critically and creatively. And, of course, having one or more community members assessing a final project or presentation adds to the authentic nature of the work.

LEARNING EXPEDITIONS

For schools like World of Inquiry (WOI) in the Rochester City School District, the advantages of PBL go even further. The K-12 school is using a form of project-based learning described as expeditionary learning, now referred to as EL.

"Our project-based work is not just about giving kids hands-on opportunities. Our project-based work is more hearts-on and hands-on," said World of Inquiry Principal Sheelarani Webster. "Our mode of instruction is through learning expeditions."

The expeditions are in-depth studies of a particular theme or content area; they promote self-discovery and allow students to create authentic projects, do rigorous field work, and offer service to the community. "For the elementary grades, we do two learning expeditions per year," Webster explained. "From September to January, the students work on social studies-based expeditions. In the spring, the focus is on science standards and reading and writing."

WOI teacher Lisa Zeller describes EL projects as "problem-based" in that they may be directly relevant to students' lives and, if set in the local community, can be culturally responsive to students.

Webster would likely concur, stressing that the expeditions include a focus on and commitment to social justice. "Expeditions are intended to help kids understand problems and understand inequities," she said.

As an example, Webster discussed a recent science expedition with fifth-grade students involving, coincidentally, wolves. "There's a lot of biology in the fifth-grade science curriculum and we had a teacher who was very fond of wolves and she brings that passion to work," Webster said. "The kids and the teacher were talking about wolves and thinking about wolves and they started to realize that people don't think wolves are very kind or very friendly in any way. They have a bad reputation. So, the kids began wondering why. They started to examine stories – fables and fairy tales – and they saw that wolves were always depicted as evil. Then they studied facts and realized that there's this wolf extinction that has happened. And then they looked at the wolves in terms of their true biology: what are these creatures like? How do they fit into the environment and what makes a wolf a wolf?"

The pupils moved on to study cultures that are accepting of wolves, such as Native Americans. By the end of the expedition, the students were compelled to make a change in the world. "They wanted teachers and kids and community members to think differently about wolves," Webster said. "They created written products, visuals, and display boards that encouraged people to think of wolves as friends, not foes."

The students held teaching sessions at the school and even set up a "wolf day" at Seneca Park Zoo. In effect, the students were encouraging others to think about assumptions and stereotypes. "This sparked emotions and a love for learning. It compelled the students to think about if this can happen with wolves, who else is this happening to?" Webster commented.

An expedition for eighth-graders had even more powerful results. Pupils in a science class were studying genetics and began examining this through the lens of skin. "Students started to realize that skin isn't just a genetic notion," Webster said. "It's a social notion and it's connected to race and race relations. This led to the kids thinking very deeply about why we have this racial divide when, really, the biology of everyone's skin is so similar – that much of skin color has to do with biology versus what is often deemed to be opinions about what is beautiful/not beautiful, smart/not smart, wanted/not wanted. With the expeditions, students are starting to make those bigger connections."

CREATIVE – BUT STILL STANDARDS-DRIVEN

In both EL and PBL experiences, students are making connections and learning academic content, but it's happening in a more in-depth and personally meaningful way compared to traditional, lecture-focused teaching. This is especially significant because when PBL is done correctly, it's the standards that are driving the projects, even if those standards aren't always front and center for students to recognize.

At Saratoga Springs High School, social studies teacher Leanne Donelan and English teacher Jim Flanders team up to teach what they call a humanities class to ninth- and tenth-grade students. "We have a block schedule at our school, so we have students for two blocks in a row – double the amount of time you have with students in a traditional classroom," Flanders said.

The longer time period is particularly helpful, as the two teachers team up and frequently use PBL activities. Saratoga Springs Central School District has nearly a decade of experience incorporating PBL into classes; the current PBL program, called Saratoga Pathways Academy (the SPA program) at the high school is available to students in grades 9-12.

And while it's exciting to talk

THE GOLD STANDARD FOR PBL

The Buck Institute for Education, which works with schools to implement project-based learning (PBL), has created what it calls the gold standard for PBL. This includes a set of essential project design elements that should be part of every high-quality PBL project. They are:

- A challenging problem or question.
- Sustained inquiry.
- Authenticity.
- Student voice and choice.
- Reflection.
- Critique and revision.
- Public product.

about the actual projects that students are doing, Donelan and Flanders stress that the content and learning standards must be the starting point. This focus also helps alleviate some of the wide-ranging misconceptions about PBL – namely that it's all fluff and fun or, on the other end of the spectrum, that it's too challenging to implement because it's just one more thing for educators to do in school days already packed with mandated activities.

"We start with the global history because the content we have to cover is pretty structured in terms of what we have to teach and because global has a Regents exam. Jim and I pair up and align our curriculum; for example, he will choose books that go along with what we're learning about," Donelan explained. "So, for instance, we're about to start studying World War II and students will be reading *Night* by Elie Wiesel, which is about the Holocaust. Once we have the content, then we develop a driving question or an essential question that students can answer through their projects and, in turn, understand why we're learning this content. The projects for our units aren't supplementary activities to what we do in the classroom; they frame our entire unit."

SHIFTING **CULTURES** AND **MINDSET**

Donelan and Flanders – and their counterparts throughout the state – can cite countless ways PBL positively impacts students, from creating a sense of community within a classroom, bringing shy students out of their shells, and developing 21st-century skills to connect students to their larger communities outside of classroom walls. And yes, it starts with the learning standards. But other things must also be in place to ensure PBL is successful.

Most importantly, there has to be a willingness to do long-term planning before implementation and to provide support for the process. Buy-in is needed, as well.

> "...when PBL is done correctly, it's the standards that are driving the projects, even if those standards aren't always front and center for students to recognize."

"You need one solid year of planning before you initiate anything – and that's minimal. And I would say to build a partnership with an entity that knows how to do this work," Webster advised, also saying that introducing PBL or EL has to be a team process. "You have to have a culture where you're building this type of thinking and learning with people. You can't stand up at a faculty meeting and say we're going to become an EL or we're going to become a project-based learning school and now go out and do it. It won't work until you've built buy-in. You could say it's almost like an expedition within an expedition."

Flanders would agree. "Having the support of administrators is key," he said. "And you also need other staff on board – like your school counselors, and even custodians have to be part of the process because you're doing things differently in a PBL classroom."

Educators also point out the need for a power shift of sorts in the classroom. While teachers may invest a lot of up-front planning time to integrate academic content and projects, they must then relinquish some control and allow students to take charge of their learning.

"In some projects, you won't be teaching students as much as you'll be guiding them. And there may not always be one right answer. That can be a hard thing for students to accept, too," Flanders said.

The mindset shift for teachers also involves understanding that when students take the time to work collaboratively and thoughtfully on projects rather than rushing to rote memorization, they retain the knowledge and skills they've gained far beyond the time they'll be tested on it. Donelan laughed as she recalled one of her PBL lightbulb moments. "I had this perception that if I said the words aloud – whatever we were learning – the kids knew it. So, I said the words and that meant I've covered the content and I could move on. But that didn't mean the students actually understood the content," she mused. "I really had to get rid of that mindset and understand, 'Hey, when I learn something new, I learn it because I'm engaged with it in some way.'"

And that type of engagement is the foundation for PBL and for teaching and learning at the highest levels. That's what will make a difference in students' lives.

"It's the antithesis of opening up a textbook and saying, 'Okay, turn to chapter two,'" Lloyd commented.

Bevington agreed: "After all, we want our students to be creators…not just containers of random knowledge, right?"

RESOURCES

- Buck Institute for Education (its new brand name is PBLWorks): https://www.pblworks.org/
- Advanced Reasoning in Education: http://www.advancedreasoningined.com/index.html
- Expeditionary Learning (now known as EL): https://eleducation.org/
- Hacking Project Based Learning by Ross Cooper and Erin Murphy

KIM M. SMITHGALL is an award-winning communications specialist and freelance writer, designer, and photographer.

P-TECH:

A Pathway to Student Success

By Pat Fontana

High school students often think – and worry – about the future. What college will they attend? Which career path will they pursue? At the same time, businesspeople in the community are anticipating labor needs and most likely looking at the local educational system for the next generation of employees. Not all high school students can afford college or have inclinations toward completing a four-year degree. Not all businesses need the skill sets developed at a traditional high school. Enter a new pathway. Pathways in Technology, better known as P-TECH, is an opportunity for high school students to explore options for their education and their career in a supportive, unique environment.

