2015 Bridge Programs Report

2000

2005

2010

15 Years

2015

THE PAST FOUNDATION
2015 Bridge Programs Report

Calvin Mires, PhD
Director, Bridge Programs

Ashley Bloom
Bridge Program Innovator

THE PAST FOUNDATION
1003 Kinnear Road
Columbus, OH 43212
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Introduction

15 years ago, PAST Bridge Programs helped launch PAST Foundation. Over the last decade and a half, these programs have grown by leaps and bounds. In 2015 on the Deca.5 anniversary of PAST, these field programs remain a vital component of the PAST mission and vision. With innovative, engaging content, they reach students across multiple states and grade levels, from elementary school to college. The programs are continually evolving and expanding with many new and exciting opportunities on the horizon.

Initially called “Summer Field Programs,” the name was modified to more accurately reflect the intended impact for students: a bridge that helps students move from one level of thinking to the next. Today, Bridge Programs shape and define the cutting-edge of problem-based, immersive STEM programs that offer students from across the nation engagement in real-world problem-solving and hands-on experiences. Please take a look at all of our Bridge Programs since 2000 (page 41).

In 2015, PAST ran eight programs across the country with more than 900 participants. While some students tested water quality and soil to develop a sustainable habitat for their communities at Hocking College in Ohio’s beautiful southeastern Hocking Hills, other students were creating sculptures using a variety of math and science principles in South Dakota.

Through the generous support of a second Ohio Straight A Fund grant, the STEM Outdoor Innovation Lab (SOIL) program enabled students from the 15 SOILabs - Akron, Cleveland, Rootstown, Columbus, Reynoldsburg, Lancaster, Millersport, and Federal Hocking – to attend weeklong immersive ecology programs at Hocking College. The Straight A Fund grants in both rounds 1 and 2 also helped establish two prototyping field stations for ongoing environmental education. The first located at Kelleys Island, hosted 12 weeks of immersive programs in 2014, and now has the ability to continue offering summer programs to schools in the Great Lakes area. Hocking College is the second prototyping field station developed to take advantage of the college's impressive environmental and green construction programs. Its location in the southeastern region of the state provides an economical and efficient balance for schools looking for experiential learning that is not far away. Across the four weeks in June, students learned about water quality, sustainability, erosion, alternative energy, biodiversity, and habitat management, with the purpose of applying these newly found skills and information to their own SOILabs back at their home schools.

For the third year, Hybrid Bridge Programs were offered in South Dakota, funded by a pre-service grant from the Bush Foundation and GEAR UP to serve high needs students. The programs were held over the course of two weeks. South Dakota School of Mines hosted the first week of GEAR UP in Rapid City, SD, where more than 150 rising 9th grade, Native American students participated in programs featuring Limnology, Medicinal Plants, and Art and STEM. The second week was hosted by Dakota Wesleyan University in Mitchell, SD, where students engaged in programs about Medicinal Plants and Minecraft®.

Day camps were also offered throughout the summer focused on Minecraft as a vehicle for spatial math.
Wildly popular with Middle School students, these day camp bridge programs follow the same pattern, challenging students to compute scale and recreate famous structures they’ve researched into a Minecraft presentation. The Golden Gate Bridge, Eiffel Tower, and even the Sioux Falls, South Dakota airport have been researched and recreated to scale.

These experiences are the foundation of the PAST Bridge Programs, which immerse students in real-world problems that are built upon four vital components:

- **Real Issues**
- **Real Partnerships**
- **Transdisciplinary Approach**
- **Presentations of Learning**

Real Issues are the foundation of every Bridge Program. By framing each project around a contemporary, real-world problem, students engage and participate in meaningful learning and problem-solving with focus and intent.

Meaning, focus, and intent are reinforced through Real Partnerships, the second essential component. PAST strives to create partnerships in communities bringing expertise from different fields to engage and work with students helping to create meaningful solutions to real problems.

These partnerships expose students to different viewpoints towards solving problems. The Transdisciplinary Approach, the third essential component, provides a rich context of perspectives, allowing students to think critically and holistically about how different methods may be used to solve a problem. Each program incorporates Science, Humanities, Technology, Language Arts, Math, and Design.

The fourth and final component of the Bridge Program structure is the Presentations of Learning that chronicles each student’s work at the culmination of the project. Program directors provide expectations and examples to students, who then present their efforts showcasing their perspectives, designs, original research, and innovative solutions to the problems. These presentations take many forms of communications, including film, models, essays, poetry, PowerPoint, or role-playing skits. All forms of presentation showcase the remarkable creativity and voice of the students.

PAST measures its success in its ability to meet these ideals, and students enthusiastically recommend PAST because of their moving experiences and lasting memories. The PAST Bridge Programs vary in intensity and content depth, depending on the age and experience of the students.

1. Level I targets students transitioning from traditional learning environments to problem-based environments.
2. Level II is appropriate for students who excel at applied learning.
3. Level III provides advanced student leadership opportunities in addition to the applied learning aspects of a program.
4. Collegiate Level programs serve motivated adult students with intense, content-rich experiences.

In 2013, PAST added a 5th level to Bridge Programs, called “Hybrid.” Hybrids turn the powerful immersive experience enjoyed by students into a learning model for teacher instructional strategies. Hybrid Bridge Programs invite teachers to participate on two levels. First, participating in the programs as a student, and then immediately afterwards joining the other participating teachers in
professional development. This format enables teachers to take what they’ve learned alongside the students and apply it in the classroom. Teachers complete the week with developed TPBL modules culminating their learning experience with Presentations of Learning similar to the expectation of the students.

Finally, no year at PAST would be complete without Design Challenges. 2015 once again saw PAST partner with schools and businesses to bring exciting and challenging competitions to students and the public. Thanks to partnerships with Columbus Museum of Art, over 600 people took up the Cardboard Challenge. In its 6th year, STEM Rocks the Box sold out Shadowbox Live Theater for the first time. Changing venue, Baldwin STEM Middle School adopted the Spring Fling inviting nearly 500 students to attend and compete. Following the success of its inaugural year, the Shadowbox® Academy ran a 3-week summer bootcamp for 16-21 years old students.

PAST also added a new Design Challenge intended to grow into a fully functioning innovative Learning Lab for high school. In late fall of 2014 and then again in spring 2015, PAST Bridge Programs, through a partnership with COSI (Center Of Science and Industry), Bureau of Ocean Energy Management (BOEM), C & C Technologies, and Battelle Memorial Institute, launched a new Design Challenge centered around underwater Remotely Operated Vehicle (ROV). Melanie Damour of BOEM, Rob Church and Dan Warren of C & C Technologies, and world-renowned inventor of side scan sonar, Martin Klein, joined the challenge providing expertise and judging.

