

ACHIEVING STUDENT SUCCESS THROUGH EXCELLENCE IN TEACHING

ASSET STEM EDUCATION COURSES & SERVICES

2019-2020



assetinc.org
412-481-7320



ABOUT

ASSET STEM EDUCATION

MISSION

ASSET STEM Education's mission is to advance teaching and learning to engage, inspire, and empower all learners.

ASSET strives to systematically improve education by equipping educators with effective tools and strategies to create innovative and relevant learning environments— so that *all* students can acquire the knowledge and skills needed to work, live, contribute, and lead in a global community.

ACTION

In 1994, ASSET STEM Education was founded to support the systemic reform of science education. Today, ASSET continues to advance instructional practice by designing and facilitating innovative professional learning for educators from Pre-K to postsecondary, classroom to community.

ASSET's research-based courses and programs model inquiry-based teaching; connect practice, content, and materials to educational standards; and integrate formative assessment and literacy development to advance student learning.

ASSET supports the development of educators into leaders through professional learning, educational solution services, and no-cost grants and scholarships.

IMPACT

From 2010-15, ASSET validated the impact of its programs in rural and high-needs schools through the US Department of Education's Investing in Innovation (i3) grant, an advanced professional development program serving 565 educators and impacting over 38,000 students.

An independent evaluation showed that ASSET-supported teachers increased understanding of content and concepts, improved pedagogy, and strengthened collaboration with peer educators. These advances fostered increased student achievement in science, math, and reading/English Language Arts in high-needs schools. (Nedley, 2016)

TABLE OF CONTENTS

EDUCATOR ESSENTIALS COURSES | **03**

STEM CONTENT COURSES | **05**

EDUCATIONAL SOLUTIONS | **09**

GRANTS & SCHOLARSHIP | **09**

EDUCATOR ESSENTIALS

COURSES

Available in-person or virtually nationwide. Continuing education credits available.

UNDERSTANDING THE HOLISTIC NATURE OF STEM (PreK-16)

Discover the fundamentals for building a strong STEM philosophy and common STEM language with education stakeholders and leaders.

- *Engage in deep thinking about their own personal definition of STEM as related to outcomes for student learning and achievement, both in academics and lifelong learning*
 - *Consider characteristics of a holistic approach to STEM education, including intentional teaching and design moves that inspire students to engage in their learning in and outside of the classroom*
 - *Consider leader roles as a way to make changes in teaching and learning cultures*
 - *Discuss the importance of having a connected academic focus to community, work, and global issues, where students are motivated to become informed, literate citizens*
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UNDERSTANDING THE NEXT GENERATION SCIENCE STANDARDS (PreK-16)

Gain a better understanding of the Next Generation Science Standards (NGSS) and three-dimensional learning, and their implications for instructional practice, teaching, and learning.

- *What are the NGSS and why were they developed?*
 - *How are the NGSS different from previous standards?*
 - *What are the key instructional shifts required of educators through NGSS?*
 - *What are the features of an NGSS lesson?*
 - *What is STEM in the context of NGSS?*
 - *What are the best practices in NGSS-based STEM education?*
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PROJECT-BASED LEARNING (2-16)

Explore the use of Project-based Learning to transform teaching practice, create equitable learning opportunity classrooms, and prepare students for workforce challenges. Course can be customized to advance a district-wide adoption of Project-based Learning or integrate externships at local businesses.

- *Understand the differences between project-based learning and traditional project assignment*
 - *Explore and connect industry practices with Project-based Learning*
 - *Connect appropriate 21st Century Outcomes to the learning outcomes of the Project-based Learning*
 - *Plan and design a Project-based Learning experience for the classroom*
-

UNDERSTANDING INQUIRY-BASED TEACHING & LEARNING (PreK-16)

Examine current teaching & learning practices and understand the essential features of implementing inquiry-based teaching.

- *Investigate the variations of inquiry by examining educator and student roles*
- *Explore key misconceptions and skills of the inquiry process*
- *Examine characteristics of an inquiry-based classroom environment & make connections to individual contexts*
- *Initiate a plan to implement inquiry in the classroom by making intentional shifts in teaching practice*

UNDERSTANDING FORMATIVE ASSESSMENT (PreK-16)

Continuously evaluate and advance student learning by integrating formative assessment into your teaching practices. This course guides educators in exploring the differentiated learning needs of students as they progress through the Formative Assessment Cycle.