While the structure and focus of P-TECH differ slightly from one school to another, the premise is the same: preparing students in a practical manner for careers that match the employment needs of community businesses, giving everyone a better chance for success.

IBM, the New York City Department of Education, and The City University of New York designed and launched the first P-TECH school in Brooklyn, New York, in September 2011. P-TECH has now grown to more than 100 schools across eight U.S. states (New York, Illinois, Connecticut, Maryland, Colorado, Rhode Island, Texas, and Louisiana), plus Australia, Morocco, and Taiwan, with further replication under way. More than 500 large and small companies are partnering with schools across a wide range of sectors, including health, IT, advanced manufacturing, and energy technology.

Here in New York, P-TECH is an innovative alternative to traditional high school that allows entering ninth-graders to work on their Regents high school diploma, an associate degree, and practical job skills in a span of four to six years. The education, just as in traditional public schools, is free for the student. Students set their own pathways based on their career interests and the amount of dedication and work they decide to apply to their educational choice.

Michael Dardaris, SAANYS 2018 HS Principal of the Year and "chief learning officer" for Hamilton-Fulton-Montgomery (HFM) P-TECH Early College High School in Johnstown describes a P-TECH education as "very individual, depending on speed and gaps in education." HFM P-TECH graduated its first class in May 2018, with 12 students earning their high school diplomas and a degree from Fulton-Montgomery Community College, after just four years at HFM P-TECH. Another four students graduated in December 2018 and a class of 27 is scheduled to graduate in May 2019.

The focus at HFM P-TECH is on advanced manufacturing and information technology. Other P-TECH schools in the state have slightly different focuses and structures, but all are committed to providing an alternative pathway for students for whom a traditional high school may not be the right fit.

Educators know that every student learns differently, at a different pace. The P-TECH alternative gives students the opportunity to choose their pace in a less traditionally structured environment with a more flexible schedule. Each day may be different for a P-TECH student, especially as they progress through the upper classes and work with mentors from local businesses.

Each school's educators are the key to making the P-TECH structure work. Principal Dardaris says that the success of the P-TECH program cannot happen without his "unsung heroes," the teachers who work so diligently with these students to help them succeed in their studies and their work. He adds that his staff and teachers "have a true interest in the students personally. They support them and care about them – even when they're holding them to their highest standards."

P IS ALSO FOR PARTNERSHIPS

These programs also cannot be successful without business partners. P-TECHs are private-public partnerships that engage members of the local business community in the education process. Students are paired with mentors, have the opportunity to job shadow, and can take advantage of paid internships, all because of the support of local companies. Industry partners also host field trips and work with the schools to ensure that students are informed of their options and their opportunities.

Mary Beth Fierro, principal at Oswego Middle School in the Oswego City School District, and SAANYS 2017 Middle School Principal of the Year, says that business leaders recognize that not all high school students are four-year college bound. When her local P-TECH representatives, housed in the Center for Instruction, Technology & Innovation (CiTi), come to speak to her eighth-graders, they are often accompanied by industry partners. In fact, she notes that one of those business representatives who speaks at every P-TECH presentation had kids who went through the Oswego City School District themselves.

Makensie Bullinger, principal at the West Campus of the Capital Region Pathways in Technology Early College High School (Center for Advanced Technology at Mohonasen), adds that her school works with the Capital Region Chamber "to develop 21st century skill sets that business partners feel they need." The school's business partners contribute to "developing curriculum so that when students go into the workforce, they'll be viable candidates."

Kurt Redman, principal at Capital Region P-TECH East Campus (Watervliet Jr./Sr. High School), says that local business partners "are really excited about it and happy to see soft skills more emphasized in the program and students being specifically prepared for these jobs." Although it is still a bit early to get a sense of outcomes for his students, there is "definitely a lot of support."

THE NUMBERS

Students and parents alike are enticed to the P-TECH option in part because of the free tuition at the participating community college. P-TECH students can come from low-income or disadvantaged backgrounds and the lure of a free associate degree, along with free job training, is strong. According to the College Board, on average, tuition and fees at public two-year colleges run about $3,347 a year. In addition, many P-TECH students are offered paid internships by local business partners.

Recruitment efforts begin with educating eighth-graders as to their options. Students must go through an application process for admission to a P-TECH school, much like the application process for college acceptance. They submit an online application, including letters of recommendation, and then sit for interviews or "conversations," as Oswego County P-TECH Principal Brian Heffron describes them. Students are competing for a spot among the

"P-TECH students can come from low-income or disadvantaged backgrounds and the lure of a free associate degree, along with free job training, is strong."

slots allotted for each P-TECH school each year.

Student numbers vary from school to school. Principal Heffron has 124 students currently enrolled in the Oswego County P-TECH program. Housed in the CiTi BOCES facility in Mexico, New York, Heffron says he has the "rare opportunity to recruit students from the nine different school districts that make up Oswego County." As a benefit of the arrangement, students can "build connections with kids who may live on the opposite end of the county."

Entering P-TECH classes are referred to as "cohorts." The Oswego County P-TECH program was launched in 2016 and is now recruiting for cohort four. In Johnstown, the HFM P-TECH graduated its fourth cohort in 2018. HFM P-TECH is housed as a standalone school and now has just over 200 students. Principal Dardaris says that 13 different school districts flow into the school, but that they are still "small and we're so connected that we can keep in touch with our kids." He adds that graduates often stop by for unofficial mentoring and to act as mentors themselves to the younger students.

Mary Cahill, Capital Region BOCES director of educational support services, says the grant that funds their P-TECH program was awarded in 2018 so their students are at the beginning of their new pathway. The Capital Region West Campus in Schenectady currently has 19 students and the East Campus in Watervliet currently has 11. These students have their own classrooms within the traditional high school and teachers come to them throughout the day.

Cahill emphasizes that the innovative P-TECH structure entices "students who wouldn't even be thinking about going to college." She, along with West Campus Principal Bullinger and East Campus Principal Redman, looks forward to seeing their student numbers increase as more eighth-graders learn about the opportunities available through this pathway to college and to a career.

TRANSITION FROM MIDDLE SCHOOL

P-TECH is a four- to six-year program that depends on the progression of high school classes as well as college classes, so students must enter as ninth-graders. P-TECH principals often work with middle school principals to recruit and educate eighth-graders on their high school pathway options. Oswego Principal Heffron does just that with Oswego Middle School Principal Fierro. The middle school has a "large population of students who are interested in pursuing a career in manufacturing," Fierro says.

As Oswego Middle School is a Title I school (as is Oswego High School), many of its seventh- and eighth-graders and their parents are excited about the possibility of the students earning a free associate degree, gaining valuable workplace skills, and potentially even working as paid interns while in high school. Fierro sees P-TECH as the "perfect alternative for that group of students."

P-TECH recruiters typically work with middle school staff and teachers to prepare students for the transition to the high school program. Presentations and educational sessions involve the eighth-graders, their parents, and their teachers, to ensure that everyone involved is thoroughly informed. Principal Heffron stresses that "one of the biggest things that we try to do is give the student as much information as possible about who we are and the pathway this program leads to."

In addition, the rising ninth- graders are required to attend a summer "bridge" program that helps them with the transition. The summer program is typically one to two weeks long and is designed to not only assess the students but to give them a better idea of what they will do as a P-TECH student. Many summer bridge programs offer a tour of the P-TECH campus as well as the local community college campus.

THE **STUDENT PERSPECTIVE**

Ryan Kamanu graduated from HFM P-TECH Early College High School with a college degree in May 2018 and a high school diploma in June 2018. Kamanu earned an Associate of Applied Science degree in health studies from Fulton- Montgomery Community College and has already put his education to good use in the Army National Guard, where he trained as a combat medic and became a nationally certified EMT. He is now working toward his personal training certificate and will eventually attend a four-year college, where he will major in exercise science or physical therapy. A four-year degree will also help in his plans to move up from the enlisted ranks to become an officer with the Guard.

Kamanu was in the group of 12 students in the first cohort at HFM P-TECH, who all graduated after four years in the program. He entered P-TECH when it was a very new concept and, although he says he "immediately jumped at the opportunity," he did feel a bit like a guinea pig. In fact, he admitted, he was ready to quit after just a few months in P-TECH.

