

STEM Scale-Up Program

Menu for 2017-2018

GREATNESS[®]
STEMS
FROM IOWANS

GOVERNOR'S STEM ADVISORY COUNCIL

2017-2018 STEM Scale-Up Program Menu

Curriculum for Agricultural Science Education (CASE) – Agricultural Power and Technology.....1

Description: Students are immersed in inquiry-based exercises that tie in the math and science of agricultural mechanics and engineering. Throughout the course, students apply technical skill while becoming competent in the process used to operate, repair, engineer and design agricultural tools and equipment.

Grade Level: 9-12

Contact: Joshua Remington, Iowa FFA Foundation, joshua.remington@iowaffafoundation.org

For more information: <http://www.case4learning.org/>

Engineering is Elementary (EiE)..... 2

Description: Engineering is Elementary is a research-based, standards-driven, and classroom-tested curriculum that integrates engineering and technology concepts and skills with elementary science topics.

Grade Level: 1-6

Contact: Christopher Soldat, Grant Wood AEA Van Allen Science Teaching Center, csoldat@gwaea.org

For more information: <http://www.eie.org/>

Engineering the Future (EtF)*..... 3

Description: Engineering the Future (EtF) is a modular, full-year, 8-12th grade curriculum of introductory engineering and technological literacy for all students, including women and minorities and any career aspiration. The specific module being offered, "Project 1.0: Design the Best Organizer in the World," provides students the opportunity to design, build and test prototypes while empowering them to apply math, science and engineering practices, work creatively and collaboratively, communicate and experience the engineering design cycle in real-world design and physics applications.

Grade Level: 9-12

Contact: Liz Pabon, It's About Time, lpabon@iat.com

For more information: <https://www.iat.com/courses/engineering/engineering-the-future/>

FIRST Robotics Competition..... 4

Description: High school students call it "the hardest fun you'll ever have." Under strict rules, limited resources and an intense, six-week time limit, teams of 10 or more students are challenged to raise funds, design a team "brand," hone teamwork skills and build and program industrial-size robots to play a difficult field game against like-minded competitors.

Grade Level: 9-12

Contact: Marcy Seavey, University of Northern Iowa, seavey@uni.edu

For more information: www.firstinspires.org/robotics/frc

Making STEM Connections..... 5

Description: The Science Center of Iowa's Making STEM Connections program provides a kit, including tools, teacher resources and lessons to inspire the "makers mentality" in youth ages 5-14 through highly engaging, interactive and safe experiences. Building upon the natural inclination to tinker, this program empowers participants to explore STEM principles and 21st Century Skills as they design, create and make.

Grade Level: K-8

Contact: Jolie Pelds, Science Center of Iowa, jolie.pelds@sciowa.org

For more information: www.sciowa.org/makingstemconnections

PowerTeaching Math..... 6

Description: Developed by Johns Hopkins Researchers, PowerTeaching Math is the leader in cooperative learning mathematics instruction helping teachers transform their classrooms environments to engage ALL students.

Grade Level: 6-8

Contact: Bonnie Darby, Success for All Foundation, bdarby@successforall.org

For more information: www.sfapowerteaching.org/

Project Lead The Way (PLTW) – Launch..... 7

Description: The program empowers students to adopt a design-thinking mindset through compelling activities, projects and problems that build upon each other and relate to the world around them. As students engage in hands-on activities in computer science, engineering and biomedical science, they apply and reinforce the knowledge and skills they've acquired in core academic areas.

Grade Level: K-5

Contact: Terry Ausman, Project Lead The Way, tausman@pltw.org

For more information: www.pltw.org

Ramps and Pathways* 8

Description: Ramps & Pathways (R&P) is an NSF-funded, developmentally-appropriate and classroom-tested approach to integrative STEM that engages young children. R&P is designed to nurture engineering habits of mind as children build their own technology of marble runs; a type of Rube Goldberg machine. In the process, children grapple with the laws of physics, properties of objects, how those properties affect motion and engage in spatial thinking.