- *Recognize the role of formative assessment & summative assessment in advancing student learning*
 - *Establish clear learning intentions & criteria for success for each lesson*
 - *Intentionally plan questions that will assess the level of student understanding*
 - *Provide descriptive feedback focused on student improvement*
 - *Teach students to use Three Key Strategies of Formative Assessment to develop self-regulated learners*
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ENGAGING LEARNERS IN AN ENTREPRENEURIAL MINDSET (6-12)

Make intentional connections between the classroom and the workplace to nurture and develop in students the non-cognitive skills which characterize the entrepreneurial mindset, such as self-regulation, resilience, perseverance, and empathy.

- *Understand the role and requirements of state standards for career education and work*
 - *Understand the need for entrepreneurship and its relationship to the classroom*
 - *Explore research on mindsets, learning, mentorship, and formative assessment*
 - *Examine strategies to encourage student self-efficacy, self-regulation, and self-motivation*
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FOUNDATIONS FOR ENGINEERING (K-8)

Gain confidence in teaching engineering intentionally in the classroom. Develop an understanding of the structure and types of cross-curricular learning, employ an Engineering Design Process (EDP), & build awareness of the engineering field.

- *Investigate an Engineering Design Process*
 - *Explore the practices of science and engineering*
 - *Be challenged to include an Engineering Design Process to existing classroom learning, including intentional teaching and design shifts to strengthen student understanding of STEM concepts*
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ACADEMY FOR THREE-DIMENSIONAL TEACHING & LEARNING (K-12)

What might instruction look like that incorporates the science and engineering practices, crosscutting concepts and disciplinary core ideas of the Next Generation Science Standards (NGSS)? This course supports school district teams in the development and implementation of the three-dimensional approach.

- *Become familiar with the K-12 Science Framework and its philosophy of science education*
 - *Explore the layout of the Next Generation Science Standards to identify its essential components*
 - *Discuss the integrated nature of three-dimensional learning using science as a context for expansion*
 - *Identify focus areas within the district or classroom to support the implementation of three-dimensional learning*
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NATURE OF SCIENCE: CLIMATE LEADERSHIP (6-8)

Engage in the science of climate change and the varied perspectives surrounding the issue by studying the key indicator of air quality and utilizing SPECK and CO₂ air quality monitors to gather and analyze empirical air quality evidence in the classroom.

- *Understand and integrate the nature of science within their teaching practice*
- *Engage in a process to research, investigate and support a real-world issue*
- *Develop the skills needed to foster a culture of data literacy*
- *Design a plan around air quality to implement in the classroom*

ACADEMY FOR INTERMEDIATE MATHEMATICS ENGAGEMENT (5-8)

Centered around the driving question, *How can I be a catalyst for change to transform mathematics education for my students and myself?*, this course challenges educators to cultivate a learning experience embedded with authentic, inquiry-based teaching & learning.

- Explore research-based strategies to foster student engagement, proficiency, and achievement in math
- Review the 8 Standards for Mathematical Practice and their importance in the classroom
- Investigate activities to increase student engagement in mathematics, such as open-ended questions and 3-act tasks
- Create a plan for implementing an inquiry-based activity using the 5E Lesson Plan Model (Engage-Explore-Explain-Elaborate-Evaluate)

SUPPLEMENTAL COACHING

ASSET's professional learning sessions can be supplemented with in-person or virtual coaching to support classroom implementation. ASSET's non-evaluative coaching model is grounded in providing support for reflective teaching practices for change, growth, and professionalism.

STEM CONTENT

COURSES

ASSET's STEM content courses advance educator practice and student achievement through evidence-based, standards-aligned classroom learning materials. Participate as an adult learner to experience investigations and STEM content

During STEM content courses, participants will:

- Engage in three-dimensional learning: disciplinary core ideas, science & engineering practices, and cross-cutting concepts
- Share teaching strategies to support literacy development and inquiry-based learning
- Identify the learning goals of the materials how the investigations support the Big Ideas
- Examine assessment opportunities
- Develop notebook as a resource

ELEMENTARY SCHOOL MODULES (PRE-K THROUGH GRADE 5)

Building Blocks of Science (BBS) ^{NGSS}

Living Things and Their Needs (K)

