

# ***Carnegie STEM Excellence Pathway Playbook***



**CARNEGIE SCIENCE CENTER**

# What is STEM Education?

## **Inquiry-Based Education**

Using curiosity and questioning as guiding principles, this type of instruction centers learning on solving a problem or answering a question through interaction and exploration.

## **Integrated Curriculum**

Eliminating siloed instruction highlights the relevance of content and facilitates students' abilities to apply diverse knowledge and skill sets to complex problems—just like in the real world.

## **Project-Based Group Learning**

Engaging teams of students in solving real-world problems helps them develop STEM competencies such as teamwork, communication, creativity, innovation, problem solving, and critical thinking.

## **Career Awareness**

By exposing students to professionals and their careers, they learn how essential STEM skills apply to the work environment and begin to imagine greater possibilities for their own futures.



# Why Participate?



## The Carnegie STEM Excellence Pathway

tool enables your school or district to develop a strategic plan for improving STEM education that is tailored to your programmatic needs.

The creators of the Pathway were a group of business leaders, teachers, administrators, and STEM leaders. This team developed a Pathway process flexible enough to be useful to schools of diverse size, budget, population, geographic location, and organizational structure. Each school and district is unique in its needs, so a one-size-fits-all “solution” rarely works as intended.

The Pathway became a strategic-planning framework that schools or districts, known as Partners, can use to determine what constitutes success in improving STEM education for their institutions.

*Will you join the  
global community of  
Pathway Partners?*

**GO TO [mySTEMpathway.org](https://mySTEMpathway.org)  
TO SIGN UP FOR AN ACCOUNT!**





**A Pathway Partner** is a school or district that is using the Pathway tool to improve its STEM education programming.

**A Pathway Provider** is an organization that has been trained by Carnegie Science Center to facilitate a Pathway Partner's engagement with the process, as well as support and coach it throughout the implementation of its Action Plans.

## *How do I get started?*

### **Partner:**

Go to [mySTEMpathway.org](https://mySTEMpathway.org), and create a Pathway Partner account. The Partner account is FREE, and you can start your journey on the Carnegie STEM Excellence Pathway immediately!

Gather a team to complete the Pathway together. Your team should be made up of at least one administrator, several teachers from different grade levels and disciplines, and relevant support staff. A team of around five to eight is most effective.

We also recommend finding coaching staff from a nearby Pathway Provider to facilitate your journey through the Pathway!

### **Provider:**

Go to [mySTEMpathway.org](https://mySTEMpathway.org), create a Pathway Partner account, and look for training opportunities. Carnegie Science Center offers training at our location in Pittsburgh, Pennsylvania. Training also is available on demand at times and locations to suit your needs.

## *What can I expect?*

### **Partner:**

You are joining a network of schools and districts that are working to improve STEM education. After completing the Pathway Self-Evaluation, you will formulate a comprehensive Action Plan that details the specific Action Steps that your school or district will take to further your STEM-related goals.

That is not the end! The Pathway is an iterative tool. At the completion of each Action Plan timeline, the cycle begins again — a new Self-Evaluation looks at how your school has improved, advises where to now focus your energy, and generates a new Action Plan. To view Success Stories and to share your own story, visit [STEMisphere.org](https://STEMisphere.org).

### **Provider:**

As a Pathway Provider, your organization will be positioned as a central hub of STEM in your area. Once trained by Carnegie Science Center, Pathway Providers are granted access to the resources and data needed to immediately begin facilitating Pathway workshops with their own Pathway Partners. Providing these workshops can be a source of revenue for your organization.



## Champion STEM in your region!

### *Who can be a Partner/Provider?*

The Pathway is a free process that anyone can use. A Pathway Provider is an organization that may offer Pathway workshops as professional development to expand their offerings in STEM education. Museums, universities, nonprofit organizations, and educational agencies have already joined in as Providers.



**GO TO [mySTEMpathway.org](https://mySTEMpathway.org),  
TO BEGIN YOUR JOURNEY!**



## Become a STEM Resource Center for your region!

*Join the growing number  
of communities with STEM  
Resource Centers.*



*Visit [STEMisphere.org](https://STEMisphere.org)!*

STEMisphere® is the online central hub for STEM resources and acts as a portal for families, educators, students, and the community.



*Interested in  
becoming the  
hub of your  
community  
to help make  
connections  
happen?*

### **STEMisphere®**

The Pathway and STEMisphere work in tandem to deliver the resources and tools needed to help educators and administrators develop STEM programs and plans for improvement. As a STEM Resource Center, the power of STEMisphere is customized specifically for your region!



CONTACT OUR TEAM AT [STEMisphereInfo@CarnegieScienceCenter.org](mailto:STEMisphereInfo@CarnegieScienceCenter.org).

The Carnegie STEM Excellence Pathway received the **2015 Roy L. Shafer Leading Edge Award** for Business Practice from the Association of Science-Technology Centers (ASTC), an international organization of more than 600 science centers and museums dedicated to encouraging public engagement with science among diverse audiences.

According to the panel of judges, the Pathway not only created a funding stream for the Science Center, it addressed the needs of the community. The jury praised the Pathway's wide reach and realistic approach to helping integrate the goals of science centers and museums and one of their main stakeholder groups: schools.

*Since receiving this award, Carnegie Science Center has trained over 80 Pathway Providers — educational leaders in science centers, museums, universities, educational agencies, and nonprofit organizations — to expand the reach of the Pathway across the nation.*



---

The following pages share stories from both Partners and Providers, serving different types of communities in varying geographic locations.

They share valuable information concerning methods of implementation, outreach, and how to move the needle in STEM education.