As 2015 comes to a close, a new chapter of PAST Bridge Programs is starting. PAST recently expanded its learning space by more than 500% at its home base in Columbus, Ohio - going from approximately 6000 square feet to over 32,000 square feet! In the new building, there will be five innovative Learning Labs. The expansion allows PAST to offer more programs throughout the year that complement formal learning during school hours. Taking advantage of the new space and Learning Labs, PAST Bridge Programs plans to leverage after-school programs that build on Robotics, Minecraft, and Forensics in the Classroom. An exciting new era is beginning at PAST. Join us for a detailed look at this year in review and stay tuned for the new and exciting opportunities starting in January 2016.
Minecraft® Mathematics
Forensic Science And Anthropology Field School
SEAMAHP Maritime Archaeological Field School
GEAR UP Limnology
GEAR UP Art and STEM
GEAR UP Medicinal Plants
Shadowbox Bootcamp
Hocking College Ecolab
Video games driving you crazy? Why not use them to improve your students’ mathematics skills?
Minecraft Mathematics is an enrichment program that uses the popular video game, Minecraft®, as a tool for learning deeper mathematical concepts and topics including scale factor, fraction multiplication, measurement and estimation, perimeter, area, and volume. The skills that are developed by playing Minecraft help students become creative problem solvers!

Minecraft is taking the world by storm, and quickly becoming one of the most popular videos games played in households with video game consoles. Not only does Minecraft captivate players, it also teaches mathematics, engineering, and programming skills.

PAST offered three different Minecraft-based programs. Our first program was conducted last spring at Wickliffe Progressive Elementary School in Upper Arlington, OH, as an after-school enrichment program for 4th and 5th graders. Students worked in teams of two and were presented with spatial-visualization mathematic problems that they first solved with real-life blocks, and then solved within the Minecraft interface. After Wickliffe, PAST evaluated and modified the program to integrate mathematic concepts more deeply, in order to further encourage creative building and problem-solving within the game itself.

The second and third programs were conducted during the summer as weeklong half-day immersion experiences. The second program occurred in South Dakota through the Dakota Wesleyan University with rising 4th and 5th graders. The third program occurred back in Columbus, OH, through Metro Middle School with rising 6th, 7th, and 8th graders. Both summer programs expanded beyond mathematics and engineering to include literacy and communication skills. Students worked in pairs to select a famous fictional or non-fictional building or environment to scale and replicate. They were required to sketch prototypes, journal their processes, evaluate and modify their designs, and share their products.

As a result, students developed an understanding of proportional reasoning, gained knowledge of coordinate planes to help describe physical locations, as well as geographical places, and experienced scale and perspective in a real and meaningful way.

Change Maker
Heather Kellert is a STEM Innovator and Hybrid Teacher with the PAST Foundation, and is a PhD student in Mathematics Education at Ohio State University. Heather is passionate about video games as a medium to teach mathematic concepts, inspire creativity, and gain problem-solving skills.
Learning Objectives:
1. Develop an understanding of basic proportional reasoning concepts such as scaling, scale factors, multiplying and dividing fractions, and conversions.
2. Delve into perspective, measurement, and estimation.
3. Explore how coordinate planes can help describe physical locations.
4. Develop critical life skills such as problem-solving and working collaboratively.
5. Expand literary and communication skills.

Highlighted Activities:
• Programming - Two high school interns helped middle school students write, assemble, and implement complex JavaScript functions that enabled the students to unlock aspects of the Minecraft platform to create dynamic and responsive themed constructs.

• Collaboration - Brothers and sisters were able to sit together in a class for a week and not have one fight. In fact, several of these siblings were able to meaningfully collaborate and problem-solve solutions for complex constructs that had major design constraints.

Demographics
• Wickliffe program: 15 Wickliffe students from Upper Arlington

• Dakota Wesleyan program: 18 South Dakota public elementary school students

• Metro program: 21 middle school students from the following:
  • Metro Middle School (5),
  • Upper Arlington School District (12),
  • Westerville City Schools (1),
  • Fairfield County Schools (2),
  • Hilliard Private Catholic School (1).

Sponsors
• Dakota Weselyn University
• Metro Early College
• Wickliffe Progressive Elementary School

For the first time ever, Minecraft Columbus conducted a qualitative analysis of how kids were learning math skills while playing and interfacing with Minecraft. The IRB was a joint research effort between PAST Innovation Lab and Ohio State University.

Students at each of the Minecraft Mathematics bridge programs were challenged to create their mathematically motivated worlds in Minecraft while simultaneously working with teachers and other students to master mathematical principles – all while having fun.
Twenty students from Ohio State University participated in the 2015 Forensic Science And Anthropology Field School. Their major fields of study included Anthropology, Biochemistry, Biology, Human Nutrition, Nursing, Chemical Engineering, and Criminology, with many minoring in Forensic Science.

The Forensic Science and Anthropology Field School was an intensive, three-week college-level course. Students participated in the resolution of a mock medicolegal death investigation, from crime scene discovery to courtroom testimony. Students processed an indoor crime scene where foul play was suspected. Evidence then led them to an outdoor scene where they searched for and recovered (fake) buried human remains. Back in the lab, they examined evidence from both scenes and attempted to identify individuals by analyzing skeletal remains and matching them against missing person files. Participants synthesized multiple lines of evidence to reconstruct what occurred at the crimes scenes. Finally, students testified as a scientific expert witnesses in a real courtroom in front of an actual judge under direct and cross-examination by attorneys.

Throughout the process, students received hands-on training in the classroom, lab, and field by law enforcement agents, legal professionals, and forensic scientists.

Change Maker
Alexis Dzubak is a post-grad student in the Department of Anthropology at Ohio State University. Alexis is passionate about her forensics fieldwork and has facilitated many PAST-sponsored Forensics in the Classroom programs in both Ohio and South Dakota.

Students taking biometric measure casts of a suspicious footprint (left) and studying blood splatter patterns on the wall (right).

Students testifying and providing expert testimony in an actual courtroom setting.
Learning Objectives
1. Improve interpersonal, professional, and public presentation skills.
2. Work cooperatively in a group and develop team skills.
3. Employ the scientific method to answer questions related to crime scene reconstruction.
4. Appreciate the role of an Anthropologist in medicolegal death investigations.
5. Distinguish forensic science as portrayed in popular media versus the reality of forensic science as practiced by professionals.

Highlighted Activities
- **Identifying Skeletal Remains** - Students constructed a biological profile (sex, ancestry, age at death, and stature) based on skeletal analysis to aid in identification of human remains.
- **Forensic Entomology** - Students worked with a forensic entomologist to learn how to collect and document entomological evidence from decomposing remains.
- **Outdoor Scene Excavation** - At Waterman Farm on OSU’s west campus, students were responsible for locating the four burials using archeological search techniques, excavating the remains, documenting the scene, and properly collecting the remains and any associated evidence.
- **Facial Approximation** - Combining training in anatomy and art to reconstruct facial features, students created individual two-dimensional sketches based upon given data about a missing individual.
- **Courtroom Testimony** - The capstone activity of the field school took place on the last day in which a mock trial was held at Franklin County Municipal Court, downtown Columbus. A judge presided over the trial and actual practicing attorneys acted as the prosecution and defense. Students selected a forensic science or law enforcement specialty to testify as to their involvement in the mock murder investigation.

Sponsors
- Ohio State University Department of Anthropology
- Ohio State University Department of Public Safety
- Ohio State University Department of Entomology
- Ohio State University Waterman Farm Agriculture Research Complex
- Ohio Bureau of Criminal Identification and Investigation
- Franklin County Common Pleas Court
In July 2015, students from Salem State University (SSU) participated in the first maritime archaeological field school in more than a decade in Massachusetts. They learned techniques and solved real world problems in the field of maritime archaeology.

