



Discovery
EDUCATION

STEM
CONNECT

THE PRODUCTIVE STRUGGLE: INTERDISCIPLINARY LEARNING IN TODAY'S CLASSROOMS

Hear from three school districts incorporating interdisciplinary lessons with STEM Connect to increase relevancy for today's hands-on learners.

"I see it as a futuristic way of thinking."



Get Nichols
Chief of School
Leadership
Fort Wayne
Community
Schools, IN

The moment Get Nichols of **Fort Wayne Community Schools** in Indiana knew her schools were on the right track was when all the students in a fourth-grade class got a math problem wrong.

Nichols, like educators across the country, wants to prepare her students to be college and career ready, even starting this process in elementary school. While no singular path guarantees college and career readiness, she knows boosting STEM skills is an important first step to set them up for success.

"We want to get out of the memorization business," said the district's chief of school leadership. "I want students to be thinking about how they can use information to consider real-world problems."

Students can quickly look up more information online than they could ever retain. Nichols said the creative application of that information is more relevant to today's students because it supports using resources to solve real-world problems.

"I see it as a futuristic way of thinking," she added.

So, back to that classroom where a young teacher used technology to help students truly understand the area of a figure. The teacher gave the students the area of the figure and its length but intentionally left out the width. Students drew shapes on their tablets, but when the teacher gave them the formula for area in a word problem, they mistakenly multiplied the two numbers they had: area and length. When the teacher told the class they were mistaken, the class expressed confusion until a student recognized the issue and blurted out, "You already told us the area!"

Suddenly, tablets lit up through the classroom, as students reread the word problem and put their new skills to work, figuring out how to calculate the width of their shapes. They'd discovered an organic solution — all on their own — to a common math problem traditionally associated with rote memorization of a formula.

"It was that productive process of struggling and failing that made them realize, 'I misread that problem,'" Nichols added. "That's inquiry-based learning."

“I value STEM Connect’s ability to be flexible and be used in concert with all the resources we have.”



Candace Singh
Superintendent
Fallbrook Union
Elementary
School District,
CA

Program Flexibility is Key

Many school districts aim to reinforce STEM skills, and are seeking clear guidelines on how to do that. Altering the content taught in schools can be a complicated process, because any change must square with the state’s curriculum standards, comply with the Every Student Succeeds Act (ESSA) framework, and resonate with a school’s staff and community.

For these reasons, Fort Wayne’s district leaders chose **Discovery Education’s STEM Professional Learning** and **STEM Connect**, an interdisciplinary K–8 digital resource that enhances core curriculum. STEM Connect allows students to collaborate and solve relevant, real-world problems, and to connect their learning to career opportunities. Additionally, STEM Connect was vetted by the New York Academy of Sciences Global STEM Alliance, a coalition that has created a blueprint for schools seeking to create powerful STEM programs.

“We did not want a defined program,” said Nichols. “Instead of a prescribed program the other vendors were offering us, we wanted our own personalization in our STEM and STEAM programs. We didn’t want someone else’s.”

STEM Connect can serve as a supplemental curriculum with specific lesson plans, or educators can use it as a guide to create open-ended classroom projects. Nichols said the program fits Fort Wayne because its seven magnet schools have different needs. For instance, district leaders knew its math and science magnet needed to add engineering and 21st century skills while other magnets needed to boost both the arts offered and how technology was used. As a result, the district is implementing both STEM and STEAM, depending on the needs of the schools.

For the same reason—program adaptability—**Fallbrook Union Elementary School District** in California also started incorporating STEM Connect into its 10 schools.

“I value STEM Connect’s ability to be flexible and be used in concert with all the resources we have,” said Candace Singh, the district’s superintendent.

Fallbrook educators said they like how STEM Connect fits the district’s goal to increase the interdisciplinary learning happening in all 10 of the K–8 district’s schools.

The North San Diego district is three years into implementing the Next Generation Science Standards for its 5,000 students, Singh explains. And an instructional coach helps teachers continue to adapt curriculum to meet these changing needs.

The program’s flexibility also appealed to **Miami-Dade County Public Schools**, an urban district focused on remaking its vast number of middle schools to increase student engagement and grapple with recent charter school growth in the area.

Miami-Dade is the nation’s fifth-largest school district, and it serves about 40,000 middle school students. After an in-depth survey revealed low engagement numbers, the mammoth Florida district launched a reboot of its middle schools by building them around three factors: social and emotional learning, student engagement, and planning and operations.

“Students said over and over they were bored out of their minds,” said Iliia Molina, the district’s executive director of middle school redesign. “The only classes they liked and would attend frequently were those where the teachers allowed them to collaborate as groups.”