Grade Level: PreK-2

Contact: Beth D. VanMeeteren, Regents' Center for Early Developmental Education, UNI, Regents.center@uni.edu

For more information: <http://www.rampsandpathways.org>

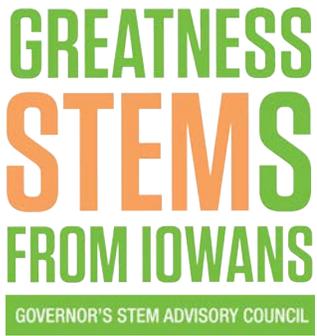
Spatial-Temporal (ST) Math 9

Description: ST Math is game-based instructional software designed to boost math comprehension and proficiency through visual learning. Integrating with classroom instruction, ST Math incorporates the latest research in learning and the brain and promotes mastery-based learning and mathematical understanding. The ST Math software games use interactive, graphically-rich animations that visually represent mathematical concepts to improve conceptual understanding and problem-solving skills.

Grade Level: K-6

Contact: Tom Allen, MIND Research Institute, tallen@mindresearch.org

For more information: www.mindresearch.org/



Curriculum for Agricultural Science Education (CASE) - Agricultural Power and Technology

2017-2018 STEM Scale-Up Program

Overview: CASE™ utilizes science inquiry for lesson foundation, and concepts are taught using activity-, project- and problem-base instructional strategies. In addition to the curriculum aspect of CASE™, the project ensures quality teaching by providing extensive professional development for teachers that leads to certification.

Grade Levels: 9-12

Program Summary

“Agricultural Power and Technology” course is a foundation course within the CASE™ sequence of courses. The course provides students a variety of experiences that are in the fields of agricultural engineering. Students are immersed in inquiry-based exercises that tie in the math and science of agricultural mechanics and engineering. Throughout the course, students apply technical skill while becoming competent in the process used to operate, repair, engineer and design agricultural tools and equipment.

Program Objectives and Description

Students develop a foundation of mechanical and engineering skills in Agricultural Power and Technology. Science of materials and energy used in agriculture are integrated throughout the course to develop a strong knowledge base. In addition, students will understand specific connections between science, math, and technical skills applied to Supervised Agricultural Experiences and FFA components that play an important role developing an informed agricultural education student. Students will investigate, experiment, and learn about documenting a project, solving problems, and communicating their solutions to their peers and members of the professional community.

What does the program provide to the educator?

- CASE™ Curriculum – 172 rigorous lessons that have been cross-walked to national content standards for math, science, English and agriculture with built in pedagogical/instructional strategies for differentiated instruction.
- Professional Development Training Institute
 - Two week training held during the summer
 - Lodging
 - Most meals
 - All institute material expenses
- Materials/Equipment to implement CASE™
- Workshops at NAAE Conference
- Access to NAAE Communities of Practice (Professional Learning Communities) on the state and regional level
- Teachers Services including purchasing lists, technology support and professional development
- Purposeful assessment of the concepts taught

What is required by the educator in order to implement this program?

- Attend two weeks of CASE™ Curriculum Institute (Institute dates and locations will vary)
- Commit to adopt and teach CASE™ curriculum upon return from institute (2018-2019 school year)
- Travel expenses above the grant stipend
- Secure equipment and supplies to teach CASE™ course above the award allocation

Website (with link to Standards Alignment): <http://www.case4learning.com/index.php/curriculum/case-courses/agricultural-power-and-technology> and http://www.case4learning.org/images/documents/APT_CASE_Brochure_2016smir.pdf

Program Video: https://www.youtube.com/watch?v=YNGvaj_fztA

Engineering is Elementary (EiE)

2017-2018 STEM Scale-Up Program

Overview: Engineering is Elementary (EiE) is a rigorously-researched, classroom-tested curriculum that increases students' interest in and confidence about engineering. EiE is designed to encourage all children—including those from underrepresented groups—to envision themselves as potential engineers. The EiE Curriculum is the nation's leading engineering curriculum for grades 1-6.