In 2015, a collaborative partnership between PAST, Seafaring Education and Maritime Archaeological Heritage Program (SEAMAHP), the Massachusetts Board of Underwater Archaeological Resources (MBUAR), and Salem State University (SSU) developed a maritime archaeological field school for college students at SSU. Students learned maritime archaeological methods and theory through the week-long project. They applied these skills to document a real shipwreck, the 19th-century schooner, Ada K. Damon – built in 1875, and wrecked on December 26, 1909, during the powerful “Christmas Storm” on the shoreline near Ipswich, MA. Ada K. Damon soon was buried in the sand dunes, and for more than 100 years, was a landmark and a popular recreation site. Today, the remains of the ship rest on the foreshore with the top of the frames exposed at low tide like skeleton ribs in the sand.

Dr. Calvin Mires (PAST Foundation), Captain Laurel Seaborn (SEAMAHP), and Mr. Victor Mastone (MBUAR), directed students as they worked together in teams to systematically survey, measure, photograph, and create a scaled site plan of the shipwreck.

While the shipwreck was used as a case study, the focus for the students was to learn and appreciate how humans employed STEM in the past to create and operate one of the most complex and symbolic machines ever built. They created a bridge to the past through problem-based learning inherent in maritime archaeological fieldwork. In addition to credits through SSU, students also earned certifications through the Nautical Archaeology Society (NAS) -- an
Learning Objectives

1. Learn basic methods, history, and ethics of maritime archaeology.
2. Increase awareness of the importance of maritime heritage and preserving cultural resources.
3. Archaeologically record and document a shipwreck that represents a heritage of maritime industry and human ingenuity.
4. Work in student-led teams to overcome real world challenges in creating important archaeological information for future research and management.

Highlighted Activities

- **National Park Service - Salem Maritime National Historic Sites:** Before documenting the shipwreck, students practiced the archaeological methods they had learned on a replica of the 18th-century tall ship, Friendship, located at Salem Maritime National Historic Site.

- **Essex Shipbuilding Museum** - Students had the chance to visit the historic shipyard where the Ada K. Damon was possibly built.

- **Great House on Crane Estate** - Students toured the Great House on Crane Estate. The Great House - a Stuart-style, 59-room mansion is a national historic landmark on the Crane Estate, a 2,100 acre property owned by The Trustees of Reservations (TTOR) - a conservation and historic preservation non-profit agency that is the oldest regional land trust in the world. The wreck of Ada K. Damon rests on a beach near the Great House on Crane Estate.

Sponsors

- Massachusetts Board of Underwater Archaeological Resources
- Salem State University
- Seafaring Education and Maritime Archaeological Heritage Program
The PAST Innovation Lab offered the Limnology program this summer in Rapid City, SD, in conjunction with the GEAR UP program at the South Dakota School of Mines. Students examined the ecological and environmental impacts of recreation outlets, local industries, and natural events. Throughout the week students were exposed to, and practiced various forms of data collection and analysis.

Students participating in the Limnology program studied the biological, geological, physical, and chemical attributes of Rapid Creek in Rapid City, SD. Each day students set out in teams of four to collect the following information at various testing sites.

After visiting each testing site, students returned to the classroom lab to analyze the data collected. At the end of the week, students presented their findings to the local community.

**Learning Objectives**

1. Teach students to use several field based data collection techniques, analyze data, and apply oceanographic principles to study local bodies of water.
2. Guide students in understanding the interconnectedness of human populations, recreation, industry, and the natural world.
3. Guide students through the process of researching and problem-solving to determine the health of Rapid Creek.
4. Give students an opportunity to practice compiling and sorting relevant data, gain confidence with public presentation skills, and experience working in research teams.

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**Change Maker**

Jeff Schneider is a science teacher in South Dakota as well as a member of the PAST Foundation and South Dakota Innovation Lab (SDIL). He works with multiple school districts around South Dakota, teaching both physical and natural sciences.

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Students in the GEAR UP Limnology program gather outside for a discussion on limnology and the use of the scientific method in the field.

The river being studied in South Dakota. Students tested the chemical and ecological health of the river.
Highlighted Activities

- **Chemical Testing/Water Temperatures** - The locations for water testing were chosen based on natural and human impacts in and around the area. Chemical analysis tests on dissolved CO2, phosphate, and pH were also performed at each site.

- **Beach Mapping** - Participants generated beach profiles and general area maps of each site in order to determine the processes of sediment transport, wave action, currents, and wind erosion.

- **Photic Zones** - The photic zone, the depth of the water that is exposed to enough sunlight for photosynthesis to occur, was measured using secchi disk to determine water clarity.

**Sponsors**

- GEAR UP
- South Dakota Innovation Lab

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*Students in the GEAR UP Limnology program studying the methodology for testing the chemical signature of their soon to be collected water samples.*

*Students analyzing a sample collected for turbidity - the amount of sediment and color of the collected sample to determine the health of the river.*

*Students working in teams analyzing and recording sample data collected and tested results in their scientific field journals.*

*A GEAR UP Student monitoring the flow rate of the current and its relationship to river health and turbidity.*

*A GEAR UP Student literally getting his feet wet in the scientific method!*

*For many GEAR UP Limnology students this program was their first exposure to scientific field work.*
The Art and STEM program was designed to give teachers and students real hands-on experience in problem-based learning. During the program, students worked through the design process to complete a sculpture utilizing a variety of math and science principles. Students developed a deeper understanding the role humanities play in a true STEM environment. The programs concluded with a gallery opening and presentations of the student’s work.

The goals of the Art and STEM program were two-fold. The first goal was for students to understand that a true STEM environment is holistic in nature that helps them develop a deeper understanding of the humanities as well as 21st Century skills. The second goal was to help educators learn how to truly facilitate the creation of a student driven product, in this case, a wire and paper mâché sculpture where students learned and demonstrated research, math, and science competencies.

The Art and STEM program’s first goal emphasized the interconnections among all disciplines to give students a broader perspective and break down the silos of traditional teaching and learning. The program allowed students to work in design teams. They were required to work together from concept design to the final presentation day. By doing so, students gained a broader understanding of the skills needed to succeed in the 21st century economy. By the end of the week, students and teachers better understood holistic teaching and learning methods as well as skills needed for the next generation of jobs and careers.

The second goal was to emphasize the need and true power of student driven products in teaching and learning environments. Educators worked diligently side by side amongst students to complete the sculpture within a specified timeframe. Teachers helped students as students worked to complete their own creative ideas. By having an educator on each team, it allowed everyone to be empowered in completing a product/art piece where students clearly learned and mastered the skills and goals set before them.
Learning Objectives
1. Work in teams to accomplish a physical product. In this case, a wire and paper mâché sculpture built to scale.
2. Use interdisciplinary skills (math, science, social studies, & language arts) to answer the question: can you use art to represent your culture, your generation, and/or your age group? Demonstrate ideas/work through a sculpture, write artist statements, and prepare oral presentations of the work to present to peers and community members.

Highlighted Activities
• **Scale, Enlargement, and 3D Modeling** - A major portion of the Art and STEM program revolved around math connections to many disciplines. In the sculpture creation, students had to problem-solve and master the task of grid creation to enlarge their ideas from sketches and research. Teams accomplished this task by first gridding off and building a variety of sketches onto 9"X12" paper. The task was then to enlarge their work and translate their imagery into 3 dimensions. In doing so, students mastered the concepts of scale as well as accuracy amongst their 3D modeling developed from 2D design.