To answer these challenges, the district created a pilot program that it calls an EDGE period—empowered and driven to grow and engage. In these classes, middle school students work on interdisciplinary projects that include STEM topics, and work with STEM Connect on project-based learning activities. The classes also include time dedicated to students’ emotional needs, offering a segment where teachers can mentor students one-on-one. It’s proven to be immensely successful in just the short time it has been implemented.

“It’s new, but the feedback we’re getting from students and teachers is they love it,” Molina said. “It was very important to us that the resource we chose was able to lend itself to whatever subject background was needed.”



“The ideal would be someone walking into a classroom and not being able to determine what’s being taught... It might be confusing because it’s all happening at once.”



Kent Martz
Principal
Weisser Park
Elementary
School, IN

Supplying the Help Teachers Need

Altering any curriculum in a school district is a major challenge to undertake. Leaders in all three of these districts acknowledge that changes need to be integrated slowly with plenty of support for teachers along the way. The ability to control the rollout of new materials plays a large role in how successful teachers are at incorporating the material into their everyday use.

As a veteran educator, Cindy Moss knows the problems that schools face in trying to change their culture.

“The way we’re teaching really isn’t working,” she said. “We pigeonhole subjects; having literacy for 90 minutes doesn’t reflect how children will use their skills in the real world.”

Moss, Discovery Education’s Vice President of Global STEM Initiatives, said school leaders and teachers want to break out of these subject-area silos, but often don’t know how. This type of learning by subject instead of using the tools of many subjects to problem- solve isn’t the way students will need to work once they graduate.

Districts using Discovery Education’s Professional Learning services benefit from a series of hands-on sessions focusing on whole- and small-group instruction, with job-embedded coaching from expert educators. Along with providing an orientation of STEM concepts, these sessions help districts develop model classrooms that expand STEM instructional experiences organically to other educators.

Shifting to an interdisciplinary model of instruction in a particular class can be a daunting hurdle for educators wary of breaking out of their content area isolation.

“We’re asking teachers to do monumental things, often without giving them the time and resources they need,” said Fallbrook’s Singh. “That’s one of the reasons we

partnered with Discovery Education. The company works with us to provide teachers with the resources they need. They help us with professional learning so we can continue to build the human capital.”

Interdisciplinary learning requires STEM concepts to be interwoven throughout instruction. Core components are intermingled in a transdisciplinary STEM classroom. Someone shadowing such a classroom may be hard pressed to determine where one subject ends and the other begins. But that’s the intent according to Weisser Park Elementary School Principal Kent Martz.

“The ideal would be someone walking into a classroom and not being able to determine what’s being taught. Is this math or reading?” he said. “It might be confusing to some, because it’s all happening at once. That’s my vision for where we might be four to five years down the road.”

Martz noted that his educators have been finding interdisciplinary connections to weave throughout different subjects, but they aren’t forcing the issue if no connection seems apparent. They’re taking it slow and discovering the most natural way to integrate topics seamlessly.

One easy way to introduce STEAM into current curriculum at Weisser Park Elementary was to take the school’s themes and add a lesson about inventors to each segment. In the fall, students built a scale model of the Brooklyn Bridge and marched 21 elephant puppets over it, in a dramatic reenactment of P.T. Barnum’s famous gambit.

“Students are responding positively, and teachers love it,” said Martz. “They’re excited about it, and we’re trying to keep that energy high, so we all have the momentum to keep going forward.”

However, middle school presents unique problems for the shift to interdisciplinary

“Twenty-first century learning cannot be done purely within the constraints of content and standards.”



Ilia Molina
Executive
Director, Middle
School Redesign
Miami-Dade
County Public
Schools, FL

learning. Integrating subjects comes more naturally to elementary school teachers, explained Miami’s Molina, because their certification includes a variety of subjects. But middle school teachers, like those in high school, tend to think of themselves as content masters.

“They feel uncomfortable leaving that area, so we often have to do a lot of hand-holding,” said Molina.

Her team reminded teachers that many of them are already teaching interdisciplinary lessons, and making connections is easier than they might imagine. A simple first step can be talking to other teachers in your grade-level team and learning from their experiences, she added. But the district didn’t just rely on pep talks. It added five curriculum support specialists to help teachers transition to including STEM topics in their lessons.

“The job-embedded coaching for us has been tremendously successful,” Molina said. This coaching has been the top reason teachers feel comfortable making this transition.

While many people assume younger teachers are more able to handle change, Molina said she believes teachers who have a good grasp on classroom management—regardless of the depth of their experience—are best positioned to change. These teachers don’t fear giving students more control, she added, and that aids in the transition.