Grade Levels: 1-6

Program Summary

The EiE curriculum has been expressly designed to address the critical need of increasing children's STEM literacy. Inquiry-based and standards-driven, EiE teaches engineering content and skills, links engineering to the science and mathematics students are already learning, and helps children develop positive associations with engineering and science—to see them as being integral to modern life, and also potential career paths. Besides promoting STEM literacy, EiE units also connect with literacy and social studies.

Program Objectives and Description

The EiE curriculum is expressly designed to:

- Foster science and engineering learning and technological literacy
- Help all students, but especially girls, minorities and other underrepresented groups, recognize their ability to engineer
- Build enthusiasm for engineering as a career choice

The EiE curriculum integrates engineering with science and improves student understanding of technology. Though people tend to think of science, engineering and technology as three separate things, they're actually closely connected. Because the EiE Project serves young children, it has a simple Engineering Design Process (EDP) to guide students through the engineering design challenges. This EDP has just five steps and uses terms children can understand.

What does the program provide to the educator?

EiE's 20 units present fun, engaging engineering challenges that allow students to apply science knowledge in meaningful ways. Materials kits with supplies for 30 students are provided for each unit. Each unit is introduced by a storybook about a child who solves a problem through engineering. Set in locations around the world, the storybooks integrate literacy and social studies and provide context and meaning for the hands-on activities that follow. In addition to introducing students to the excitement of engineering, EiE fosters valuable cognitive skills such as critical thinking, collaboration, communication, creativity, flexibility, persistence and learning from failure. Educators see the EiE materials as an excellent fit for elementary school students and most often cite as strengths the hands-on approach, the sound pedagogical design of the units, the ease with which they can be adapted to fit local circumstances, the collaborative nature of the activities and the many ways in which using the EiE units promote a greater awareness of the ubiquity of engineering in the lives of their students.

EiE's "Engineering Adventures" and "Engineering Everywhere" are available and especially created for out-of-school programs. "Engineering Adventure" offers real-world engineering challenges, which promote creativity and teamwork. In "Engineering Everywhere," kids engineer a better world with engaging activities that relate to real-world experiences.

What is required by the educator in order to implement this program?

Grant Wood AEA requires the applicant to attend a one-day Professional Development training related to EiE. EiE's "Everyone Engineers" workshop introduces you to the concepts of engineering and technology and prepares applicants to facilitate EiE unit(s) with their students. Educators who experience EiE's professional development feel more prepared to teach engineering, technology, and problem solving.

EiE Website: <http://www.eie.org/>

Connections to Standards and Curricula: <http://www.eie.org/eie-curriculum/eie-connects-standards>

Program Video: "[EiE Overview](#)" and "[All Kids Can Engineer](#)"

Engineering the Future (EtF)

2017-2018 STEM Scale-Up Program

Overview: *EtF Project 1: Design the Best Organizer in the World* introduces students of all backgrounds and interests to the engineering design process and team practice through engaging hands-on discovery learning challenges. The module offered has a flexible format and is appropriate for in or out-of-school implementation. It takes approximately eight weeks to complete in a formal education setting.

Grade Levels: 8-12

Program Summary

Engineering the Future (EtF) is a modular, full-year, 8-12th grade curriculum of introductory engineering and technological literacy for *all* students, including women and minorities and any career aspiration. The full-year curriculum is presented in four modules or projects. The module offered through the STEM Scale-Up Program is *Project 1.0: Design the Best Organizer in the World*, and the program's flexible format is appropriate for in or out-of-school implementation. It takes approximately eight weeks to complete in a formal education setting.