In eighth grade, Kamanu was attracted to P-TECH by the recruiting presentation that offered a free college education and a free laptop. Even at that young age, he knew he wanted to do something in the medical field. His ultimate goal was to take his medical skills to Kenya, from which his father hailed, and he may still do that. No one in his family had completed college and he was ready for the new adventure.

Today Kamanu says P-TECH is the "single best program out there. It will give you the head start to advance, the tools to succeed," including professionalism, presentation, and cooperation skills. He "loved project-based learning and the professionalism that we were taught." He adds that he had "an awesome mentor," the

administrator of a nursing home in Johnstown and he appreciated the fact that P-TECH allowed him to participate in clubs and sports in his home school.

The ability to stay connected to the student's home school can be one of the keys to that student's success within the P-TECH structure. P-TECH principals say that some students are concerned about being able to participate in sports and clubs and are reassured they are able to do so by connecting with their home schools. Even given that option, however, Principal Fierro says that one of her students decided P-TECH was not for him because he wanted to be more active in sports and music and could not do so while still focusing on his P-TECH program.

A very small percentage of all P-TECH students do decide the loose schedules and rigid attendance requirements inherent in the program are not right for them. When that happens, the P-TECH principal and counselors consult with the students and their parents and those students return to their home schools and a traditional high school education, often ahead of their peers academically. Principal Dardaris notes that "90 percent of students stay in the program."

Dardaris explains that a good candidate for the innovative P-TECH school might not necessarily be one with academic strength but that "it's really about grit." Students who are "willing to dust themselves off after falling down … are being successful." Principal Heffron says he is "really looking to see if there is a passion for what the program is designed to be doing." Each P-TECH is focused on a specific area, which typically matches the advanced manufacturing or computer technology needs of area employers, so students should be inclined toward careers in those fields.

In the P-TECH structure, students are expected to show up and participate. Attendance requirements are strict, in part to match the potential attendance needs of an employer. Designed to reflect the practical expectations of their local business partners, P-TECH expectations are that students will actively engage in collaborative, hands-on work and team projects. In return, students are offered individualized learning that enables them to develop the professional leadership skills, practical job skills, and real-world experience that will lead them on a pathway to their success.

Students who are "willing to dust themselves off after falling down… are being successful."

PAT FONTANA is a business writer and communications trainer, with a background in corporate training and community college instruction. Her business, WordsWorking, focuses on improving workplace communications, concentrating on the fundamentals of human interactions.

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FYI

OPINIONS

"In fact, tens of thousands of well-paying jobs remain unfilled today for lack of qualified applicants. While on the other side of the scale, high school dropouts – and even high school graduates without the right academic and workplace training – have little to look forward to beyond joining the ranks of the working poor."

Kristina Johnson, SUNY Chancellor and Jennifer Ryan Crozier, president of the IBM Foundation, Forbes Magazine, on the promise of P-Tech, July 2018.

TRENDING IN EDUCATION

YouTube...

P-TECH: How High Schoolers Are Redefining Their Future

Scan or visit: https://bit.ly/2SW5dwv

Edutopia...

Five Keys to Rigorous Project-Based Learning

Scan or visit: http://bit.ly/2tvJc9t

PBLworks...

Watch Gold Standard PBL in Action

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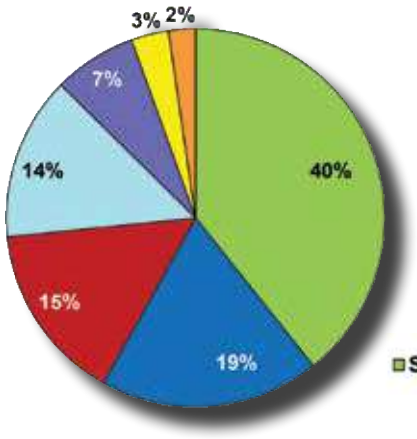


New Graduation Pathways

2014 Cohort | June Graduates after 4 years Statewide

Districts reported 11,200 students earned a diploma through a new pathway; increase of 13 percent over last year

STEM Science STEM Math CTE CDOS Humanities Alternative Arts LOTE

EVOLUTION *of the* Diploma Requirements

Pre-1996

Credits Required – 18
Assessments –
- Regents Exams for Regents diploma
- Regents Competency Tests for local diploma

1996-1999

Phase in of Regents Exams for all:
- 55 for local diploma
- 65 for Regents diploma

Students with a disability may continue to access Regents Competency Tests if they fail a Regents Examination

2004-2008

- Regents Appeal 62-64 adopted in 2005
- Phase out of 55 low pass for general education students

2011

Regents Competency Test phase out for students with a disability

2012

Compensatory Safety Net option becomes available for students with a disability

2013

Adopted for students with a disability:
- CDOS Credential
- Skills and Achievement Credential

Eliminated:
- IEP Diploma

2015

- 4+1 Pathways to a diploma approved
- Expansion of Safety Net Appeal 52-54 for a local diploma
- English Language Learner Appeal approved 55-59 on the ELA Regents

2016

- CDOS +1 Pathway adopted
- Expansion of Appeal 60-64
- Superintendents Determination of proficiency toward a local diploma for students with disabilities becomes effective

2018

Expansion of the Superintendent Determination to include ELA and Math

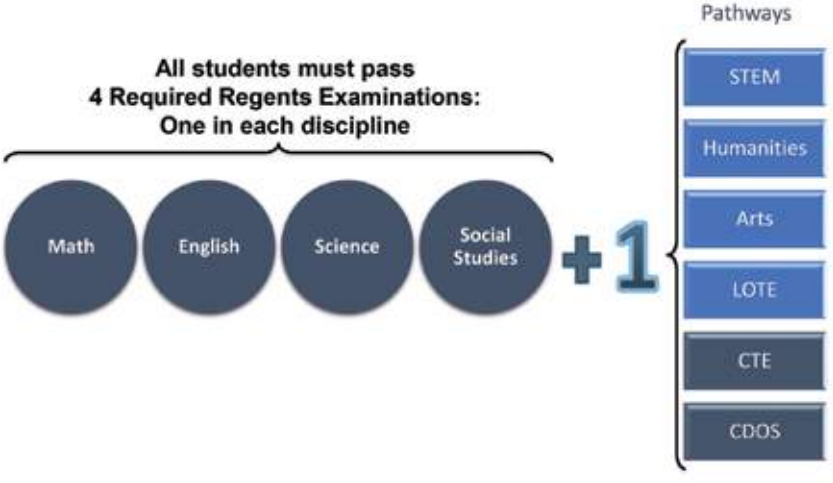
September 2019

Blue Ribbon Commission of stakeholders to be convened to review diploma requirements

2020

Present findings to the Board of Regents

4 + 1 Pathways to a Diploma



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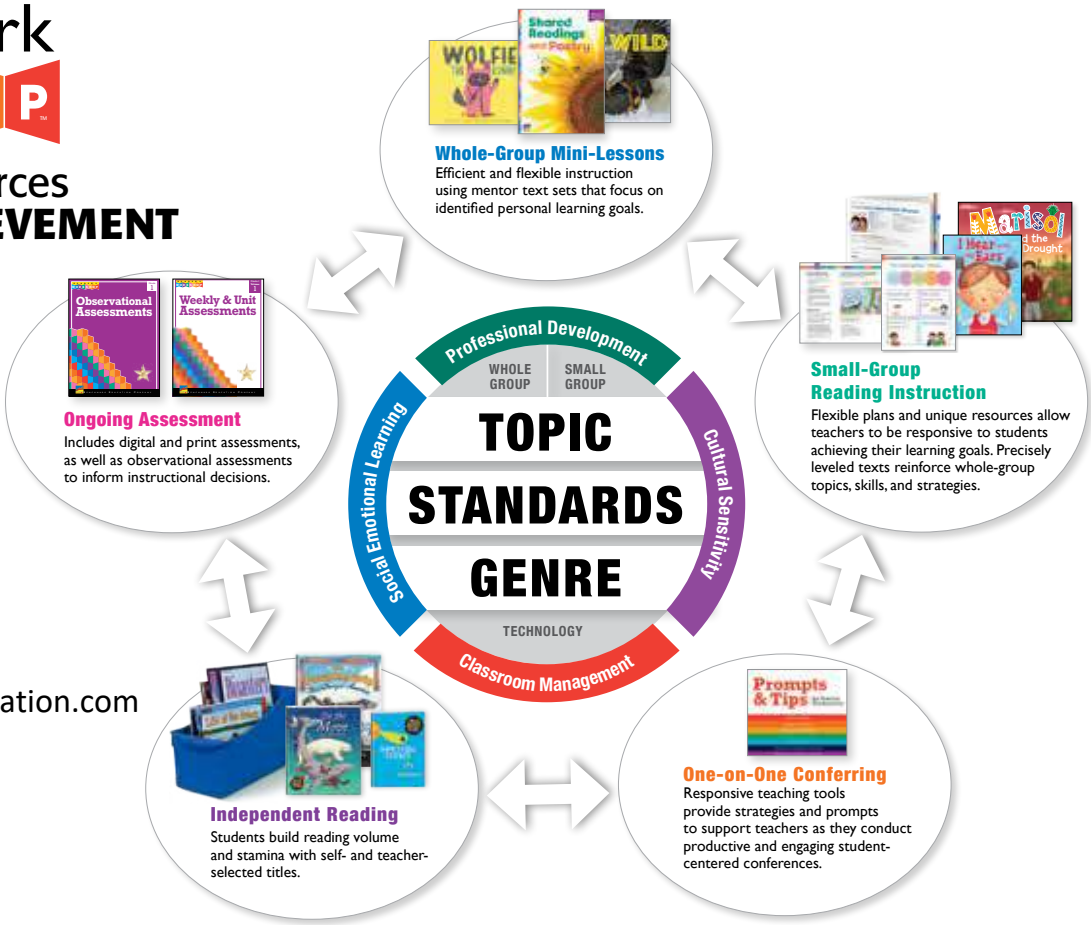

