

A WORLD IN MOTION[®]

A comprehensive science, technology, engineering, and mathematics (STEM) education solution.



SAE International[®]

A WORLD IN MOTION[®]
CELEBRATING
20 YEARS

SAE
FOUNDATION
for Science and Technology Education

SAE International and the SAE Foundation – Leaders in science, technology, engineering and math (STEM) Education

SAE International is a global body of scientists, engineers, and practitioners that advances self-propelled vehicle and system knowledge in a neutral forum for the benefit of society.

The SAE Foundation is the charitable arm of SAE International, which strives to encourage and increase student participation and achievement in science, technology, engineering, and math (STEM). The Foundation seeks to achieve this mission by developing and delivering educational programs which provide hands-on, project-based, collaborative learning experiences integrated with exposure to STEM professionals, such as the *A World In Motion*® (AWIM) program and *Collegiate Design Series* (CDS).

In addition, the SAE Foundation supports the continued study of talented, committed young people who seek degrees in engineering and recognizes achievements in engineering by providing more than 65 awards and scholarships.





A World In Motion® (AWIM)

For 20 years, SAE International's *A World In Motion®* programs have brought together teachers, students, and industry volunteers to introduce students in grades 4 through 10 to the wonders of science, technology, engineering, and mathematics (STEM) education.

Since 1990, AWIM has expanded from a single collection of teacher lesson plans into a series of age-appropriate "Challenges". Each Challenge incorporates a problem-solving process, taught at many engineering schools across the country and utilized by engineering design teams working in the field. The "Engineering Design Experience" provides a problem-solving context in which students design a product or devise a solution to a problem. Three to four students, grouped into Engineering Design Teams, are presented with a marketing/production/design problem from a fictitious company. The student teams examine what is to be accomplished, identify the intended product audience, establish what information to gather and synthesize, and plan how to design, develop, test, and present a prototype of their design solution.

All AWIM activities benchmark to national science and math standards and conform with:

National Research Council (NRC) standards that promote engineering design

AND

National Council of Teachers of Mathematics (NCTM) standards that promote mathematical connections through real world problems

AWIM Fast Facts

- More than 70,000 curriculum/challenge kits have been provided to teachers and volunteers.
- Over 4 million students have participated in the AWIM program in all 50 United States and 10 Canadian provinces and territories.
- Over 25,000 engineers, scientists and technology professionals have volunteered in partnership with the AWIM program

A Closer Look at the AWIM Challenges



Primary School Challenges

K-3 Challenges – Coming Soon!

Curriculum planning, activity design, and testing is well under way on four new units geared to the Kindergarten through third grade levels. Scheduled for release in 2012, these literacy-based design challenges reach kids in their most formative primary years. **Real life and fictitious connections to STEM principles leads these young learners to begin understanding and engaging in variable testing, recording, and analyzing data.**

Elementary School Challenges

Skimmer Challenge

Students construct paper sailboats and test the effects of different sail shapes, sizes, and construction methods to meet specific performance criteria. **Friction, forces, the effect of surface area and design are some of the physical phenomena students encounter in this challenge.**

JetToy Challenge

Students make balloon-powered toy cars that meet specific performance criteria: distance traveled, weight carried, accurate performance, and speed. **Jet propulsion, friction, air resistance, and design are the core scientific concepts students explore in this challenge.**

Gravity Cruiser Challenge

Students focus on understanding the relationships between the “sweep” of the lever arm, the number of winds the string makes around the axle, and the distance the gravity cruiser travels. They also investigate how the diameter of the wheels and axles, and the amount of weight placed on the lever affect the gravity cruiser’s speed and distance. **This challenge introduces a rich activity in critical thinking and students learn how to use the experimental method to test hypotheses and solve a tricky engineering problem.**