## Success Story: Pathway Provider

*The Museum of Discovery is a STEM Resource Center for its state and provides a searchable online directory of STEM programs and activities customized for Arkansas that is powered by STEMisphere.*



**The Carnegie STEM Excellence Pathway has given the Museum of Discovery in Little Rock, Ark., a formal way to help the state's varied schools and school districts improve STEM education for students.**

The Museum of Discovery gave its first workshops as a Pathway Provider during the 2017–2018 school year. It is the only Pathway Provider in Arkansas and is recruiting schools and districts throughout the state.

Participation in the Carnegie STEM Excellence Pathway's Emerging, Progressing and Advancing workshops is among the services the museum offers schools and districts through its Discovery Network. "There wasn't really any other comparable model that allowed people to improve and develop their day-to-day STEM provision," said Margaret Rowan, Network Educator with the Museum of Discovery.

Response from the representatives of the 16 schools or school districts that participated in the first year of training was overwhelmingly positive, Rowan said. For example, one school that had no STEM program before the Pathway really blossomed and began offering monthly STEAM Nights, she said.

Pody Gay, Network Director, said schools and districts pay fees for Discovery Network services, and the Pathway attracted educators who hadn't previously used its services.



## Success Story: Collaboration

Intermediate Units were established in 1971 by the Pennsylvania General Assembly to be regional educational-service agencies and liaisons between local schools and the state's Department of Education.

One of the services they offer schools and districts in their region is professional development related to the Carnegie STEM Excellence Pathway.

Schools and school districts throughout Pennsylvania can work collaboratively to improve STEM education through participation in the Carnegie STEM Excellence Pathway because the state's Intermediate Units serve as Pathway Provider organizations and have staff trained to facilitate Pathway workshops.

Staff members from different schools and districts in an Intermediate Unit's region sometimes attend workshops together. Rob McKenzie, Instructional Technology Specialist and STEM Consultant for BLaST Intermediate Unit 17, which serves Bradford, Lycoming, Sullivan, and Tioga counties, said historically, staff members from school districts in close proximity have viewed nearby school districts as competitors. But workshop attendees have said, "Yes! That was so valuable," when asked if they liked the opportunity for collaboration that came from meeting together.

*"I think the Carnegie STEM Excellence Pathway is opening the door to a more collaborative approach," McKenzie said. "Instead of 'I've got to be the best,' it's 'How can we build capacity, and can we do this together? Can we make our area and our region STEM stronger together?'"*



McKenzie said there is a push from the state Department of Education to develop STEM ecosystems, and his Intermediate Unit has formed a STEM leadership team that is looking at involving representatives of local museums and higher education in the discussion. These conversations have come about, in part, he said, because of the Pathway.



Photo courtesy of Arconic Inc.



*"STEM fields offer exciting and rewarding careers but can only be built upon a robust and immersive education."*

— Ryan Kish,  
Senior Program Manager  
for Arconic Foundation

## Success Story: Local Support

**Businesses need employees with STEM skills and often are willing to support programs that will help schools develop the workforce of the future.**

They also want to invest in the communities where they operate and recognize that education is vital. This means schools or school districts might be able to attract grant money from local companies or foundations to subsidize professional development through the Carnegie STEM Excellence Pathway.

For example, Arconic Foundation gave the New Kensington-Arnold School District in southwestern Pennsylvania a grant for professional development for teachers at Roy A. Hunt Elementary School. Ryan Kish, Senior Program Manager for Arconic Foundation in Pittsburgh, said the foundation invests in STEM education in the communities Arconic's employees call home because these subjects and related methods of problem solving increasingly are the surest path for individual career and economic success. "STEM fields offer exciting and rewarding careers but can only be built upon a robust and immersive education," he said.

Staff members at Hunt Elementary identified the Carnegie STEM Excellence Pathway and the expertise of Carnegie Science Center as tools that would help them offer a high-quality STEM experience to students. "Time and resource constraints of school districts can be substantial barriers to the implementation of comprehensive STEM education reform, and we are proud to help the school overcome that barrier for this program for the benefit of the students," Kish said.

STEM education at its best does not seek to teach specific skills but rather empowers students with the belief that they can use problem solving to tackle unfamiliar challenges. Regardless of what areas of study or careers these students eventually choose, the school's effort to improve STEM education ultimately will enhance how students learn and approach challenges throughout their lives, Kish said.



## Success Story: Pathway Partner

**After St. Ambrose School in Godfrey, Ill., became a Pathway Partner, its staff improved STEM education there by using the Carnegie STEM Excellence Pathway and the support of a Pathway Provider, St. Louis Science Center.**

St. Ambrose Principal Jean Heil began her Pathway journey by gathering a STEM leadership team of elementary through middle school teachers and the school's technology coordinator. The team identified two areas in need of improvement through the Self-Evaluation – STEM curriculum and making connections to the real world. Afterward, the team created an Action Plan and set a goal to develop a schoolwide STEM project that incorporated a real-world issue.

The project culminated with a STEM fair that included students presenting their work to parents and community members.

In preparation for the STEM fair, the team met to decide on the theme “Mission to Mars.” St. Ambrose took a schoolwide approach to the project-based learning, with middle school students working on how to get to Mars and elementary students creating sustainable habitats. Teachers took advantage of resources available from St. Louis Science Center.

*“We had local newspapers, community members, parents, grandparents, staff, and students all engaged with sharing knowledge and learning from each other, Heil said.*”

“It was outstanding! The students were so engaged and loved learning about what other classes had been working on throughout the semester and how it all connected. The visitors/parents were impressed with how much kids learned through the project. Teachers were excited about how well the STEM focus integrated into their classrooms and how receptive their students were to the project-based learning.”



*The St. Louis Science Center is a STEM Resource Center for its region and provides a searchable online directory of STEM programs and activities customized for its area that is powered by STEMisphere.*

# Carnegie STEM Excellence Pathway