• **Color Mixing** - Another portion of the program was to allow students the time to master proportion and measurement through the science of color mixing. In doing so once again, students understood the connections amongst art and science as well as other disciplines to produce high quality products to represent their team’s ideas. Students learned about and experienced how to proportionally create their own colors by only utilizing the primary colors of red, yellow, and blue. This was a crucial understanding for students, as they needed to utilize their resources wisely to convey their ideas through sculpture.

• **Critiques/Artist Statements and Presentation Skills** - Throughout the program, students were continually asked to revisit and reflect upon their learning as well as their accomplishments. These regular intervals of students and facilitator monitored checkpoints enabled the opportunity to provide/receive written and verbal feedback, as well as course-correct their work immediately. In addition to the use of art critiques to reflect upon their progress, each student was also required to write an artist statement about their team’s sculpture, including the intentions, thoughts, and meanings that went into the creation of such a product. In doing so, the facilitators and students were able to demonstrate their learning in a variety of ways. The teams had an opportunity to present their sculptures and artist statements in a gallery opening for fellow GEAR UP students and staff members.

Demographics
• 25 9th grade students enrolled in the GEAR UP Program in South Dakota

Sponsors
• Gear UP
• South Dakota Innovation Lab

*Students building their sculptural art installation.*
The Dakota/Lakota medicinal plants program was formulated to educate students on what was once the tribal way of life. Survival on the land was based on the beliefs that plants were considered sacred (wakan) and their spirit was able to heal the sick, both physically and spiritually, through the guidance of the Medicine Man or Woman.

Unfortunately, many of the Dakota/Lakota people have lost the in-depth knowledge of medicinal plant use, but now are learning again about its traditional uses in everyday life. This program aimed to teach students about medicinal plant uses and how to harvest them.

This program educates parents, students, and the community regarding natural resources that are currently available to them. It shares the Dakota/Lakota way of life and how medicinal plants are harvested and prepared, and what ailments they cure. Students learn natural and human induced hazards from various plants that may become dangerous to a person’s health.

Most of the Dakota/Lakota people are living between two worlds. On one side is modern medicine. On the other are the traditions of the people. According to Dakota/Lakota elders; “Western medicine wants to only heal the body, where as our people believe that you got to look at something else too: mind, heart, soul, spirit. At the point the body shows physical ailments, some other problem hasn’t been dealt with, and it manifests itself in sickness.” Today, medicinal plants are commonly used in the Dakota/Lakota traditional homes. Students were invited to explore the knowledge, uses, and whereabouts of plants that have been passed down by elders.

After generations of drastic social and cultural changes, Dakota/Lakota people face epidemics of diabetes, alcoholism, and obesity. This generation is about merging the old ways with the new, and introducing a natural approach to healing by restoring balance to the spiritually wounded and gathering/using medicinal plants that are always available. Often, young Dakota/Lakota women are spearheading this effort.
Learning Objectives
1. Develop the skills and knowledge needed to construct their own understanding of science, technology, and the world in which they live.
2. Teach students to think for themselves when determining whether or not a cultural belief about a plant is borne out through the scientific method. Students use scientific processes and tools, and technology to test these beliefs and learn about plants.
3. By practicing good habits of research, students systematically learn the process skills needed to participate in meaningful scientific investigation of natural phenomena.
4. Conduct a variety of labs and experiments to answer questions about a particular plant used by the Dakota/Lakota people. Students will learn the effectiveness of their plant for a variety of uses.

Highlighted Activities
- Identifying Dakota/Lakota Medicinal Plants in South Dakota
- Learning Dakota/Lakota names
- Learning to identify and write plant description
- Understanding native habitats
- Discovering plant propagation
- Identifying the flowering period of native plants

Demographics
- Ninth Grade students enrolled in the GEAR UP Program in South Dakota

Sponsors
- GEAR UP
- South Dakota Innovation Lab

Students study medicinal plants and their effects and usefulness for human consumption.
What happens when you combine engaged students, enthusiastic teachers, and skilled community experts in a performing arts experience like no other? Shadowbox® Academy Summer Bootcamp! Through the joint efforts of Shadowbox Live®, ECOT (Electronic Classroom of Tomorrow), and PAST, a three-week arts intensive program was created that provided master class workshops in four performance disciplines: singing, dancing, acting, and musicianship, as well as discussions of arts administration, production, life skills, and professionalism. Led by theater and educational professionals, teachers worked alongside students gaining valuable experience in the performing arts.

Encore! Encore!! That is exactly what the Shadowbox Bootcamp created this year. Inspired by its success with the STEM Rocks the Box project, Shadowbox Live implemented the Shadowbox Academy Summer Bootcamp. Shadowbox Bootcamp is a three-week summer intensive experience for high school and college students, ages 16 to 21 years of age. This year, both students and teachers auditioned in all four major Rock Art discipline areas: modern dance, rock vocals, rock instruments, and acting.

The Shadowbox Bootcamp has a holistic educational goal of teaching students life skills. The program teaches students how to build resilience and perseverance, to overcome their fears, to receive constructive feedback and, ultimately, to experience the thrill of performing before a live audience. Students who have participated in the Shadowbox Academy Summer Bootcamp often cite it as one of the most pivotal, life-changing events they have experienced.

Students are offered real-world opportunities to audition, perform and master performance in the rock arts, vocal, comedy, dancing and technical experiences in theater.
Learning Objectives
1. Teach students life skills such as building resilience and perseverance to overcome their fears.
2. Help students receive critical and constructive feedback.
3. Offer students the experience and the thrill of performing before a live audience.
4. Give students a real world experience of being a rock art performer.

Highlighted Activities
- Experience workshops and training in each of the four major Rock Arts disciplines.
- Instructors for the program are professional performers.
- Students invited to attend LunchBox shows.
- Juried in each of the disciplines to determine their best talents.
- Experience rehearsals prior to the show.
- Join the professional performers in an evening show for the general public.

Demographics
- High School and College Students, ages 16 - 21
  - The Arts & College Preparatory Academy - 1
  - Columbus State Community College - 1
  - Denison University - 1
  - ECOT - 4
  - Fort Hayes Alternative Arts High School - 1
  - Geert Groote College of Amsterdam - 1
  - Graham School - 1
  - Grove City High School - 1
  - Miami University - 1
  - Olentangy Liberty High School - 1
  - Ohio State University - 2
  - Otterbein College - 1
  - Reynoldsburg eSTEM Academy - 1
  - Worthington Kilbourne High School - 2N/A - 1
  - Total: 20

Sponsors
- Shadowbox Academy

Students are pushed to explore their inner diva at the Shadowbox Live Bootcamp experience.

Rock Your Potential Poster advertising the Shadowbox Live Summer Boot Camp 2014 Shadowbox Academy Bootcamp.
In its second year, Growing SOIL program grew from 9 to 15 schools, and launched a second prototyping field station through a partnership with Hocking College and its environmental programs. Each school participating in the SOIL program was given 20 slots to send students to Hocking College for a one week immersion in transdisciplinary problem-based learning focusing on water quality.