STEM Connect helps the district meet this goal, she notes, by providing a way for staff to see how STEM can mesh within the classroom. But it’s also important for educators to begin having conversations about implementation among each other.

“Twenty-first century learning cannot be done purely within the constraints of content and standards,” Molina said. “If we really want to prepare students, teachers should be able to have conversations with their peers about how they’re addressing concepts.”

Tempering expectations remains necessary, particularly in the program’s first year. Even with the district’s help, Molina estimates that a third of her teachers are adding the STEM material without any issues. Another third require “significant handholding,” while the last third are struggling.

“That’s why we work with Discovery Education. We’re going to fix these problems together,” said Molina. “They are always able to personalize the support they offer, and willing to reexamine how they normally do things to fit the needs of our initiatives and our schools.”

Nichols agreed that Fort Wayne teachers are wrestling with integrating new topics with project-based learning, but that battle is worthwhile.

“It’s going to take them some time to plan and go through the struggle of reviewing implementation and adjusting their lesson designs until they feel comfortable with it,” she said.

“But we feel good about that. If there was a strict formula to follow, teachers end up teaching like robots, and we would know this is not the kind of productive struggle or global learning that we want our children to experience.

“We want our teachers to experience the same type of learning that they’re going to provide for our students. It’s the whole idea of teaching adults to be inquirers themselves,” she said.

Igniting Students’ Curiosity

Of course, creating interdisciplinary lessons is not just a fancy way to check an administrative box. It can really kindle students’ engagement and show students how this knowledge plays into possible future careers, said Fallbrook’s Singh.

“When we teach [a subject] in isolation, it’s not as exciting or fun. It doesn’t represent what students experience in the real world,” the superintendent said. “We want learning to be fun. When they see the relevancy and interconnectedness in the lessons, they’re excited to learn more. And we know that it creates deeper comprehension and long-term memory when they can apply their learning to their world.”

STEM Connect helps Fallbrook accomplish this goal by providing students with opportunities to learn about diverse STEM careers in context and to connect the skills they are using now to real work happening around the world.



STEM Connect’s Career Connections features a growing library of nearly 100 STEM career videos, highlighting exciting jobs like aerial firefighters, cryptological technicians, and nuclear engineers.

Because the rural district has a significant percentage of at-risk learners, Singh said educators have a very high sense of urgency to prepare them for their secondary education.

Fallbrook students regularly visit higher education settings like Cal State San Marcos and San Diego State University. These trips expose the students to STEM career possibilities they wouldn’t normally experience, providing a vision of their futures they might not otherwise consider.

Fort Wayne’s Nichols agreed that all the learning shouldn’t be done in a traditional classroom. Giving students content knowledge without communication skills or critical thinking is only half of a school’s job.

“If we don’t teach our children how to develop these skills, then what they’re doing now may not give them a successful opportunity to prepare for what lies ahead,” she added.

The administrator sees students’ excitement when they can participate in project-based learning. “I’m not a big believer of teachers being lecturers or mimicking a TED Talk,” she said. “That makes students passive learners.”

Instead, if you engage students in inquiry-based learning, the difference is obvious, she added. “They are thinking with you, manipulating learning with you, having discourse with each other and the teacher. And when you add technology, they’re using all their senses in concert with learning.”

For Miami-Dade’s Molina, student engagement is the yardstick showing the team that it made the right decision in boosting STEM lessons. “When we see how excited some of the students are, it’s definitely been a good indication that it was the right choice,” she said.

While in some respects, the district went “back to basics” when revamping its middle schools, the administrator acknowledges that 2018’s students have different needs than the students from the 1980s. They require different lessons and activities to be engaged.

At the core, the goal is for students to be excited and engaged at school, seeing the value in their education.

“It requires exposing them to higher order problems and careers, to leadership roles and how to present. These are all skills that students today need to be successful tomorrow.

“We want students to see that the content they’re learning about doesn’t just live within the four walls of a classroom,” said Molina.

Teach them today. They’ll handle tomorrow.



Education is about preparing for what’s next. STEM Connect helps students realize their potential and how their interests can apply to a diverse range of STEM careers for the future. Discovery Education STEM Connect is a cutting-edge interdisciplinary K-8 resource designed to enhance core curriculum and bring STEM to life in your classrooms. Our powerful 4Cs framework uses relatable scenarios that connect students to real world challenges. With each unit, students gain valuable critical-thinking and solution seeking skills for life.

Learn more: [DiscoveryEducation.com/STEMConnect](https://www.discoveryeducation.com/STEMConnect)