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COLLEGE & CAREER READINESS

P-TECH Programs Give Students a

Head Start in College, Career Readiness

By Karin Davenport

What is P-TECH? Pathways in Technology Early College High School (P-TECH) is a program that creates individual pathways for students to simultaneously obtain their high school diploma, earn an associate's degree, and obtain workplace learning experience. The program is designed to motivate and enable students to earn a college degree and successfully transition into the workplace, armed with the preparation and skills needed by employers.

Six P-TECH programs are currently offered in the Syracuse City School District: Electrical Technology or Mechanical Technology at ITC; Clinical Laboratory Technology (CLT) or Health Information Technology (HIT) at Henninger; and Computer Information Systems (CIS) or Remotely Piloted Aircraft Systems (RPAS) at PSLA at Fowler.

WHY CHOOSE P-TECH?

Henninger P-TECH coordinator Ella Briand said the biggest assets of the school's P-TECH programs are their partnerships with professionals and colleges, which sets the P-TECH program apart from traditional high school programs.

"Our Health P-TECH programs are unique in that they give students who successfully complete the program a choice in a wide open, lucrative career market," Ms. Briand said. "The jobs in health information management/ technology and clinical laboratory technology are both essential to departments in every medical facility or network. Henninger High School has state- of-the-art equipment and highly qualified teachers to prepare students for these jobs, and our medical industry partners are looking forward to hiring them."

At ITC, P-TECH students work with career coaches from local business partners on a monthly basis. They take field trips to local manufacturing facilities, and they develop college and career portfolios, which are updated as they progress through the program. Over the summer, freshmen attend a summer bridge program that prepares students for the upcoming year, while sophomores have the opportunity to engage in a workplace challenge, helping local manufacturing company Darco solve a real-life problem, in conjunction with Syracuse University engineering students.

PSLA at Fowler P-TECH coordinator Matt Caron said P-TECH students in his school's programs have an advantage because of their exposure to real-world technology developments.

"We have a drone corridor in the Rome area – one of just five to seven nationwide," Mr. Caron explained. "That makes our program more credible. The state is putting so much money into that field – which makes a real connection between our students' classroom learning, their career coaching, and the jobs that are out there. Employers need people who really understand and are familiar with the emerging technologies, and our P-TECH students in RPAS and CIS are trained as local experts. Our school is entirely a CTE school, and P-TECH is a fast track to helping our students figure out what they want to do. These students get exposure to real industry professionals, rather than textbook information and teachers. They really get an honest look at what a career could look like."

WHO SHOULD ENROLL IN P-TECH?

According to current P-TECH students, if you have an interest in getting a head start in college or a particular career, and if you are hardworking, determined, and responsible, a P-TECH program may be the right path for you!

"I have always wanted to be in the medical field, but I didn't know how or where to get started," Rosel Ali Alfahdawe, a junior Clinical Laboratory Technology student at Henninger, said. "I enrolled in CLT because it was a valuable opportunity, and I'm so glad I'm a CLT student. The program has built my confidence to challenge myself and to do my best to be successful. I have gained great study skills, relationships with people in the community, and the experience of college – while in high school!"

Rosel said the program has allowed her to step into the medical field and feel as if she is first in line for a career. "I could be a licensed 19-year-old with a career in a lab," she said.

Dominique Freelon, a freshman in the PSLA at Fowler Computer Information Systems program, said she is using the program to help her see if a potential career in technology could be in her future.

"I like technology and I look forward to learning about coding. I might like to work in technology one day, and the P-TECH program allows me to get to meet real professionals in the field and learn how they think and how they work," she said.

For Garnet Grimm, a senior in the Electrical Engineering program at ITC, his program of study served as a way to help give him the background knowledge he will need to study computer engineering in college.

"I got interested in programming in middle school, which is why I decided to enter the P-TECH program," he said. "Through the program, I've gained a deeper understanding of software. I've even designed and printed parts with a 3D printer, which has helped me learn more on the mechanical engineering side as well. I plan to study computer engineering in college, so these electrical skills I've learned will help set me ahead."

Garnet noted that even for students who don't plan to spend additional time attending college before seeking employment, P-TECH provides the opportunity to earn a college degree and build a professional network before jumping into the business world.

HOW WILL P-TECH SET YOU AHEAD?

All of the P-TECH programs in the Syracuse City School District are intended to help give students a head start when it comes to college and career readiness.

"One of the major selling points of the CLT P-TECH program is that our students have their associate's degree paid for 100 percent," Henninger Clinical Laboratory Technology instructor Janet Clark said. "Our students will have a job waiting for them anywhere in CNY – or anywhere in the country – because these jobs are in high demand! Clinical laboratory technicians are a major player on health-care teams, as 70 percent of every diagnosis is based on some type of lab test. This means that one of our graduates may potentially play a major part in the treatment and diagnosis of patients in our community."

While SCSD P-TECH programs all boast valuable business partnerships, each also offers students unique advantages.

"No matter what job our students end up pursuing, technology will be a

part of it," PSLA at Fowler Computer Information Systems instructor Theresa Voltz said. "There's no losing if you're in a P-TECH program… you'll automatically have an advantage. Students in the CIS program will get a taste of everything – coding, networking, drones, cybersecurity, computer forensics… they'll be exposed to a little bit of everything!"

ITC P-TECH teacher Chris Nolan said students' exposure to business ideas and techniques is one of the biggest assets of the ITC P-TECH programs.

"We are one of only two school districts in the area that have an actual machining shop," he explained. "We have lathe and mill machines – they are very expensive – which allow students to learn about machining, metal work, measurements, and the fundamentals of engineering. These are the same machines that local businesses use, so the experience really sets them up for success not only in the distant future but also more immediately in terms of apprenticeship opportunities."

P-TECH instructors at ITC noted that former graduates of the program have enjoyed the opportunity to continue working with the companies they worked with in high school – even while pursuing a college degree. At least one student from the Mechanical Engineering P-TECH program interned at Dupli Graphics in high school and upon graduating from high school, accepted a full-time job!

To learn more about the P-TECH programs offered in the Syracuse City School District, visit syracusecityschools.com/CTE.

KARIN DAVENPORT is the communications specialist for the Syracuse City School District.

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Middle School Career and Technical Education: A New Model to Promote Student Success

By Dawn B. Mastroianni

Middle school: a time for students to find their niche; ignite their passions; and connect their interests to the world outside of school. New York State middle school students can benefit from a recent regulation change that allows their schools to expand and update the career and technical education (CTE) opportunities they offer. Through middle school CTE classes, students begin to identify their individual skills, abilities, and aptitudes. They begin to see how their unique combinations of skills, abilities, and aptitudes can become assets in their futures.

Students discover the relevance of the academic and technical skills they acquire in school, as they apply them to real-world situations that interest them.

