

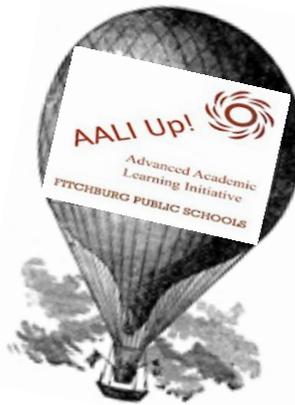


Middle School Advanced Academic Learning Initiative

AALI UP, up and on its way!

Newly launched this academic year, the Advanced Academic Learning Initiative (AALI) at the Fitchburg Public Middle Schools is progressively establishing a foundation. AALI Coaches have been busy collaborating with colleagues and teaching Science Technology Engineering Math (STEM) concepts and skills, with a variety of topics ranging from engineering design and modeling to Earth and space science. The three

middle schools have begun to acquire computer equipment and materials necessary to implement Gateway to Technology (GTT). GTT features a project-based curriculum designed to challenge and engage the natural curiosity and imagination of middle school students. The next step to move AALI forward will include an introduction to the GTT Energy & the Environment and Design & Modeling modules.



Advanced Academic Learning Initiative

Middle School Newsletter

January 2013

AALI Coaches:

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What AALI Coaches have been up to...

Middle School AALI coaches continue to collaborate with Elementary AALI coaches as we plan educational opportunities for AALI students and future school-based community events. The District's AALI, Math and ELA coaches have participated in a variety of professional development activities, with a focus on the coaches' role of improving classroom instruction and increasing student learning district-wide.

Middle and Elementary AALI Coaches are working together to keep parents informed through Newsletters and the AALI web pages that can be accessed via www.fitchburgschools.org or by visiting the individual school's website.

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AAI at Longsjo Middle School

Lost in Space

In mid-December, 5th & 6th grade AALI students completed an e-mission: Moon, Mars, & Beyond



through the Christa McAuliffe Center at Wheeling Jesuit University in West Virginia.

Students connected live via Skype with Commander Evick to locate a lost spaceship. Students were assigned to five planet teams (Uranus, Neptune, Pluto, Jupiter, or Saturn) and became a transmission, cargo, or navigation

specialist. Students had a number of tasks to complete: calculating water and food necessary for a rescue mission, decoding messages, and plotting potential locations on a coordinate graph for the missing spaceship.

To prepare for this mission, students created a scaled model of the solar system in the hallway, generated a map of their classroom, and conducted web-based research on planetary facts. Students successfully collaborated to synthesize information from all specialists. Students watched "live feed" as the rescued astronauts entered the rescue vessel.



Coverage of this event was provided by our local newspaper, *The Sentinel & Enterprise*, in an article published on December 15, 2012.

Grade 7 Engineering Design Challenges

During CORE class at Longsjo, 7th grade students in Ms. Bianchi's Science class have been applying the engineering design process to solve design problems. Design challenges originated from various sources including the PBS series *Design Squad* and The Boston Museum of Science Program, *Engineering is Elementary*. Following a co-teaching model, Ms. Bianchi and Ms. DiMauro introduce the design

challenge to the entire class and students collectively establish criteria and constraints. Students form design squads to brainstorm possible solutions, create a drawing of a prototype, and begin constructing. Students repeatedly test their prototype and continue to revise their design accordingly throughout the entire class period. Sample projects include

creating a newspaper table to support the weight of a dictionary, an index card tower for a museum exhibit, and a Moon lander with a shock absorbing system.