Hocking College Field School, Weeks 1 and 2
- Hocking College, Nelsonville Ohio
- June 1st - June 12th
- Students Directors:
  - Hannah Swope, Undergraduate Student, Hocking College
  - Dawn Robotyn, Undergraduate Student, Hocking College
  - Tracy Simons, Undergraduate Student, Hocking College
  - Jarrod Ball, Undergraduate Student, Hocking College
  - Zachary Buskirk, Undergraduate Student, Hocking College
  - Sierra Gale, Undergraduate Student, Hocking College

During the first two weeks of the Hocking College Field School, led by student directors from Hocking College, middle and high school students explored and learned about the importance of water quality and how water runoff can have deleterious effect on surrounding areas. Students were broken up into smaller groups of 8-10 and rotated through 3 different sessions. The sessions focused on 3 main areas, each concentrating on a main question that would need to be answered to complete their design challenge.

Soil Quality - What causes soil erosion? Students ventured out to three different rivers and streams around Hocking College to collect soil samples using a soil probe. After visiting each site, students returned to the classroom to determine the color, texture, porosity, permeability, and turbidity of each soil sample. Working in their groups, students were given a mini design challenge to create a way to determine which of the soil samples had the largest threat of erosion.
Water Quality - *How is water quality determined?* Traveling to two river locations, including the Hocking River, participants worked to find the water quality of each location. Students learned how to use a pH meter and got “down and dirty” using dip nets to find macro-invertebrates which they identified using a dichotomous key. Returning to the classroom, the students were given the challenge of determining the water quality of each site using the information they gathered in the field.

Wetlands - *How do wetlands filter water?* Wetlands are among the most important ecosystems on Earth, and during this session, students found out why. Traveling to a pond, a wetland, and a steel slag leech bed, students found the pH, conductivity, and the water temperature of each using a pH meter. After visiting each site, students returned to the classroom and dissected cattails using dissecting microscopes. They analyzed and compiled the data they collected while in the field. Students then used the information gathered during the week to design their own human-made wetland or stormwater basin. At the end of the week they presented their designs to their fellow campers, Hocking College professors, and local community members.

**Learning Objectives**
1. Teach students to use several field-based data collection techniques, analyze data, and apply data to study water quality.
2. Encourage and guide students in understanding human impact on water quality and the environment.
3. Teach students how they can use technology to help identify flora and fauna both in the field and in the classroom.

**Highlighted Activities**
- **Hocking College Logan Campus** - During this day trip, led by advanced energy program instructor Darin Hadinger, the students garnered hands-on experience while learning about alternative energy. Hocking College Logan Campus is a green building and students explored the different aspects of the building that could be used back at their schools, such as vertical gardens and solar panels.

- **Hocking College Nature Center** - The Nature Center director, Dave Sagan, invited students to have a hands-on experience with both snakes and birds. Students were able to hold and learn about a variety of snakes ranging from garters to an albino Burmese python, and even see a rattlesnake eat!

**Demographics**
- Fairfield Union - Middle School: 18
- Fairfield Union - High School: 10
- Federal Hocking - Middle School: 9
- Millersport - Middle School: 21

*Students from nine Fairfield County District schools participated in a variety of ecology-themed activities during the first two weeks of June at the Hocking College campus in Nelsonville, Ohio.*
During the final two weeks of June, students from all around Ohio ventured to Hocking College to learn about ecology. Each day, students had the chance to explore a new ecosystem in the Hocking College area and apply new skills to collect and analyze data. Students used their data and information to design and reclaim a local area to promote biodiversity and community involvement. On Friday of each week, students presented their designs to their fellow campers, Hocking College staff, and local community members.

Hocking College Field School, Weeks 3 and 4
- Hocking College, Nelsonville Ohio
- June 15th - June 26th
- Director:
  - Cari Ann Ritzenthaler, Graduate Student, Bowling Green University

During weeks three and four, students were given the design challenge of reclaiming an area in a community to promote both biodiversity and community involvement. To help create their designs the week was based around three themes:

**Biodiversity in ecosystems** - Exploring four different ecosystems around Hocking College, students worked to discover what flora and fauna they could find. Using phone apps, books, and the knowledge of the director, students identified flora and fauna, and discussed which of the ecosystems had the greatest biodiversity.

**Maintaining ecosystems** - Each ecosystem has threats ranging from human impact to invasive species. Students, working in groups, researched invasive species in each of the four ecosystems, searched for the invasive species while exploring in the field, and made decisions on how they would control the species from spreading.

**Human Impact on ecosystems** - While out in the field, students quickly learned how human impact affects ecosystems. Before going out to explore, students learned the 7 basic principles of “leave no trace”, and practiced them as they traveled through different ecosystems. After visiting each ecosystem, students designed and built their reclaimed areas based on their own solutions to the problem. At the end of the week, students presented their solutions to their fellow classmates, Hocking College staff, and community members.

**Change Maker**

Cari Ritzenthaler is a recent graduate from Bowling Green State University with a major in Ecology and Conservation and a minor in Environmental Education, and will be continuing her studies towards a Master’s degree. She specializes in working with invertebrates and reptiles, and is especially interested in understanding box turtles.
Learning Objectives
1. Teach students to use several field-based collection techniques to collect data.
2. Encourage and guide students in understanding human impact on the environment.
3. Teach students how they can use technology to help identify flora and fauna while both in the field and in the classroom.
4. Develop an appreciation of ecosystems and the flora and fauna found within those ecosystems.

Highlighted Activities

- Fish Hatchery - Students traveled to the Lake Snowden fish hatchery, and toured the facility where they observed the workers collect catfish eggs, and even saw the catfish eggs hatch!

- Wayne’s National Forest Visitor Center - To learn more about ecosystems and biodiversity in the southern Ohio region, students traveled to the Wayne’s National Forest Visitor Center. Students were able to venture along the path, while reading plaques and billboards about different flora and fauna.

Demographics:
- Baldwin STEM Middle School: 5
- Metro High School: 6
- Metro Middle School: 5
- Millersport Middle School: 4
- MC2 STEM High School: 5
- National Inventors Hall of Fame STEM Middle School: 5
- Reynoldsburg eSTEM Academy: 1
- Starling Middle School: 1

Sponsors
- Fairfield County Educational Service Center
- Hocking College

Students from many different school districts participated in a variety of water-quality-themed activities during the first two weeks of June at the Hocking College campus in Logan, Ohio.
Andrew Bloom
A graduate of Ohio Wesleyan University with a major in Biology and a minor in Education. He has been a Physical Science teacher in Columbus City Schools for 4 years. He has worked with PAST for 5 years. His passion is teaching young people about the world that surrounds them and how those things all work.

Katie Sedin
A graduate of St. Norbert College, DePere, WI, with a major in Elementary Education and a minor in Religious Studies. She worked at Boy Scout Camp for eight summers where her love of the great outdoors blossomed.

Erica Noll
A recent graduate of Capital University with a major in Interdisciplinary Studies in Biology and Education, with a specific focus in Informal Education. Her passion lies in helping people to find answers about the world around them, and helping to explain why things are the way they are. Her dream job is to work as the educational programmer for a museum.