This unit provides students the opportunity to design, build and test prototypes while empowering them to apply math, science and engineering practices, work creatively and collaboratively, communicate and experience the engineering design cycle in real-world design and physics applications. This hands-on STEM curriculum is “designed backwards” to satisfy the same ISTE technological literacy performance expectations as the Iowa Core 21st Century Skills, utilizing affordable materials and supplies readily available to *all* schools. EtF strongly meets Iowa's Core Standards and 21st Century Skills framework to promote understanding of engineering and math content at much higher levels by weaving 21st century interdisciplinary skills, knowledge and experience into real-life applications through projects developed by the National Center for Technological Literacy (Boston Museum of Science).

Program Objectives and Description

Students taking the EtF course will take on the role of engineers and apply the engineering design process to define and solve problems by inventing and improving products, processes and systems. Students will be expected to work against deadlines and plan and track project progress with Gantt charts. During the implementation process, teams invent, create and innovate, integrating disciplinary learning. They redesign, iterate and optimize using decision matrices. They test mockups and prototypes and assess product life-cycle impacts. Individual evaluation is partially facilitated by student documentation of ideas and team processes, answers to questions in readings and reflections recorded in the *Engineering Notebook*. Additional assessments include self- and teacher-scoring rubrics for team behaviors, products and presentations, and by a comprehensive end-of-project exam.

What does the program provide to the educator?

- Print/digital and teacher materials and resources for *EtF Project 1: Design the Best Organizer in the World*
- 1-day Regional *Getting Started EtF* Training Workshop (3 optional regional locations, 3 optional dates)
- 1-week online *Getting Started with EtF* professional-development course (2 optional dates)
- Webinar Sessions (2 per semester addressing implementation and best practices)
- 24/7 Online Teacher Support Site

What is required by the educator in order to implement this program?

Educators should be open to the discovery learning approach, and have flexible classroom seating. They need to have the materials to implement the program and should participate in the PD and support learning community.

Website: <https://www.iat.com/courses/engineering/engineering-the-future/?type=introduction>

EtF correlation to NGSS standards: <https://drive.google.com/file/d/0B4aWo37tgA86anh4WG8zOW16cnc/view?usp=sharing>

FIRST Robotics Competition

2017-2018 STEM Scale-Up Program

Overview: Combining the excitement of sport with the rigors of science and technology, *FIRST* Robotics Competition is often called the ultimate “Sport for the Mind.”

Grade Levels: 9-12

Program Summary

High school students call it “the hardest fun you’ll ever have.” Teams of 10 or more students are challenged to raise funds, design a team brand, hone teamwork skills and build and program industrial-size robots to play a field game against like-minded competitors under strict rules and limited resources. It is as close to real-world engineering as a student can get. Volunteer professional mentors lend their time and talents to guide each team. Teams form during the fall. The official season kick-off and release of the new robot game is in January. Teams have six weeks to design and build their robot followed by regional competitions in March and April. Each season ends with an exciting *FIRST* Championship.

Program Objectives

- Involve more students in this real-world engineering challenge
- Develop participating students’ STEM and teamwork skills by working in a team, creating a business plan, communicating with stakeholders and designing, constructing, wiring and programming a robot
- Provide teachers with an opportunity to apply classroom STEM learning in a real-world setting
- Increase partnerships between schools and local community businesses. Students benefit from working next to and learning from professionals. Communities benefit from employees mentoring students to develop a future workforce with essential STEM and teamwork skills.

What does the program provide to the educator?

- Professional Development workshop at the University of Northern Iowa.
 - First-year teams will receive three days of professional development, including 2 hours of Graduate Credit, plus follow-up support for the Team’s lead coach. This training includes essential robot design and construction concepts, team organization principles, build season planning suggestions and competition planning suggestions.
 - Teams in year two or three will participate in a one-day workshop focusing on team growth.
- Team *FIRST* Registration - \$3,000-\$6,000* *FIRST* registration includes a kit of parts to build a basic competition robot and registration fee for one FRC Regional Competition.
 - First-year teams receive \$6,000 to cover all registration fees.
 - Teams in year two or three will receive \$3,000 to cover part of the \$5,000 registration fee.
- First-year teams will receive a supply kit full of helpful tools and commonly used robot parts.
- Ongoing support from *FIRST*, *FIRST* Senior Mentors, the Iowa *FIRST* Assistant Regional Director and veteran *FIRST* teams.