In September 2017, the New York State Board of Regents adopted a permanent change to CR 100.4 as it relates to career and technical education. Career and technical education, defined in terms of a continuum, is "a kindergarten through adult program area of study that includes rigorous academic content closely aligned with career and technical subject matter, using the state learning standards of career development and occupational studies as a framework... career and technical education includes the specific disciplines of agriculture education, business and marketing education, family and consumer sciences education, health sciences [occupations] education, technical education, technology education and trade/industrial education."

New York has joined a number of states that in recent years have chosen to strengthen the middle school band of the CTE continuum. States have recognized that middle school CTE adds relevancy to students' learning experiences by exposing them to real-world options and connecting academics to career and college options. For some, CTE in middle school can also serve as a key dropout prevention strategy for students who may be disengaged or who may lack preparation necessary for the transition to high school.

The updated middle school regulation ensures that all students have 1¾ units of career and technical education coursework prior to the completion of eighth grade. The CTE coursework can begin as early as fifth grade and, as is the case for all subject areas in middle school, must be presented by an appropriately certified subject-matter expert. Teachers holding NYS teacher certification in any title in the CTE content areas (i.e., agriculture education, business and marketing education, family and consumer sciences education, health sciences [occupations] education, technical education, technology education and trade/industrial education) are potential teachers for middle school CTE under the updated regulation. New York State school districts determine how they will position the CTE instruction in the middle school schedule and who will provide the instruction in their middle schools.

Passage of the new middle school CTE regulation inspired the development of a curricular guidance framework designed to assist schools in implementing the new regulation with fidelity. The framework was developed through a yearlong endeavor led by the Career and Technical Education Technical Assistance Center of New York (CTE TAC) in collaboration with the New York State Education Department (NYSED) and the professional organizations for agriculture education, business education, family and consumer sciences education, health sciences education, technology education, and trade and technical education.

Similar to other states, New York's middle school CTE experiences are intended as introductory exploratory experiences that offer students opportunities to develop and practice skills that promote success across career fields. The goals of middle school CTE, built on the new framework, are to: connect middle-level experiences to high school opportunities; expose students to all CTE content areas; allow for flexibility in delivery by using a module format; and to foster acceleration into graduation pathways that capitalize on students' interests in CTE content.

The middle school CTE curricular guidance framework consists of 33 modules: six theme modules, which are the basis for middle school CTE; and 27 content modules, which are the vehicles for meeting the standards represented by the themes.

Theme modules recognize that today's students need to be agile learners. They require skills that will serve them regardless of the careers they might be interested in today, and regardless of the careers that might interest them tomorrow – careers that are not yet understood. The theme modules are foundational, cross-content, and standards based. They represent the basis for middle school CTE: the knowledge and skills that will benefit all students as they transition to high school, regardless of the pathway they choose. Each of the six theme modules asks a guiding question:

1. **Career and Community Opportunities –**
   What knowledge and skills are necessary to demonstrate introductory understanding of the influences that societal, economic, and technological changes have on employment and the impact that employability skills, interests, and aptitudes have on individuals' career choices and postsecondary options?
2. **Communication and Interpersonal Relationships –**
   What communication and interpersonal skills can enhance an individual's ability to develop caring, respectful, effective relationships within the home, school, community, and workplace?
3. **Financial and Consumer Literacy –**
   What knowledge and skills are necessary to demonstrate an introductory understanding of how money can be managed and how individuals can create and achieve financial goals while managing financial challenges?
4. **Health, Safety, and Wellness –**
   What knowledge and skills are needed for individuals to consistently promote and practice safe and healthy behaviors that encourage wellness in home, school, workplace, and community settings?
5. **Problem Solving and Innovation –**
   What knowledge and skills are necessary to demonstrate introductory understanding of the application of problem-solving processes and the acquisition, evaluation, and application of the products of research for informed decision making?
6. **Sustainability –**
   What knowledge and skills are necessary to evaluate the long-term effects of personal practices on the environment and to demonstrate introductory under-

standing of how to use and conserve resources to meet human needs while minimizing harm to the environment?

The theme modules were carefully designed as the unifiers for middle school CTE in New York, regardless of how middle school CTE is scheduled in a particular district and regardless of the certification held by the CTE teacher providing the instruction. Middle school students will encounter learning experiences that facilitate the intellectual flexibility that their futures will require. The acquisition of life and career abilities that promote individuals' success across career clusters is the primary purpose of New York's new middle school CTE.

The importance of the themes cannot be understated; however, the themes are esoteric without a context relatable to middle school learners. Content modules supply the context needed to bring the themes to "life." Content modules were developed for each CTE content area (i.e., as above). They are based on national standards; they connect middle school CTE to high school CTE; and, they are designed for instruction by teachers certified in titles for that CTE content area.

Career and technical education classrooms have a tradition of involving students in projects as the means of developing technical skills. The projects that characterized the CTE classrooms of the past must undergo serious transformation in order to become the project-based/problem-based learning experiences that today's students require. The vision for today's middle school CTE is students engaged in project-based/problem-based learning experiences that promote technical skills, while purposefully addressing a theme. School district leaders and teachers of middle school CTE must now answer the question, "How can we design project-based learning experiences that will help our middle school students gain foundational CTE knowledge and skills through the lens of the CTE content area(s) we have represented in our school?"

The CTE TAC is providing professional development sessions, "From Projects to Project-based Learning," for middle school CTE teachers to hone their instructional practice and to serve as models for their colleagues. A set of exemplar learning experiences that illustrate how CTE content can be utilized to help middle school learners develop the life/career abilities related to the transferable skills represented by the themes is planned for posting on the CTE TAC site by school year's end.

Working together, CTE educators can transform students' futures by providing a platform to engage them in the pursuit of lifelong transferable skills.

DAWN MASTROIANNI is a senior consultant at CTE Technical Assistance Center of New York.

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CTE Programs

Making a Difference

By Richard Jones

Highly engaged students, great learning results, and active community relationships are hallmarks of successful schools. Several career and technical education (CTE) programs that were recently recognized as models exhibit these positive school characteristics. In New York State, CTE encompasses six subject areas: agriculture, business and marketing, family and consumer sciences, health science, technology, and trade and technical.

CTE exists in many forms including required courses in middle school, three to eight credit-approved CTE programs, and high school electives. Many of the programs have existed for decades, sometimes under another name, and others are brand-new. All CTE programs are continually evolving to keep pace with new technology in the workplace and even new career areas. Pedagogically, CTE has changed as well, incorporating standards-based academic skills, requiring technical assessments, and forging articulation agreements that allow students to earn college credit for their high school CTE studies. What has not changed is that CTE offers students opportunities to engage in real-world projects, explore their talents, acquire specialized skills, and develop positive work habits.

NYS CTE MODEL PROGRAM RECOGNITION OVERVIEW

An initiative was recently established to recognize outstanding CTE programs that could serve as exemplars for other programs and schools. The Career and Technical Education Technical Assistance Center of NY (CTE TAC) administers the CTE Model Program Recognition. CTE TAC is funded through the Carl D. Perkins Career and Technical Education Improvement Act, is administered by NYSED, and offers free technical support services to schools, districts, and BOCES (http://nyctecenter.org).

CTE Model Program Recognition criteria were developed from research by the national Association for Career and Technical Education (ACTE). They include:

- curriculum alignment with state standards and employment demands
- technical instruction integrating academics
- technical assessments and an employability profile
- business and community partnerships
- post secondary articulation
- work-based learning
- facilities and equipment
- CTE student leadership organizations (CTSOs)

The review of applications includes an on-site visit by an external team and examination of student achievement data. Following are descriptions of several of the model CTE programs.

Urban Forestry and Landscape Services at Putnam-Northern Westchester BOCES offers students the opportunity to explore arboriculture, landscape design, construction management, and construction. The 250-acre BOCES campus on which students work has wetlands, open space, and old- and new-growth forests. The program has state-of-the-art equipment, including an articulated loader, sawmill, front-end loader, spray rig, excavator, and various tools needed to perform tasks at a professional level. Community partnerships allow students to attain contextualized technical knowledge and skills.

Students in the program can earn industry-recognized credentials and partake in conservation challenges where they can earn scholarships. Business and industry partnerships in the private and public sectors include Vermeer, Care of Trees, Save a Tree, Alpine Tree Care, Town of Yorktown Department of Public Works, and West-

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chester County Parks Department, among others. The program has articulation agreements with University of Massachusetts Stockbridge School of Agriculture, Paul Smith's College, and SUNY Morrisville. With respect to academic success, recently 80 percent of students passed the Regents or an approved substitution exam, 90 percent of students passed a technical assessment, and 90 percent of students received a technical endorsement on their diploma.