Middle School Challenges

Fuel Cell Challenge

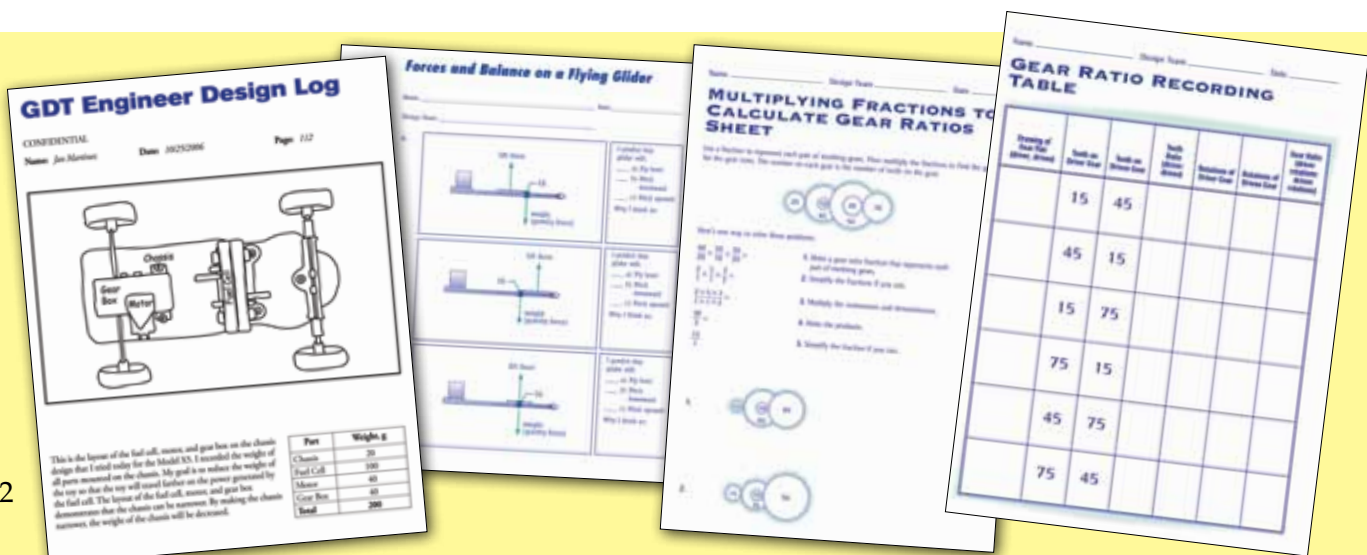
Student teams design a toy car that uses a PEM (Proton Exchange Membrane) fuel cell to power the electric motor. **Elements of electrical currents, “Green Design”, and transformations of energy are explored as the teams develop their product.**

Motorized Toy Car Challenge

Students develop new designs for electric gear driven toys. To meet a specific set of design requirements, students must write proposals, draw sketches, and work with models to develop a plan. **Force and friction, simple machines, levers and gears, torque and design are core concepts covered.**

Glider Challenge

Students explore the relationship between force and motion and the effects of weight and lift on a glider. The glider activity culminates in a book-signing event where each design team presents its prototype and the class presents its manuscript to Mobility Press “representatives” and members of the local community. **Students learn the importance of understanding consumer demands and the relationships between data analysis and variable manipulations.**



What Makes AWIM Work

The AWIM program development staff is a dedicated group of professionals with a combined total of more than 60 years of elementary and high school teaching experience, curriculum evaluation, and program creation and implementation. Their goal is to produce STEM education programming that keeps pace with our nation's need to keep science and technology interesting and captivating. As a result, AWIM Challenges are inquiry-based, developmentally appropriate, and pedagogically sound.

Pedagogically Sound

In tandem to mastering a broad array of performance-based skills and standards, students also develop a broad set of critical skill sets to help them achieve in all subject areas.

Critical Thinking

- assess a new situation
- generate and evaluate ideas
- gather and interpret data
- synthesize information
- integrate and apply learning

Communications

- design team name, logo, and slogan
- develop and produce drawings and diagrams
- prepare written and verbal reports
- deliver oral presentations

Project Management

- define goals; establish objectives
- identify and set priorities
- organize and present data
- propose and test solutions

Inquiry and Analysis

- conduct formal testing
- measure and record outcomes
- make qualitative and quantitative observations
- establish relationships among variables and make predictions
- use the scientific methods of experimentation, questioning, trial and error

Teamwork and Collaboration

- participate as a member of a team
- practice cooperation and compromise to reach group consensus
- assign team member roles and responsibilities
- understand group dynamics

Engineering Design

- Set goals
- Build knowledge
- Design
- Build and Test
- Present



Interdisciplinary In Nature

Built into all of the AWIM activities is the concept of interdisciplinary learning. As one of many ways to learn over the course of a curriculum, interdisciplinary learning helps bring students to a new awareness of the meaningful connections that exist among the disciplines.



What Makes AWIM Work

Teacher Training

The AWIM program utilizes an education model that couples an inquiry-based content with a delivery method that provides professional development and support to teachers in the classroom. Teachers who participate in AWIM are provided the opportunity to train with Master AWIM teachers to enhance their understanding of the subject matter and curriculum delivery. This professional development has been proven to:

- increase teachers' confidence for teaching in general
- increase their comfort with physical science concepts in particular
- encourage them to develop their teaching practices and style

This is crucial in the many schools where teachers are teaching subjects, like science and math, that are not within their certification or specialization.

Volunteer Participation

While teachers are the impetus that make AWIM happen, and the activities make it exciting, industry volunteers make AWIM unforgettable.

The in-class participation of an industry volunteer (a practicing STEM professional) is encouraged at certain junctures in the curriculum. In addition to helping bring the AWIM Challenges to life, the industry volunteer provides students with first hand impressions and information about careers in their chosen profession. They also serve as an in-classroom resource for teachers. To date, more than 25,000 engineers, scientists, and technology professionals have volunteered in partnership with AWIM.