Caitlin Davis
A graduate of Otterbein University with a Bachelor degree in Middle Childhood Education and an Associates degree in Arts. She has been working for South-Western City Schools since graduating. Her passion is being outside exploring and discovering new things while also opening students’ minds to new adventures.

Natika Washington
Going into her 5th year at Ohio State University as a Sport Industry and Communication major. She is entering her 7th year working with FIRST Robotics where she has spent 4 years as a student and 3 years as a mentor. Although this is her last year at Ohio State University, she is planning to stay involved with FIRST to help promote the STEM field.

Zac Patterson
A graduate of Bowling Green State University with a major in Physics & Earth Science Education. He is starting his 4th year of teaching physical science at The Arts & College Preparatory Academy in Columbus. He enjoys helping students explore their curiosity through scientific investigations.
Community Cardboard Challenge

ROV Challenge

Spring Fling

STEM Rocks the Box
PAST and Columbus Museum of Art (CMA) have partnered for three years, bringing the Cardboard Challenge to communities in Central Ohio. Each year area schools and their districts are invited to design Community Cardboard Challenge Events to help promote creativity. This year, the event experienced exciting growth and expanded to 10 Columbus locations, the most it has ever had.

The PAST Innovation Lab has worked with CMA for three years bringing the Cardboard Challenge to communities in Central Ohio. The Cardboard Challenge is an annual event that celebrates children’s creativity. Every year, children, parents, and friends can dream and build whatever they want, using cardboard, recycled materials, and imagination. This challenge is global, and last year had over 125,000 participants from 46 countries. In Columbus, the event was held at the Columbus Museum of Art for the last two years, but this year, the Cardboard Challenge took place over the following 10 locations:

- Columbus Gifted Academy
- COSI
- Dublin Scioto High School
- Duxberry Arts IMPACT Elementary School
- Evening Street Elementary School
- Hilliard Innovative Learning Center
- Montrose Elementary School
- Reynoldsburg eSTEM Academy
- St. Andrew School
- Wickliffe Progressive Elementary School

Creativity is a critical essential skill for problem-solving, adapting, and communicating in a world that changes with increasing rapidity. The Cardboard Challenge is a fun way to tap into children’s natural curiosity and creativity to solve challenges posed by facilitators, other teams, and most importantly, themselves.
Learning Objectives
1. Develop children’s natural creative talents.
2. Foster creativity and problem-solving.
3. Promote creative thinking and collaboration.

Sponsors
• Columbus Museum of Art
• COSI
• The Mattress Firm

Proud students display their imaginative creations.

Future engineers used the Day of Play to invent wearable Remote Operated Vehicles.

The Day of Play sign was a collection point of imaginative creations.

The Cardboard Challenge was about exploration, problem-solving and pride.

Proving imagination doesn’t recognize an age restriction.

Problem solving is always at the forefront of the Cardboard Challenge.

Plenty of material for creating and exploring dreams and imagination.

The Cardboard Challenge makes for great family time as well.
On May 7th, 2015, the ROV Design Challenge took place at COSI (Center Of Science and Industry). 21 teams of students from grades 7-12 came from central and northeastern Ohio to compete in a Basic or Advanced underwater course with their classroom-built ROVs. Teams also gave presentations about their design and construction process to expert judges. These presentations were judged on organization, evidence of collaboration, content, and answers to specific questions that the experts posed.

The ROV Challenge invited Ohio students in grades 6-12 to join the challenge by participating with their Remotely Operated Vehicles (ROV). This was the inaugural year of ROV Design Challenges in Central Ohio, with an initial showcase of ROVs last November being a tremendous success. Each team had the opportunity to “fly” their ROV in the COSI shipwreck tank racing against time to complete assigned tasks. There were two levels of competition. The Basic Challenge was opened to new teams with the goal of introducing students to ROV operations and functions. The Advanced Challenge was for experienced teams and presented more challenges and tasks.

In addition to flying their ROVs in the shipwreck tank, teams also submitted a Statement of Invention (SOI) and a Digital Presentation, detailing their design, construction, testing, and modification process prior to the day of the challenge. These two items were judged separately on a rubric. The day of the challenge, each team gave a technical presentation to the expert judges, and had to answer questions about the construction and design of their ROV.

Students were asked to brainstorm, design, build and compete at COSI in the aquatic tank during the ROV Challenge. Teams from multiple High Schools around Ohio converged at COSI to compete and test their designs in the COSI aquatics tank.

Change Maker
Alyssa Reder is an Administrative Assistant at the PAST Foundation. After receiving her Bachelor’s degree in Middle Childhood Education from Ohio State University, Alyssa decided to pursue the world of educational research. This is where she found her true passion for the improvement of education for administrators, teachers, and students.
Basic ROV Tank Challenge:
- The ROV must submerge and begin the course from the specified landing pad within the tank.
- A timer will start as soon as the ROV lifts off the landing pad [each ROV is allotted a maximum time of 10 minutes to complete the course].
- The ROV must navigate from the landing pad through a series of obstacles (3 hula hoops suspended off the bottom), turn and successfully retrace its path.
- Finally the ROV must land on the specified landing pad to complete the challenge.

Advanced ROV Tank Challenge:
- The ROV must submerge and begin the course from the specified landing pad within the tank.
- A timer will start as soon as the ROV lifts off the landing pad [each ROV is allotted a maximum time of 15 minutes to complete the course].
- The ROV must navigate from the landing pad through an obstacle (a hula hoop suspended off the bottom) then successfully retrieve 2 of 3 possible scientific samples, and store them on the ROV.
- Finally the ROV must return to the specified landing pad to complete the challenge.
- The tank challenge is timed, however the time of the flight only comes into play should there be an overall score tie between teams in the entire event.

Learning Objectives
1. Learn to design, engineer, and modify an ROV to accomplish a set of tasks that mirror the types of research and recovery facing underwater vehicles in today’s scientific expeditions.
2. Document through writing, illustrations, photographs, and/or other forms of media the design process of building an ROV.
3. Demonstrate 21st century skills through presenting a Technical Presentations to a professional panel of judges.

Highlighted Activities
- For the ROV Design Challenge, PAST invited field experts Dan Warren and Rob Church from C&C Technologies to participate as judges. PAST also invited the Father of Side Scan Sonar, Marty Klein, to be a guest judge for the Technical Presentations. (See judge biographies on the next page.)

- Students from all over Ohio were invited to participate in this challenge. A group of Middle School aged students from Laurel School, located in the Cleveland area, traveled to Columbus to compete against High School teams. This Middle School team received the award for “Best Technical Presentation” in the Basic Challenge category.

Demographics
- Dublin Coffman High School: 5 Teams (20 students)
- Laurel School: 1 Team (4 students)
- Metro Early College High School: 6 Teams (24 students)
- Reynoldsburg eSTEM Academy: 9 Teams (36 students)

Sponsors
- BOEM
- C&C Technologies
- COSI

Students are reviewing their technical presentation before presenting the the panel of ROV experts on the day of the event.
ROV Judges Bios:

National Judges:

Martin Klein, Founder and former President, Klein Associates, Inc.
Martin Klein, known as “The Father of Side Scan Sonar”, is the Founder and former President of Klein Associates, Inc. (now L-3 Klein) of Salem, New Hampshire. An MIT graduate, he was Program Manager for Sonar Systems at E.G. & G. International where he developed the first commercially successful side scan sonar systems. Klein’s sonars have been used around the world to help find many famous shipwrecks including the Titanic, the Atocha, the Lusitania, the Edinburgh, the DeBraak, the Breadalbane, the Hamilton and Scourge, the Lake George Radeau (oldest warship in the U.S.), Sir John Franklin’s HMS Erebus and countless others. He is a Life Member of the IEEE. He was chosen as the New Hampshire Small Business Person of the Year in 1983.