Pre-Engineering Academy at Kenmore-Town of Tonawanda UFSD serves 250 students. It is one of the four Ken-Ton CTE academies, along with business/finance, computers, and information technology. The Pre-Engineering Academy offers students a contemporary STEM experience where they gain exposure to engineering design, robotics, prototype development, automation, electronics, and computer science. The required Project Lead The Way (PLTW) curriculum, plus the elective courses, provides a mix of learning opportunities using modern equipment and traditional hands-on fabricating.

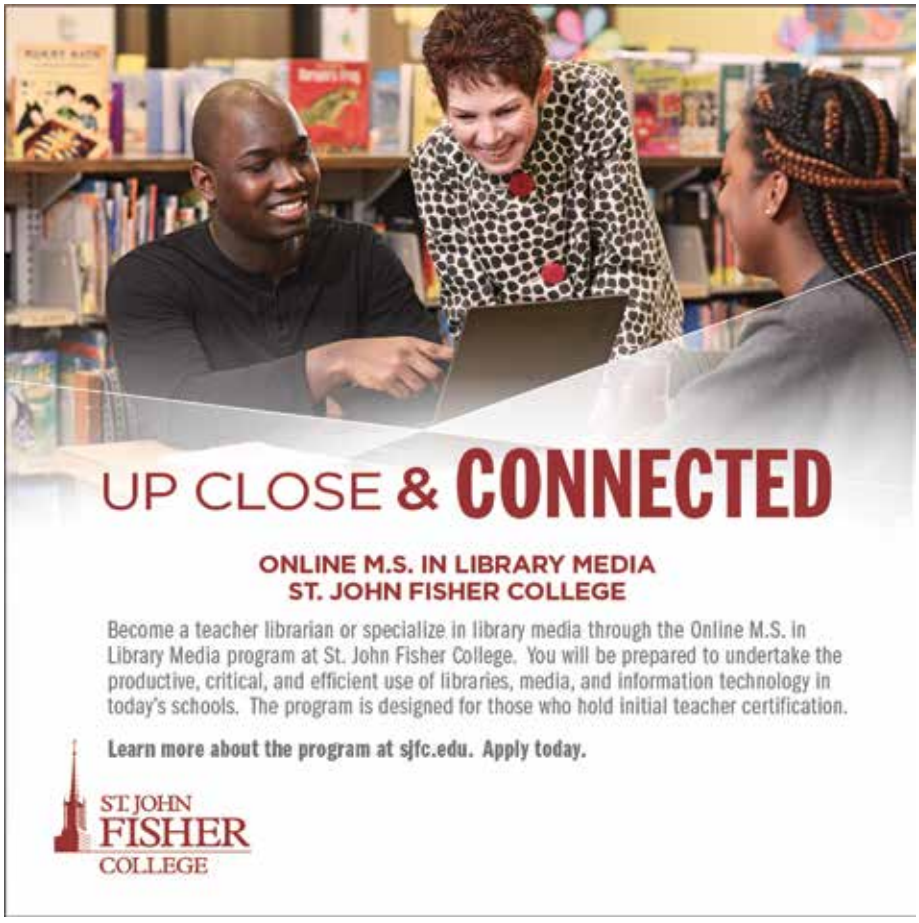
The pre-engineering students engage in a wide variety of projects within the CTE sequence including assembly-line design and fabrication, robotics and automation design, digital electronic circuit projects, 3D modeling projects, computerized numerical control (CNC) programming, and prototype fabrication and 3D printing. The students must also complete a capstone design project in which they direct all efforts from design through fabrication. In the academy, 100 percent of students passed the Regents or an approved substitution exam and all passed a technical assessment and received a technical endorsement on their diploma in 2016.

Graphic communications at Saunders Trades and Technical High School in Yonkers is a four-year program serving students in grades 9-12. Each year approximately 30 students enroll in this intensive program and graduate with a career and technical education designation on their diploma. The students engage in projects that are relevant to issues teenagers face, such as cybersafety, traffic safety, and workplace safety. Students regularly submit their projects to design contests and art exhibitions and have their work selected and showcased every year.

Graphic communications students gain specific practical and professional skills that give them an advantage when applying to college and for a job. The program incorporates as much real-world work-based learning into the curriculum as possible. One of the ongoing "live jobs" is working on the school's annual yearbook. The entire book is created in-house, with students designing the cover, laying out the pages, taking photographs with a professional DSLR camera and retouching them, and selling ads to help raise funds. Typically, 100 percent of students pass the Regents or an approved substitution exam, pass a technical assessment, and receive a technical endorsement on their diploma.

High-quality CTE programs can be an integral part of providing a school where students are engaged, successful, and ready for their future. To learn about the CTE Model Program Recognition and how outstanding CTE programs can apply, please visit the CTE TAC website (https://nyctecenter.org/planning/model-programs).

RICHARD JONES, center specialist at CTE Technical Assistance Center of New York.



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Early College Career Academy

A partnership between SUNY Adirondack & WSWHE BOCES

By Kim Wegner

A few years ago, WSWHE BOCES and our local partners realized we had a growing deficit. Our area has been fortunate enough to be called "home" by a few companies with "jobs of the future." But we realized that our local graduates were leaving high school without the skills to fill these jobs. So, driven by workforce needs and the ever extending skills gap, the Early College Career Academy (ECCA) became a reality in 2014 with vision and leadership from the Washington-Saratoga-Warren-Hamilton-Essex BOCES, SUNY Adirondack, and our 31 component school districts. ECCA is the program we designed to prepare students for the world of work.

THE PARTNERSHIP

As a BOCES, we know what we do well, but for a challenge like this, we also realized we couldn't do it alone. We convened component district leaders, our local institute for higher education, as well as industry partners from places like Globalfoundries, Irving Tissue, RASP, Espey Manufacturing, Fingerpaint Marketing, and Creatacor, to INOC Communications and Cisco. We wanted to make sure that we had students graduating who were not just academically completing high school, but who were also challenging themselves with advanced coursework and industry experience beyond what we traditionally find in a career and technical education program.

THE PROGRAM

The program targets students who are what we call "the forgotten middle." Students who are disengaged in traditional school and are looking for a more relative, hands-on, and engaging experience are successful in this model. These students have an 80 or above average, and are middle- level students who are looking for a challenge and desire hands-on learning and a diverse pathway toward high school graduation. The program's goal is to help close the skills gap; we prepare students to become competitive in the national workforce by helping them develop the skills and knowledge necessary to meet business and industry demands. Keeping this goal in mind, we built four pathways for students to choose from: electrical technology/advanced manufacturing, information technology computer networking/cybersecurity, new media, and business and entrepreneurship. We currently enroll 154 students across the four choices. The program enjoys unique support from over 40 industry and association partners providing industry challenges, mentoring, job shadowing, and internships.

During their two years in the program, students are eligible to earn up to 32 college credits toward an associate's degree while dually enrolled in high school. The program takes place on the Queensbury and Wilton Center campuses of SUNY Adirondack, where students take classes from BOCES CTE instructors and college professors using 1:1 technology in state-of-the-art industry labs.

THE CORE ELEMENTS

Foundationally, ECCA students are earning industry-recognized credentials--in the business and entrepreneurship credential. ECCA students are in a degree-aligned program, where core courses are aligned with the chosen pathway enhancing the technical education that relates to the pathway. For example, a student in the business entrepreneurship program can take business communications for their English requirement at the college and are awarded .5 unit of English 12 at their high school. We emphasize work-based learning, including guest speakers, site tours, industry challenges, Kaizen events (continuous improvement), job shadowing, and pre-employment skills. Finally, ECCA believes in and makes extensive use of technology in labs. All program elements drive our curriculum, are career focused, and implement project-based learning principles.

Through acquisition of industry credentials, a degree-aligned program, work-based learning, and exposure to state-of-the-art technology, the Early College Career Academy prepares students to apply the skills and knowledge learned in the classroom directly to career opportunities or extended higher education.

OUR SUCCESS SO FAR

The class of 2018 was the fourth class to complete the program. Fifty-five students were honored from fourteen school districts; 1,497 college credits were earned; the average college GPA for our 11th- and 12th-graders was a 2.78, and 154 industry certifications were earned.