What is required by the educator in order to implement this program?

- Recruit additional team mentor(s)
- Recruit a minimum of 10 student team members
- Arrange a location for the team to use for meetings and building their robot
- Attend the Coaches Professional Development Workshop, July 27-29, 2017, for rookie teams and July 29, 2017 for veteran teams
- Arrange community partners and sponsors to cover additional costs to build a robot
- Register their team for and compete in at least one regional *FIRST* Robotics Competition Event

Website (with link to Standards Alignment): <http://www.firstinspires.org/node/5551>

Program Video: <https://www.youtube.com/watch?v=hcS7M4sY0fQ>

Making STEM Connections

2017-2018 STEM Scale-Up Program

Overview: The Science Center of Iowa's Making STEM Connections program provides a kit, including tools, teacher resources and lessons to inspire the maker mentality through highly-engaging, interactive and safe experiences. Building upon the natural inclination to tinker, this program empowers participants to explore STEM principles and 21st Century Skills as they design, create and make.

Grade Levels: K-8 (Ages 5-14)

Program Summary

The Making STEM Connections program is designed to empower teachers to cultivate engaging, purposeful and successful extensions of their already developed curriculum. The making philosophy directs students to use their hands in conjunction with their minds to produce meaningful learning outcomes. Educating teachers on the process of making as well as familiarizing them with the tools and materials, to be used will be the cornerstone of the Making STEM Connections professional development. A classroom using the Making STEM Connections kit might have students learning how to fuse plastics to create textiles or assembling an art-bot using a DC motor and batteries. Teachers are provided with a curricular framework to develop STEM principles and enhance those already existing in their classroom using maker materials, both high tech and low tech as well as skills.

This curriculum framework is focused around the idea that making and tinkering are ways to engage student's minds and build conceptual understanding around academic content. Making STEM Connections is structurally supported by cross-curricular experiences and opportunities, including literacy and math, to reinforce the maker foundation of active learning and problem solving. The purpose of making as a learning technique is summed up by Dale Dougherty, Chairman of Maker Education Initiative, "It is the difference between a child who is directed to perform a task and one who is self-directed to figure out what to do."

Program Objectives and Description

- Ignite student interest in STEM by helping them discover science in the world around them through interactive, hands-on activities
- Provide teachers with foundational tools to develop a maker space in their classroom
- Support teachers implementation through professional development, technical manuals, reference materials and curricula

What does the program provide to the educator?

- Educational materials including lesson prompts, teacher resources, as well as books for teacher instruction and inspiration
- Maker toolbox with a variety materials to support a classroom of 30 such as a GoPro Camera, robotics components, MaKey MaKey, circuit materials, DC Motors, hand tools, soldering iron, sewing machine, safety goggles and first aid kit
- Literature for student engagement and understanding
- Professional development led by a master teacher & maker, focused on the making process and research behind its success

What is required by the educator in order to implement this program?

Awardees participate in a full day of professional development. This experience includes an overview of making, strategies for inspiring the maker mentality, training for tool use and safety as well as a walkthrough of each lesson prompt. Awardees will also benefit from four regional webinars offered as continued support and education about making and use of their kits.

Website (with link to Standards Alignment): <http://www.sciowa.org/makingstemconnections>

"Our parents and our grandparents created the world's largest economy and strongest middle class not by buying stuff, but by building stuff -- by making stuff, by tinkering and inventing and building; by making and selling things first in a growing national market and then in an international market -- stuff "Made in America." — President Barack Obama at the first-ever White House Maker Faire, June 18, 2014

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Project Lead The Way: Launch

2017-2018 STEM Scale-Up Program

Overview: [Project Lead The Way \(PLTW\)](#) is a nonprofit organization that provides a transformative learning experience for K-12 students and teachers across the U.S. We create an **engaging, hands-on classroom environment** and **empower students** to develop in-demand knowledge and skills they need to thrive. We also provide teachers with the training, resources and support they need to engage students in real-world learning.