He is a fellow of the Explorers Club and the Marine Technology Society and is the former Director of Budget and Finance for the Marine Technology Society. He was elected to the National Academy of Engineering “for the development of underwater imaging systems that have contributed to ocean exploration and the recovery of high value objects.” He is on the Advisory Board of the MIT Sea Grant Program and the Stellwagen Bank National Marine Sanctuary, and is on the Collections Committee of the MIT Museum. He serves as a judge and mentor for the Marine Advanced Technology Education (MATE) ROV Competition and has received many other awards and recognition for his pioneering work in sonar and ocean exploration.

Daniel J. Warren, Senior Marine Archaeologist, C & C Technologies
Daniel J. Warren is a Senior Marine Archaeologist at C & C Technologies, An Oceaneering International Company. Daniel received his MA from East Carolina University’s Program in Maritime History and Nautical Archaeology in 1998. Daniel’s research focuses on the location, documentation, and analysis of deep-water shipwrecks. He is currently serving as Co-Principal Investigator for the archaeological analysis component of the Bureau of Ocean Energy Management’s Comparative Analysis of an Oil Spill on the Biota Inhabiting Several Gulf of Mexico Shipwrecks Project.

Robert Church, Senior Marine Archaeologist, C & C Technologies
Robert Church is the Senior Marine Archaeologist for C & C Technologies, Inc. an Oceaneering International company. He has worked as an underwater archaeologist for over 20 years and has been with C & C since 1998. Mr. Church has been the chief scientist on several deep-water shipwreck projects and has conducted numerous deep-water field investigations of historic shipwrecks using ROVs and AUVs. These have included the archaeological investigation of the German U-boat, U-166, passenger freighter SS Robert E. Lee; several other World
War II casualties, and 19th Century sailing vessels. A variety of ROV systems were used during these projects from large work ROVs to small inspection class systems.

Mr. Church has a Masters of Arts degree in Maritime History and Nautical Archaeology from East Carolina University and a Bachelors of Arts degree in History with a minor in Biology from the University of Arkansas at Little Rock. For his work in deep-water archaeology, he received the “Corporate Leadership Award” from the U.S. Department of the Interior (CORLA, 2002), the “Cooperative Conservation Award” for the U.S. Department of the Interior (2005), and the “Excellence in Partnering Award” From The National Oceanographic Partnership Program (NOPP, 2007 & 2011).

Columbus-Based Technical Judges:

Chris Brandon, Engineer
Chris Brandon has 17 years of experience in product design, engineering, management, testing, and manufacturing. He has successfully led and contributed to several project initiatives with an ability to communicate technical concepts to both technical and non-technical audiences. Mr. Brandon has successfully managed teams of engineers, designers, technicians, and developers in meeting customer deliverables for projects across a broad range of technical fields including government research, vehicle telematics, hydrocarbon processing, and consumer products. Mr. Brandon is a strong proponent of problem-based learning and considers the teachings of Dr. Richard Feynman among his many sources of inspiration.

Tim Carpenter, Mechanical Engineer
After graduating from the University of Cincinnati with a degree in Mechanical Engineering (B.S.M.E), Tim Carpenter worked for over 29 years at Battelle designing, developing, and testing specialized equipment for use in various environments, including underwater and low space (material science experiments in microgravity aboard the Space Shuttles and sounding rockets).

Dick Diffenderfer, Director, Technology and Engineering Showcase
Ohio Technology and Engineering Educators Association
Prior to retirement Dick Diffenderfer had a forty nine year professional career representing a variety of experiences. He graduated from Trenton State College, New Jersey in 1962 with a degree in Industrial Arts. Later formal education includes a MA from Trenton State College (1966) (now College of New Jersey), and PhD from Ohio State University (1974). Mr. Diffenderfer worked for the state departments of education in New Jersey (1966-1967), Delaware (1967-1969), and Ohio. The most recent assignment for 29 years (1982-2011) was as state consultant for Technology Education in Ohio.

Mr. Diffenderfer serves on the Steering Committee for National Engineers Weeks, Future City Competition – Ohio Region, and was a frequent contributor to International Technology and Engineering Educators Association (ITEEA) teacher IdeaGarden LISTServ. In 2007 he was named to the Ohio Technology Education Association (OATEA) Academy of Fellows. He holds Life Memberships in the International Technology Education Association and Career Technical Education Association. In retirement he is currently engaged in the technological literacy STEM outreach efforts of the Ohio Technology and Engineering Educators Association.
On May 22nd, 2015, at Baldwin STEM Middle School, 375 students ranging from grades 2 to 12 gathered to participate in Spring Fling. Middle and High School teams competed in the Catapult, Trebuchet, and Globe Theater Challenges. Elementary students joined in the fun by creating their own mini-catapult using just spoons and marshmallows to simulate catapulting actions. Along with the students who participated, parents, teachers, administrators, and volunteers came to experience the Globe Performances, Heraldic Banners, and of course the flinging of water balloons!

Spring Fling is a Science, Technology, Engineering, and Math (STEM) focused design challenge that allows students of all ages to participate. High School students, 9th-12th grades, designed and built trebuchets. Middle School students, 6th-8th grades, designed and built catapults. Along with this classroom-built machinery, students in grades 5-8 participated in the opportunity to design heraldic banners, modernize a scene from a famous Shakespeare play, and design their own Castle Siege board game. Elementary school students were able to join in on the day and participate in building Mini-Catapults.

Here are the challenges for 2015:

- Catapult Challenge
- Trebuchet Challenge
- Castle Siege Board Game Challenge
- Globe Performance Challenge
- Heraldic Banner Challenge
- Mini-Catapult Challenge

For Trebuchet and Catapult challenges, students had to design, build and operate a trebuchet or catapult within the prescribed specifications in order to compete against other teams by flinging water balloons at a set of targets to demonstrate the team’s ability to control and predict where the water balloon will land.

The Castle Siege Table Game challenge was all about strategy to build and compete in a warfare miniature game. The game includes both a defensive force that attempts to hold a modular castle fortification against an offensive force that utilizes both troops and siege machines.

Change Maker
Alyssa Reder is an Administrative Assistant at the PAST Foundation. After receiving her Bachelor’s degree in Middle Childhood Education from Ohio State University, Alyssa decided to pursue the world of educational research. This is where she found her true passion for the improvement of education for administrators, teachers, and students.
Learning Objectives
1. Experience rapid prototyping and construction deadlines in response to a design constraint in the field.
2. Learn to apply physics, engineering, and mathematical concepts to a real-world problem or challenge.
3. Opportunity to apply modeling and diagramming skills to illustrate their designs and make their solution understandable to the public at large.
4. Integrate teamwork and social skills into a flexible strategy for building a prototype or putting on a performance.
5. Practice, apply, and adapt writing and modeling skills in a competitive environment.