KIM WEGNER is the lead coordinator for innovative programs at WSWHE BOCES.

Negativity Will Prevail...

Unless We Intervene

(The Cure for Entropy and Workplace Burnout)

By Paul Fanuele, EdD

Negativity seems to exist in all avenues of our lives. It is up to each of us to use our knowledge, confidence, and abilities to counteract all of the negativity and disorder that occurs in the world. Without people to restore order and add positive motion to the world, disorder and negative consequences will continue to grow and rule our society. These consequences vary, but include burnout in the workplace. If we stop to think about it, negativity seems to appear in many of our everyday activities.

Fortunately, there is science to help explain why negativity is so prevalent in our daily lives including the news reports we absorb each day and the words we choose to use when communicating with others.

SCIENCE

For all the physics enthusiasts out there, the science I am referring to is the second law of thermodynamics, also known as the law of entropy. *Merriam-Webster* defines *entropy* as "the degradation of the matter and energy in the universe to the ultimate state of inert uniformity" or, more simply, "a gradual decline into disorder." Author Steven Pinker (2018) states that by the laws of probability our system will move toward disorder or uselessness because there are so many more ways of being disorderly than of being orderly. Think about it. If you were asked to come up with ways your weekend could go wrong, you could probably think of many. Now, if I asked you to think about how it could go well, the list would probably be shorter. What about sayings that perpetuate disorder? Pinker (2018) reminds us of a few, such as "things fall apart," "rust never sleeps," and "whatever can go wrong, will go wrong." One that did not make his list is "stuff happens..." Perhaps you have heard a more colorful version of that one. The law of entropy seems to appear at any moment. If you left the milk out this morning, when you return home, it will be spoiled; if you do not weed the garden, the weeds will take over; if you never brush your teeth, say good-bye to them.

NEGATIVE NEWS AND WORD USAGE

Perpetual disorder and a focus on the negative are also verified by the news. Most of the reported stories are about things that went awry. There are more stories about deaths, robberies, controversies, and countries under attack than there are stories about newborn babies, life-saving miracles, and countries celebrating decades of peace (Pinker, 2018). If we stop to think about it, our world is getting better, but it is just not being reported in that manner. There will always be something that goes wrong each day, but there is so much more that goes well. The good news seems to get lost among the negative or trivial. However, what if news outlets reported only every 50 years? This is what researcher Johan Galtung conjectured. Would they report that one of the Kardashians got married or would they say that life expectancy has gone up and violent crime is down (Pinker, 2018)?

The use of words with a negative connotation also perpetuates disorder. Robert Schrauf and Julia Sanchez (2010) studied how well we remember words that express emotions. They studied people in their 20s and 60s in

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both Mexico City and Chicago. The results indicated that 50 percent of the words participants recalled that express emotion were negative. The remaining half were split between positive words (30 percent) and neutral words (20 percent). This is mind boggling because another study indicated that in the English language, positive-inflected words outnumber negative-inflected words (Keim, 2011). Therefore, even though there are more positive words in the English language, we are more easily remembering the negative ones. Entropy strikes again. Unless we take action and are purposeful in our word choice, the negative will prevail.

A CALL TO ACTION

It is clearly up to us to intervene. One of the best ways to intervene and counteract entropy is through acquiring knowledge and being a lifelong learner. Knowledge is power. Knowledge allows us to create new ways to help our society such as a medical breakthrough, an invention, environmentally friendly fuels, an electric car, or a new way of thinking about a problem. All of these occur because people have sought out knowledge and applied that knowledge. We need to value lifelong learning and promote it in our schools. We need to model to our students the importance of taking the time to learn and analyze something that interests us. We need to focus on the journey of learning and not on the failures that occur along the way. Find a passion and pursue it. Find a passion and create order within it. Science tells us that we can create order within an isolated system. We need to find our isolated system, our love, our passion, and focus on it. Who knows what might be accomplished if we utilize our knowledge and passions to create positive motion?

Mathematician James R. Newman believed that entropy was the constant demise of the universe and its general progression toward disorder (*Merriam-Webster*). This belief sounds pessimistic and most would agree that it is. However, just because science says we are always inching toward disorder does not mean that we cannot create order out of chaos. The only way to defeat pessimism is to be optimistic. We need to utilize our knowledge to defeat entropy. Winston Churchill said, "A pessimist sees the difficulty in every opportunity; an optimist sees the opportunity in every difficulty."

Optimism has been defined as reacting to problems with a sense of confidence and high personal ability (Seligman, 2006). We gain confidence by seeking knowledge and being lifelong learners. The more we learn, the more we will be able to remain optimistic about the future. The more we learn, the more we will be able to improve our society. The more we learn, the more we will be able to counteract entropy, but only if we intervene. If we stand back, entropy will continue to wreak havoc. Simply put, we need to be lifelong learners and intervene. When we hear one of those negative sayings like "things fall apart," we need to arm ourselves with the fact that we have the knowledge, confidence, and ability to say, "Sure, things fall apart, but I can put them back together," or better yet, "I have figured out a way to keep them from falling apart."

AVOID BURNOUT

In the education field, knowledge, confidence, and ability are especially necessary to avoid burnout. We need to be purposeful in order to counteract entropy in all areas of our lives, but especially in the workplace. We spend more time at work than at home, so its importance is obvious. However, we often neglect the balance needed in our personal and professional lives, which often leads to burnout. We continue to push ourselves both at home and work, until we become completely exhausted or at least close to it. We must guard against burning too brightly in one arena, only to become dim in the other. We must be deliberate in our actions in order to avoid burnout and other negative consequences. We need a plan to counteract the entropy in the workplace. Many plans have included surrounding ourselves with positive people, eating right, and getting proper sleep and exercise (Fanuele, 2015).

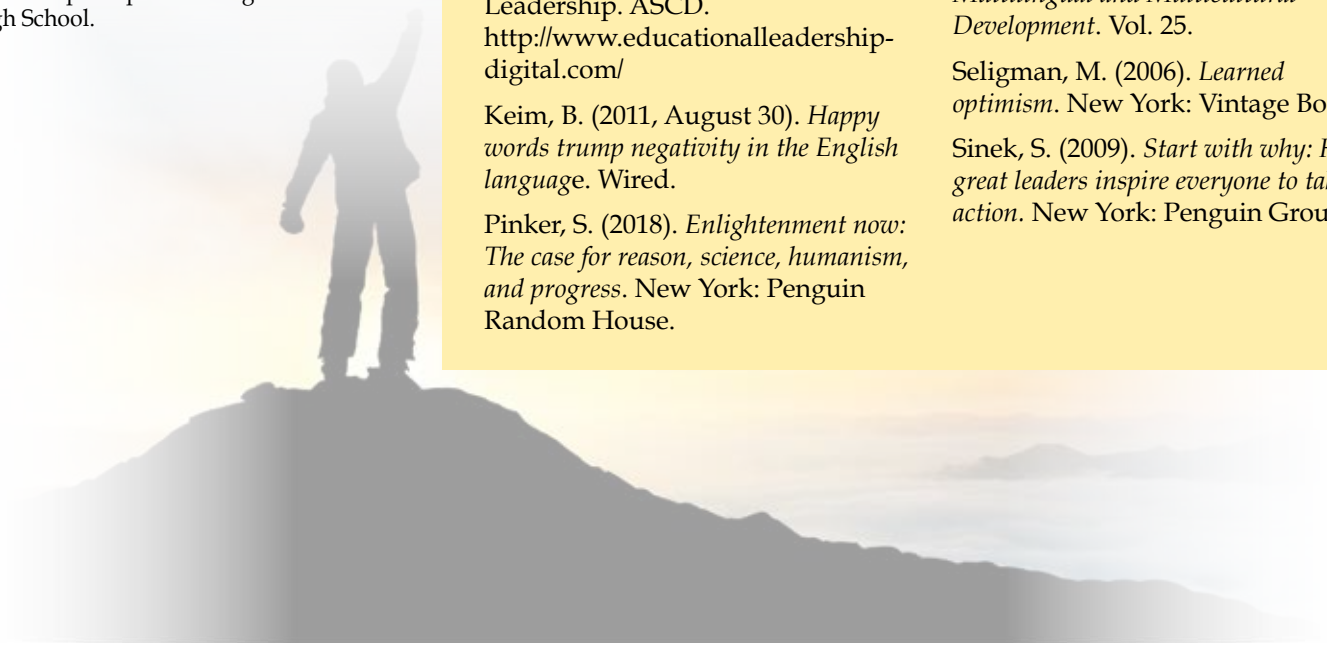
Sinek (2009) proposed we focus on our purpose, or "why." We should focus on why we do what we do and why we go to work in the morning. Our purpose should be clear to us and easily recalled. Baruti Kafele (2018) suggests as we become more seasoned in our jobs (a nice way to say "getting older)," we should find our younger "why." Our younger "why" is the purpose we had early in our career, when we transitioned from classroom teacher to school leader. Kafele (2018) stated that there was a comma after the statement, "I want to be a principal," not a period. What is after the comma is the most important part. "I want to be a principal, because…" Find your "why," or if you are a veteran, find your younger "why." Be purposeful in your actions each day to stop, or at least hinder, the effects of entropy. Create order within your sphere of influence. It will positively impact you and the community you lead.