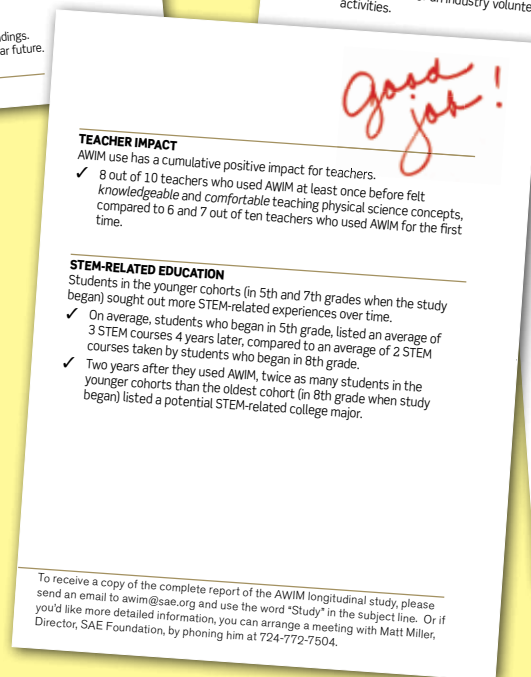
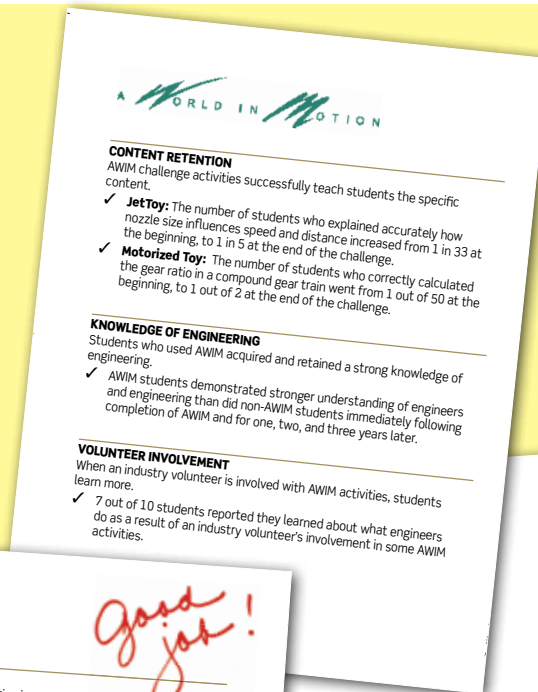


AWIM Success

AWIM Longitudinal Study Findings

The SAE Foundation contracted the Goodman Research Group, Inc. to conduct an independent five year longitudinal study to measure the effectiveness of AWIM. Specifically, they sought to measure the effects on students' science and mathematics literacy. Findings of this longitudinal study conclude:

- AWIM has a positive impact on students and teachers. Moreover, both teachers' repeated use and increased familiarity with the program and the presence of a volunteer adds to the value of the AWIM experience.
- Teachers value the AWIM experience and are interested in continuing to use it and exposing new students to the AWIM Challenges each year.
- Participation in one AWIM Challenge, including working in student teams to complete an authentic engineering design experience, is enough to start students on a path of knowledge and interest in engineering.
- The AWIM curriculum offers something for everyone; that is, all types of student learners benefit from it in the long term.
- AWIM is unique among other external curriculum packages that teachers in the study used in their classrooms. A strong benefit of the AWIM curriculum is its start in elementary school.



To receive a copy of the complete report of the AWIM longitudinal study, please send an email to awim@sae.org and use the word "Study" in the subject line. Or if you'd like more detailed information, you can arrange a meeting with Matt Miller, Director, SAE Foundation, by phoning him at 724-772-7504.



A World In Motion® (AWIM)

Awards and Accolades

2008 National Science Board (NSB) Public Service Award

The NSB recognized SAE International for its commitment to student and professional engineers, and math and science education through its Collegiate Design Series and AWIM programs.

2008 CMC Excellence in Engineering Education Collaboration Award

SAE International's *A World In Motion®* program won the 2008 CMC Excellence in Engineering Education Collaboration Award from the American Society for Engineering Education (ASEE).

2009 National Society of Black Engineers (NSBE) Golden Torch Corporate/Education Partnership Award

The NSBE honored SAE International with this award for inspiring more than 1,300 minority and urban youth to study math, science, and engineering through the SEEK (Summer Engineering Experience for Kids) Academy.

2006 InnoVision Technology Community Service Award

The InnoVision Technology Community Service Award recognizes organizations that establish and support innovative, technology-based projects and programs that improve the quality of life for an Upstate community. SAE International was presented with the Award for expanding the presence of AWIM in classrooms in the South Carolina Upstate region.

To find out more about AWIM:

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