Highlighted Activities
- Student teams competing against each other in the Trebuchet Challenge and the Catapult Challenge showed both teamwork and good sportsmanship. The teams and volunteers worked together to move through the challenges efficiently and effectively while still having fun!
- The student’s Heraldic Banners were vast in their variety of designs and creativity. The teams put forth their best effort to highlight 21st century skills.
- The Castle Siege Game Board designs that were presented at the Challenge were unique and well thought out in terms of strategy. The students enjoyed not only playing on their boards, but also being able to see what others had created.

Demographics
- Baldwin STEM Middle School, 65 teams (260 students)
- Nexus Academy, 1 team (4 students)
- Pickerington Central High School, 7 teams (28 students)
- Reynoldsburg eSTEM Academy, 2 teams (8 students)
- Reynoldsburg (HS) 2 Academy, 1 team (3 students)
- Reynoldsburg Herbert Mills STEM Elementary, 6 teams (24 students)
- Reynoldsburg Summit STEM Elementary, 16 teams (48 students)

Sponsors
- Baldwin STEM Middle School
Did you ever have a dream to be on stage? A desire to entertain others? Students from area STEM high schools did just that! Students interested in performing first started with auditions in two of their preferred Rock Arts disciplines. Once accepted into the program, students begin an intensive two-week rehearsal schedule. They worked side by side with professional artists to learn comedy acting, singing, dance, musical instruments, backstage, theater lighting and sound, and other related entertainment jobs. At the end of the week, students performed in a Shadowbox Live® showcase.

Students from area STEM high schools participated in an extraordinary performance on Monday, April 20th, and gave an encore performance on Tuesday, April 21st.

This performance aimed to provide students with an authentic experience of life as a performer. Following auditions, students were cast in one or two disciplines depending on their talents. Not all students were accepted into the program - further exposes them to competitive nature of this occupation.

Participating students were welcomed into the program with everything needed to be successful. Their informational packets include a letter of assignment with their instructor’s name, a list of expectations, an information sheet for costumes, and an information sheet for media relations to assist with personal promotional and instructional materials to help guarantee the students’ success.

Next a rehearsal schedule was created for each student. With over 30 participants, once the rehearsal schedule is set students are expected to attend those times. With a one-week window to perfect the performance, it is critical that everyone takes responsibility for their own success.

Finally, the students put their knowledge into practice by performing alongside seasoned actors, singers, and musicians for a real audience in a sketch comedy performance.

Change Maker
Stacie Boord has been performing professionally her whole life. For the last 25 years she has been a leader with the Columbus-Ohio based theater group, Shadowbox Live. Shadowbox Live the largest resident-theater group in America is committed to bringing high-quality, real-world arts experiences to Ohio’s students.

STEM Rocks the Box
Students were challenged to perform in their chosen expression before a live audience.
and rock n’ roll show called “STEM Rocks the Box” to a sellout crowd. This program is designed to give the students a real world experience and explore the possibility of a career in entertainment.

**Learning Objectives**
1. Experience the life of a performer and explore the possibility of a career in entertainment.
2. Learn to schedule work, rehearsal, and performance timelines and schedules.
3. Experience the audition process and the character traits that make competing in theater an easier and manageable experience.
4. Integrate financial planning and budget strategies into the process to give students a leg up for managing a career where a steady paycheck is not always a given.

**Highlighted Activities**
- In its fifth year of challenging and showcasing Central Ohio youth to step up and perform before a live audience
- STEM Rocks the Box this year held its first ever encore presentation
- Challenging students to perform, audition, learn and find their passion through real-world applications and opportunities
- Building communication, and collaboration skills
- Instilling a holistic learning in the arts experience
- Real-world rock arts performance experience

**Demographics**
High School students, ages 16-19

- Africentric High School - 1
- Columbus Alternative High School - 2
- ECOT - 4
- Fort Hayes Alternative High Schools - 1
- Graham School - 1
- Metro Early College High School - 18
- Reynoldsburg (HS) 2 Academy - 2
- Reynoldsburg eSTEM Academy - 1
- West High School - 1
- Whetstone High School - 1
- Total: 32

**Sponsors**
- Shadowbox Live
Where We’ve Come From

PAST Bridge Programs

Annalies Corbin, PhD – CEO and President
In 2000, Dr. Corbin founded PAST Foundation and directed the first two Bridge Programs in 2001: the Marshall/Firehole Hotel Underwater Archaeology Project and Red River Archaeology Project. In 2005, she turned her focus to building and growing the PAST Foundation into a nationally recognized leader of STEM education and problem-based learning.

Sheli Smith, PhD – Chief Academic Officer
Sheli is part of the original PAST team. She oversees all programs at PAST including Bridge Programs. Starting in 2001 she has led and overseen more than 30 bridge programs across the nation, providing foundation and vision for the development and evolution of the bridge programs.

Anne Corscadden-Knox – Bridge Program Coordinator (2006-2012)
Anne first joined PAST Bridge Programs in 2004 as participant of the Frolic Field School. Two years later she joined the PAST staff coordinating bridge programs and transitioning the foundation from collegiate only oriented field experiences to programs that spanned grades 5 through 16 and helped students of all ages bridge concepts from one level to the next.

Ketal Patel, Director of School Design and Strategy (2011-Present)
Ketal joined PAST in 2011 and created the Hybrid Summer Bridge Programs that blends field experiences for students and teachers with professional development. She built and directed hybrid programs at Dakota Wesleyan University and GEAR UP in South Dakota, which are now being replicated nationally.

Beth Witte – Bridge Program Coordinator (2013-2015)
Beth joined PAST in 2013 after working two years at an ecology camp in North Carolina. She directed and developed Bridge Programs focusing on STEM Outdoor Innovation Labs that continued to grow and expand the Bridge Programs’ content and vision.

Calvin Mires, PhD – Bridge Program Director (2015-Present)
Calvin joined the PAST team in the spring of 2015 from East Carolina University Program in Maritime Studies. As the current director, he is excited both to continue the rich and diverse programs PAST has established and continue to develop new programs in Ohio and around the nation.

Ashley Bloom – Bridge Program Innovator (2014-Present)
Ashley joined PAST in 2014 as program staff for the SOIL Project immersion program at Kelleys Island Environmental Field Station in Lake Erie. She grew the SOIL program helping establish a second environmental field station at Hocking College. The current Bridge Program Coordinator, Ashley is also part of the teaching team in the new Innovation Learning Lab.
2015 Sponsors

BOEM
C&C Technologies
Columbus Museum of Art (CMA)
COSI
Dakota Wesleyan University
Fairfield County Educational Service Center (Fairfield ESC)
Franklin County Common Pleas Court
GEAR UP
Hocking College
Massachusetts Board of Underwater Archaeological Resources (MBUAR)
Ohio Bureau of Criminal Identification and Investigation
Ohio State University Department of Anthropology
Ohio State University Department of Entomology
Ohio State University Department of Safety
Ohio State University Waterman Farm Agriculture Research Complex
Salem State University (SSU)
Seafaring Education and Maritime Archaeological Heritage Program (SEAMAHP)
Shadowbox Academy
State of Ohio Straight A Grants
South Dakota Innovation Lab (SDIL)
The Mattress Firm