CONCLUSION

We as leaders need to take action, be deliberate in those actions, and be a driver of positive motion in our society. If we are passengers, negativity will prevail. The second law of thermodynamics is clear; entropy will triumph unless we counteract it. We need to be purposeful in what we choose to read and watch as a news source. We need to be purposeful in the words we choose to use. We need to be purposeful in how we interact in the workplace. We need to utilize our knowledge, confidence, and abilities to drive positive motion to counteract

chaos and create order in our lives. If we do not intervene, negativity will prevail.

PAUL M. FANUELE, EdD, is the executive principal at Arlington High School.



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Closing the Experience Gap to Solve the Math Crisis

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By Cali Wright & Brian LeTendre

A deep conceptual understanding of math establishes the problem-solving foundation that all areas of STEM are built upon. However, less than half of students in the U.S. are proficient in math by fourth grade. That number drops to around one-third by eighth grade and continues to decrease through high school. Our nation is facing a math crisis. As the demand for jobs in the STEM field continues to grow, so does the challenge we are facing. Now more than ever, a solid math foundation is critical for students to succeed in school, graduate, and be prepared for a career in STEM.

A **NEUROSCIENCE-BASED** APPROACH

MIND Research Institute is a nonprofit, neuroscience social impact organization whose mission is to mathematically equip all students to solve the world's most challenging problems. MIND was founded in 1998 by three University of California researchers united behind a simple yet innovative idea: let's teach math the way children learn – visually and experientially.

Everything we do at MIND is grounded in research about how the brain learns. Neuroscience offers great insight into how people build an understanding of the world around them, from infancy all the way through adulthood. When developing a deep understanding of mathematical concepts, there are four neural subsystems that work together to enable this:

- **Perception-Action Schema Building**: a continual cycle of perceiving or detecting something, taking an action and then observing the immediate effects of that action and adjusting the next action.
- **Experiential, Episodic Knowledge:** knowledge that results from an experience that's vividly memorable, both emotionally and physically.
- **Problem Solving and Creative Ideation:** applying facts and concepts in new and novel situations, and across academic subject areas.
- **Academic Discourse and Language Processing:** putting ideas into words, and being able to explain and justify the reasoning for those ideas.

THE **EXPERIENCE GAP**

While STEM subjects seem tailor made for rich and varied learning experiences, those types of experiences are often severely lacking when it comes to mathematics. Examples of creative experimentation and rich, hands-on activities with science, technology, and engineering are easy to imagine, but what about math? Math is very often taught in a way that focuses on calculations and rote memorization. As a result, many students have a poor relationship with math, as they have only experienced it in a very limited way.

This dissonance between the types of math experiences students could have, and the ones they currently have access to, is what we refer to as the "experience gap." And while much of the conversation about math education centers on achievement and proficiency, the experience gap is the underlying issue.

So in our efforts to address the math crisis, we have to focus on the ways that we are teaching and learning math, providing rich new ways for students to experience the math that is all around them.

BRIDGING THE **EXPERIENCE GAP** IN THE CLASSROOM WITH **ST MATH**

ST Math – created by neuroscientists, mathematicians, and educational innovators at MIND Research Institute – is a game-based supplemental math program that develops conceptual understanding by teaching math without words. Students are able to see abstract math concepts through graphically rich visual models and real-time informative feedback. ST Math's rigorous puzzles facilitate students' action-oriented learning, which increases problem-solving skills. Students work through the mastery-based, standards-aligned curriculum at their own pace; meanwhile the teacher monitors progress, facilitates students who are struggling, and utilizes the digital manipulatives from the software in class lessons.

With ST Math, students experience math in a totally different way. The program is designed to engage all children, regardless of socioeconomic, linguistic, or cultural background. ST Math is the only program on the Business Roundtable's short list of recognized programs. The Business Roundtable recognized ST Math as one of only five K-12 programs deemed to have "strong potential for helping prepare more U.S. K-12 students for college and the workforce." You can find more information and play ST Math games at www.stmath.com.

EXPERIENCING MATH THROUGH **PROJECT-BASED GAME DESIGN – THE K-12 GAME-A-THON**

A benefit of project-based learning (PBL) is making cross-discipline connections that simultaneously cover understanding in multiple subjects. Common complementary pairings in PBL are English and history, and mathematics and science. But when students are challenged to solve a problem they care about, the lengths they will go to and the pairings they create to develop skills that address the problem can be unexpected.

One place we have experienced this phenomenon is when students get creative by combining their personal interests with designing a math game.

The national K-12 Game-a-thon challenges students to think critically and creatively to design a game that solves a mathematical problem. Teams of one or more students, along with a teacher or parent in a coordinator role, can invent card games, board games, apps, outdoor games, or anything else.

At its core, the Game-a-thon follows a project-based learning model in which students are given a meaningful and open-ended challenge: design and build a math game. The flexible nature of the challenge lends itself well to student engagement and ownership of the project, where students can learn both hard and soft skills.

The K-12 Game-a-thon approaches problem solving through the use of game design principles. An optional Game-a-thon lesson plan and student kit breaks these game design principles down to individual steps, such as defining learning goals, game mechanics, target audience, playtesting, and more. Students can spend time focusing on each one, strengthening their understanding of each.

The entry submission process includes a video that asks students to reflect on the process and skills they developed rather than the end product. This also ensures that the experience includes the Academic Discourse and Language Processing neural subsystem we talked about earlier, though it may be included elsewhere in the learning experience as well.

Project-based game design increases core learning outcomes, including:

- **Collaboration** – students have the opportunity to work collectively toward a shared objective and benefit from peer interactions.
- **Critical thinking and problem solving** – students challenge themselves to view math from the perspective of a game designer and determine best approaches to evoke meaningful play.
- **Creativity and innovation** – students push the boundaries of game design by taking risks and thinking outside the box to find creative solutions.
- **Design thinking** – students learn design processes including ideating, prototyping, testing, iterating and giving feedback, all in tandem with core game design principles.
- **Communication** – students communicate their ideas and thoughts to others through a summative video presentation of their game.
- **Math literacy** – students engage meaningfully with math concepts in new ways to build deeper understanding.
- **Digital literacy** – students have the opportunity to learn and utilize digital tools like video editing and game creation software.

MIND Research Institute proudly sponsors this student challenge to cultivate and showcase game designs that feature creative and unusual solutions to mathematical problems. As students apply the math they are learning to gameplay, they may also launch a lifelong love of math. The Game-a-thon is open to teams of youths from across the United States. A team may consist of one or more participants, and all teams will need an adult coach or teacher who provides his/her contact information, acts on behalf of the team, and facilitates communications with the Game-a-thon coordinators.

Registration is now open for the 2019 K-12 Game-a-thon. You can register and find more information and resources at www.mindresearch.org/gameathon.

CONTINUING **OUR MISSION**

As we enter the fourth industrial revolution, the country needs more than ever for our next generations to be mathematically equipped to solve the world's most challenging problems. At MIND, we believe that in order to solve our current math crisis, all students must have access to high-quality educational content and dynamic learning experiences.

In order to truly impact the math crisis in America and create change on a national level, we need the support of educators, administrators, individuals, foundations, and organizations that share our passion for empowering today's students to be tomorrow's problem solvers.

You can learn more about all of MIND's initiatives, as well as partnership opportunities, at mindresearch.org.

CALI WRIGHT is the senior content and brand specialist for the MIND Research Institute.

BRIAN LETENDRE is the manager for engagement content for the MIND Research Institute.

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