Grade Levels: K-5

Program Summary

K-5 students already have the qualities of great designers and innovators. [PLTW Launch](#) taps into their exploratory nature, engages them in learning that feels like play and encourages them to keep discovering – now and for years to come. Our pathways in computer science, engineering and biomedical science **engage** students in hands-on activities, projects, and problems; **empower** them to solve real-world challenges and **inspires** them to reimagine how they see themselves.

Program Objectives and Description

[PLTW Launch's 24 interdisciplinary modules](#) bring learning to life. The program empowers students to adopt a design-thinking mindset through compelling activities, projects and problems that build upon each other and relate to the world around them. As students engage in hands-on activities in computer science, engineering and biomedical science, they apply and reinforce the knowledge and skills they've acquired in core academic areas. In addition, each module empowers students to develop essential skills such as problem solving, critical and creative thinking, communication, collaboration and perseverance. The program's flexible 10-hour modules are designed with all the information and materials you need to bring lessons to life for your students and school. With PLTW Launch, you can choose to start with a single module, implement all 24 modules or anything between. No matter what approach you take, PLTW team members will be with you every step of the way to support a successful program implementation and continued growth of your program. To support this unique classroom experience, our professional development provides teachers with robust and flexible instructional support, on-demand resources and a close-knit community of collaboration with fellow educators.

What does the program provide to educator?

- 2017-2018 Launch Participation Fee (PLTW grant of \$750 per school): provide PLTW team members support for a successful program implementation and continued growth of your program, access to ongoing teacher training, professional learning communities and PLTW Learning Management System.
- PLTW Launch train-the-trainer grant to cover the registration for one Launch Lead Teacher per school (\$750). PLTW will host and schedule specific regional training in IOWA to support the program. Awardees are required to train at least one Launch Lead Teacher who will be equipped to train an unlimited number of Launch Classroom Teachers at your school for no additional cost.
- Schools will receive a \$3,000 credit towards materials needed to implement the program. Allowable expenses include: PLTW modules required equipment and supplies (including tablets) and any additional Launch Teachers you wish to train.

What is required by the educator in order to implement this program?

1. **Select your PLTW Launch implementation approach:** Review the PLTW Launch section in the [PLTW Implementation Guide](#).
2. **Plan for your program:** Determine your [PLTW investment](#) and get familiar with [technology requirements](#).
3. **Apply for the STEM Scale-Up Program award**
4. **Register your school with PLTW:** Once you have been selected to receive a STEM Scale-Up Program award visit [PLTW Get Started](#) and follow the steps to register your school.
5. **Identify your PLTW Launch Lead Teacher:** Each awardee is required to send one Launch Lead Teacher to training. The Launch Lead Teacher Training schedule and registration process will be shared in the spring and trainings will be offered in July/August.

Program Video: [PLTW Launch](#)

Standards Alignment: [PLTW Launch Standards Alignment](#)

PowerTeaching Math

2017-2018 STEM Scale-Up Program

Overview: Developed by Johns Hopkins Researchers, PowerTeaching Math is the leader in cooperative learning mathematics instruction helping teachers transform their classrooms environments to engage ALL students.

Grade Levels: 6-8 and Algebra 1

Program Summary

Developed by Johns Hopkins Researchers, PowerTeaching Math (PTM) is the leader in cooperative learning mathematics instruction helping teachers transform their classrooms environments to engage ALL students. PowerTeaching Math provides teachers with the tools necessary to enhance their mathematics instruction and to grow professionally. It prepares students for the rigorous demands of high school so they will continue to succeed and feel confident in their math abilities.