Investigate and observe what plants and animals need to survive

My Senses (K)

Inquiry-based activities and experiences that build upon one another using the five senses

Weather and Sky (K)

Explore, document, and compare & contrast temperature, wind, precipitation, and cloud cover

Push Pull Go (K)

Explore motion and the forces that make things move by constructing toys

Engineering is Elementary (EiE)

An Alarming Idea: Designing Alarm Circuits (1-5)

Explore connections between the science of electricity and the field of electrical engineering

Best of Bugs: Designing Hand Pollinators (1-5)

Explore agricultural engineering, insects and the pollination system, and hand pollination

Catching the Wind: Designing Windmills (1-5)

Discover and discuss wind and methods used by engineers to capture energy

Just Passing Through: Designing Model Membranes (1-5)

Investigate organisms, basic needs, and bioengineering

A Long Way Down: Designing Parachutes (1-5)

Discover how to create a parachute and relate it to astronomy and aerospace engineering

Marvelous Machines: Making Work Easier (1-5)

Learn about simple machines and industrial engineering

Now You're Cooking: Designing Solar Ovens (1-5)

Explore environmental impact by learning about energy and green engineering

To Get to the Other Side: Designing Bridges (1-5)

Explore connections between balance, forces, and civil engineering

Water, Water Everywhere: Designing Water Filters (1-5)

Explore solutions to water pollution and plan, construct, test, and improve water filters

Full Option Science System (FOSS) Next Generation ^{NGSS}

Animals Two by Two (K)

Investigate and interact with common land and water animals

Trees and Weather (K)

Learn what plants and animals need to survive, and how their needs relate to where they live

Air and Weather (1)

Explore the natural world by observing and monitoring change

Sound and Light (1)

Understand how to observe and manipulate the phenomena of sound and light

Motion & Matter (3)

Experiences around forces and interactions, matter and its interactions, and engineering design

Water & Climate (3)

Engage with pervasive ideas through the anchor phenomenon of weather in diverse climates

Energy (4)

Explore physical science through the anchor phenomenon of energy

Environments (4)

Study the structures and behaviors of organisms and how they relate to the environment

Soils, Rocks & Landforms (4)

Experience soils, rocks, and minerals, and study changes to rocks and landforms at Earth's surface

Earth and Sun (5)

Investigate patterns observed in the sky over time and their effect on Earth

Living Systems (5)

Explore the idea of a system as one of the grand integrating concepts that pervades all of science

Mixtures & Solutions (5)

Engage students with the phenomena of matter and its interactions in our everyday life

SAE International ^{NGSS}

Engineering Inspired by Nature (K-3)

Investigate seed dispersal and test variables affecting paper helicopters and parachutes

Making Music Challenge (K-3)

Explore sound and vibrations and engineer a musical instrument

Pinball Designers Challenge (K-3)

Build, test, and modify a non-electronic pinball machine

Rolling Things Challenge (K-3)

Explore the effects of changing ramp heights and vehicle weights

Straw Rockets Challenge (K-3)

Build, test, and modify variables to design the best rockets

Gravity Cruiser Challenge (4-6)

Build, test, and modify gravity-powered cars

Jet Toy Challenge (4-6)

Build, test, and modify balloon-powered cars

Skimmer (4-6)

Build, test, and modify sailboats made of paper

STC-Kindergarten ^{NGSS}

Exploring Forces and Motion (K)

Investigate how forces, pushes and pulls, are responsible for the motion of objects

Exploring My Weather (K)

Engage in measuring, collecting data, and making predictions about weather

Exploring Plants and Animals (K)

Discover that plants and animals have unique characteristics and are living things

Science & Technology for Children (STC)

Land and Water (3-5)

Explore interactions between land and water such soil erosion and how water shapes land

Plant Growth & Development (3-5)

Explore plants and other organisms and their role as part of an organized system

Rocks and Minerals (3-5)

Observe the properties of rock and minerals, and sort based on those properties

Smithsonian Science for the Classroom ^{NGSS}

How Can We Send a Message Using Sound? (1)

Explore ways to send a message and organize them by means and distance

How Can We Stop Soil from Washing Away? (2)

Explore and collect evidence on ways water and wind can change the shape of the land

How Can We Protect Animals When Their Habitat Changes? (3)