Program Objectives and Description

PTM uses a research-proven cooperative structure to help teachers create a learning environment in which students support each other's learning through discussion of challenges and errors, on-the-spot explanations and motivation to contribute to the success of the team. In several independent studies, students participating in the program gained a full year more than students in a randomized comparison group and had a greater liking of math and higher self-concept in math. PTM's cooperative learning structure teaches students to think critically and problem solve, communicate efficiently and collaborate effectively with their peers. Well-implemented cooperative learning environments provide teachers with the freedom to observe, interact and assess where the students are and allows them to adapt lessons and add targeted instruction as needed in real time.

Through PTM, middle school teachers will provide their students with a "toolbox" of resources they can apply to any challenge they face in high school and beyond. These skills are not only critical for success in math but for success in all STEM fields. No student gets left behind, everyone stays on task, and each student is held accountable for his or her own learning. PTM provides teachers the means to prepare tomorrow's leaders.

What does the program provide to the educator?

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|--|--|
| A set of teacher and student materials grades 6 through 8 and Algebra I (teacher materials include scope and sequence) | Online access to lessons and social networking with other Power Teacher Mathematics teachers in your building |
| Ongoing student assessment for each cycle | A flash drive that includes all lessons for each grade level, including award winning media clips for concept learning |
| One registration and travel stipend for the Experienced Sites Conference held in Phoenix, AZ February 11-14, 2018 | On-site support from an experienced PowerTeaching Math coach during the school year* <i>*Number of days depends on number of teachers implementing the program per location</i> |

What is required by the educator in order to implement this program?

| | |
|---|---|
| Apply for STEM Scale-Up award by March 3, 2017 | Participation in on-site support visits |
| Attend Regional Program Introduction prior to start of school (school leaders one day, teachers two days) | |

Website (with link to Standards Alignment): [Link to the Document](#)

Program Videos: <http://sfapowerteaching.org/15161>

Frequently Asked Question: <http://sfapowerteaching.org/129708>

Ramps and Pathways

2017-2018 STEM Scale-Up Program

Overview: Ramps & Pathways (R&P) is an NSF-funded, developmentally-appropriate and classroom-tested approach to integrative STEM that engages young children. R&P is designed to nurture engineering habits of mind as children build their own technology of marble runs; a type of Rube Goldberg machine. In the process, children grapple with the laws of physics, properties of objects, how those properties affect motion and engage in spatial thinking.

Grade Levels: PreK-2nd grade

Program Summary

The R&P curriculum was designed through a collaboration of experts in child development, teachers of young children, science educators, and young children. R&P addresses the critical need to increase children's STEM literacy, cultivate STEM identities, and develop executive function skills (working memory, cognitive flexibility, and inhibitory control). R&P is inquiry based and address the NGSS and early learning standards. Place-based social studies and literacy is naturally embedded.

Program Objectives and Description

R&P is designed to provide children access to a fully integrative STEM activity that:

- Develops a working understanding of physics
- Offers opportunities to design and engineer their own technology of marble runs
- Engages children in challenges in spatial thinking
- Inspires children to learn the tools of literacy to document and communicate what they are learning and figuring out

R&P is not designed as a sequence of daily prescribed lessons in STEM. Instead, it is a framework that assists the teacher in facilitating the physical and social environment of the classroom to allow children to investigate the macro question of, "How can I get this object to move in an interesting way?" over time.

What does the program provide to the educator?

- A classroom Ramps and Pathways Kit of non-consumable materials including unit blocks, ramps, spheres, and other manipulatives worth more than \$2,000.
- Two days of professional development with one hour of University of Northern Iowa graduate credit.
- \$120 for each day (sub-pay or stipend).

What is required by the educator in order to implement this program?

The applicant will attend two non-consecutive days of Ramps and Pathways professional development, preparing them to integrate STEM within other academic disciplines and arrange their classroom setting to be conducive for inquiry in STEM as well as literacy and social studies. Participants or the school must provide transportation to site of PD and participants are on their own for lunch.

Ramps and Pathways Website: rampsandpathways.org

Iowa Early Learning Standards: <http://www.uni.edu/rampsandpathways/menu-item-container/3/meeting-early-learning-standards>

Head Start Performance Standards: <http://www.uni.edu/rampsandpathways/resources/meeting-educational-standards>

Next Generation Science Standards: <http://www.uni.edu/rampsandpathways/menu-item-container/3/meeting-next-generation-science-standards>

Program Video: <http://www.uni.edu/rampsandpathways/media-center/ramps-and-pathways-integrated-stem>

Spatial-Temporal (ST) Math

2017-2018 STEM Scale-Up Program

Overview: Through our instructional software's uniquely visual, non-language approach to teaching math, students across the country are deeply understanding math, developing perseverance and problem-solving skills and becoming life-long learners prepared for success.

Grade Levels: K-6

Program Summary

Spatial-Temporal (ST) Math® is the leader in visual math instruction and represents the highest quality and most effective blended learning math solution in K-12 education. Created by the social benefit organization MIND Research Institute, ST Math is game-based instructional software for K-12, offered as a whole-class instructional supplement and designed to boost math comprehension and proficiency through visual learning. Integrating with classroom instruction, ST Math incorporates the latest research in learning and the brain to promote mastery-based learning and mathematical understanding.

When teachers bring ST Math into the classroom, the software games help students make connections between the visual representations from ST Math and symbolic representations found in their core instruction. The ST Math software, comprised of over 300 math games with thousands of math puzzles, allows students to engage in a personalized, self-paced learning path through Iowa state standards-aligned math objectives. A recent analysis conducted by MIND Research showed that Iowa students in grades using ST Math grew on average 6.6 points in the percentage of students scoring at Satisfactory or Advanced on the ITBS, as compared to a drop in Satisfactory/Advanced of 1.2 points for a comparable group of non-ST Math students in Iowa schools.

Program Objectives and Description

- To ensure that all students are mathematically equipped to solve the world's most challenging problems;
- To utilize cutting-edge research in learning and neuroscience to inform continual improvement of programming;
- To provide students with the opportunity to strengthen neural connections as they learn new concepts, immersing students in richly interactive, hands-on learning;
- To provide educators with meaningful, effective technology resource to engage their students and provide rigorous content;
- And, to provide Iowa students with a program that has a track record of success.

What does the program provide to the educator?

The Annual Single-Student Subscription allows schools to purchase access to the full ST Math content (K-6) for a desired number of students at that site. There is a \$4,200 flat fee for up to 145 student licenses per school site. For schools licensing more than 145 students the subscription rate is \$29 per student. STEM Council covers all fees for selected participants. Licensing includes: Access to ST Math software at school site and updates; Consultation with MIND to generate a plan for successful and timely implementation; Thorough professional development provided to teachers and administrators for start-up; Post-start-up training and professional development modules, including video and scheduled live webinars, to improve program knowledge, use and outcomes; ST Math Digital Training Manuals; Monthly summary progress reports at school/district-level; yearly data review meeting to set goals; Real-time class/school/individual-level reports, indicating level of math standards mastery and RTI growth; Service and technical support via e-mail, phone, or online chat; and a suite of online support resources.

What is required by the educator in order to implement this program?

ST Math is a cloud-based resource that can be accessed from any Internet-connected computer or tablet. Recommended implementation time for students is 90 minutes per week (60 minutes for K-1). All teachers using ST Math attend professional development either in-person or online prior to implementing to ensure all parties are comfortable, prepared and supported.

Website (with link to Standards): <http://www.mindresearch.org/stmath/standards/>

Program Videos:

- **Demo Games:** <http://mindresearch.org/play/>
- **Interactive Introduction to ST Math:** <http://learn.stmath.com/courses/c01/>
- **Founder's TEDx Talk:** <https://www.youtube.com/watch?v=2VLje8QRrwg>