Investigate what animals need to survive and how habitat changes affect them

How Do Weather and Climate Affect Our Lives? (3)

Learn why and how scientists measure weather

How Can We Provide Fresh Water to Those in Need? (5)

Explore water scarcity and the ways humans have attempted to get water to where it is needed

MIDDLE SCHOOL MODULES (GRADE 6-8)

Full Option Science System (FOSS) Next Generation ^{NGSS}

Chemical Interactions (6-8)

Investigate the nature of matter and energy

Diversity of Life (6-8)

Construct explanations for the structures and functions of living organisms

Gravity & Kinetic Energy (6-8)

Explore speed, acceleration, gravity, and collision physics

Populations & Ecosystems (6-8)

Explore the role of organisms in ecosystems and their structures and behaviors



SAE International ^{NGSS}

Cybersecurity: Keeping our Networks Secure (6-8)

Examine the movement of information through the internet and securing data

Fuel Cell Challenge (6-8)

Design a toy car which is powered by a PEM (Proton Exchange Membrane) fuel cell

Glider Challenge (6-8)

Build, test, and modify gliders based on insights on consumer demand

Motorized Toy Car Challenge (6-8)

Develop proposals, sketches, and models to design electric- gear-driven toys

Science & Technology for Children (STC3MS) ^{NGSS}

Ecosystems & Their Interactions (6-8)

Explore the ways organisms interact with living and nonliving components of ecosystems

Energy, Forces & Motion (6-8)

Investigate different forces and how they change the motion of objects and energy

Genes & Molecular Machines (6-8)

Explore the different ways that organisms reproduce and what that means for their genetics

Space Systems Exploration (6-8)

Develop and use models to investigate the interactions of the Sun-Earth-Moon system

Structure & Function (7-8)

Consider how the structure and function of organisms contribute to their survival

Matter as Interactions (6-8)

Understanding matter and predicting behavior to engineer solutions to common problems

OUT OF SCHOOL TIME (GRADE 6-8)

Engineering Adventures

Bubble Bonanza: Engineering Bubble Wands (3-5)

Explore how bubbles behave and engineer bubble wands

Go Green: Engineering Recycled Racers (3-5)

Utilize recycled materials to engineer toy cars

Lift Off: Engineering Rockets and Rovers (3-5)

Engineer rockets and rovers and explore planets and moons

Shake Things Up: Engineering Flying Technologies (3-5)

Engineer earthquake-resistant model buildings

Engineering Everywhere

Don't Runoff: Engineering an Urban Landscape (6-8)

Utilize environmental engineering skills to redesign a city and control storm water runoff

Put a Lid on It: Engineering Safety Helmets (6-8)

Use biomechanical engineering to design a helmet for a crash test dummy

CUSTOMIZED PROFESSIONAL LEARNING

Not seeing your school's materials? ASSET can customize professional learning to advance educator practice and effectiveness with your materials, whatever they may be.

EDUCATIONAL

SOLUTIONS

Customized solutions for sustainable improvement

Customized Professional Learning

New or customized courses designed around materials, needs, challenges, & age bands

Large Group Sessions

Group discounts and on-site options available. Administrators attend at no cost.

Prepaid Professional Development

Simplify your planning with the ASSET Loyalty Program. Volume discounts available.

One-on-One Coaching

Non-evaluative. Virtual options. Supplement professional learning or target areas for growth.

Standards Alignment

Align curriculum, instruction, & assessment to standards to foster student achievement.

Consulting

Services include content development, support for 21st century learning, materials, & more.

Discuss solutions: info@assetinc.org
(412) 481-7320

GRANTS &

SCHOLARSHIP

Creating equitable learning opportunities for all

Grant-Funded Programs

ASSET partners with foundations, corporations, & education organizations to implement innovative, no-cost programs for educators nationwide.

Recent program focuses include:

- Three-dimensional Teaching & Learning
- Intermediate Mathematics Engagement
- Fostering the Entrepreneurial Mindset
- Pre-K STEM

Access ASSET Scholarship Program

Educators & administrators from under-resourced schools and organizations can apply to receive professional learning and STEM materials.

Available services may include:

- In-person or virtual professional learning
- Hands-on STEM learning materials
- Participation in prescheduled courses
- On-site facilitation for large groups

Review opportunities & apply: assetinc.org



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