Index Card Tower

Collaboration with Colleagues

At Longsjo, a large part of the AALI Coach's role involves collaborating with Science teachers in the building. Longsjo's AALI Coach, Christine DiMauro, regularly attends Common Planning Time (CPT) meetings to plan rigorous units that integrate best teaching practices and emphasize higher order thinking skills. At Common Planning Time (CPT) Science teachers work with the AALI Coach

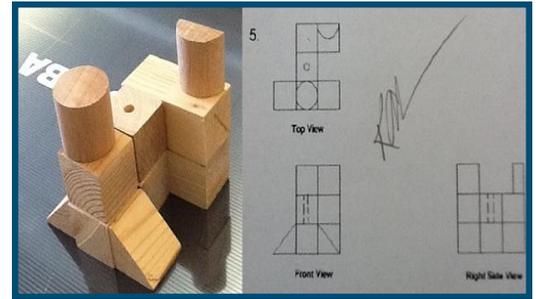
to debrief quarterly Science benchmark results using the Collaborative Inquiry Process. In cooperation with Science teachers, the AALI Coach developed a calendar for Science benchmark assessments at each grade level. In addition, the AALI Coach works closely with John Donnelly, Longsjo's Technology Specialist, to implement the Gateway to Technology curriculum.

"Ms. DiMauro works extremely well with all Science teachers and staff at all levels of experience. She has a unique skill set in differentiating and creating appropriate projects and activities in my 7th grade Engineering and Technology classroom. She has helped me to analyze student performance data, and to design units and plans which help all students to, not only meet the standard, but to excel. The students in my class love the new format of this class-the "hands on" approach really helps them to grasp the concepts. This is largely due to the credit of Ms. DiMauro and her dedication to helping my students succeed." -Ms. Bianchi, Grade 7 Science Teacher, Longsjo Middle School

AAI at Longsjo Middle School

Design & Modeling

- Mr. Donnelly's students in grades 6, 7, & 8 began this unit with sketching orthographic projection and isometric drawings.
- Students are transitioning from creating technical drawings with manual instruments to using Autodesk Inventor Professional 2013 3D modeling computer software.
- Students will learn to document, edit, and archive drawings as well as study techniques for adding features such as holes, slots, and chamfers.



Design & Modeling Lesson Creating an Orthographic Drawing

Automation & Robotics

- The unit begins with students understanding what robots are used for and the effect they have on our lives.
- Students will experience how a robot uses sensors to receive information through various sources.
- Eventually, students will apply their knowledge to use RobotC programming to build, model, and test solutions to automated problems.

Energy & the Environment

- 5th & 6th grade AAI students will complete Lesson 3.1 Investigating Energy in three groups of 12-15 students.
- Students will conduct web-based research to investigate alternative energy sources to fossil fuels such as solar, wind, geothermal, hydropower, and biomass.
- Students work in teams of three to research and create a presentation for an Energy Expo.
- AAI students will complete Lesson 3.2 Sustainable Energy in grade 7 and Lesson 3.3 Making an Impact in grade 8.



Windmill Blade Design Challenge (awaiting arrival of kits)

Extended Learning Time (ELT)

- **Fieldtrip to the Moon with Ms. DiMauro**

Students complete engineering design challenges from the PBS series *Design Squad* to solve problems that people would face if they lived on the Moon. Sample projects include a Moon rover, rocket launcher, and Moon lander.

- **Automation & Robotics with Mr. Donnelly**

Students use components to create mechanical systems and determine their purpose in real-world use.

AALI at McKay Arts Academy (MAA)

MAA Students Form Design Squads

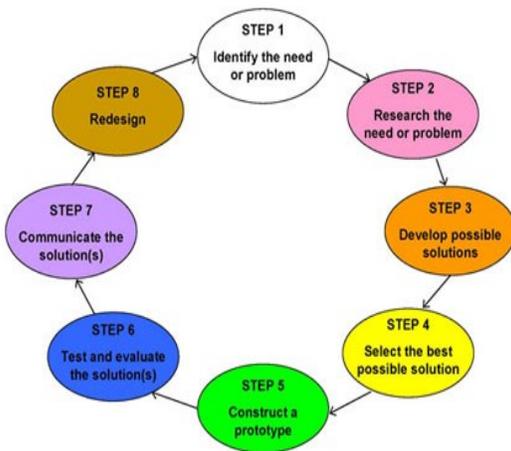
To teach math and science and to promote excitement about engineering, Ms. Danette Day the AALI coach at MAA, worked with students to form design squads. Ms. Day and her colleagues introduced lessons to students from the award winning PBS series *Design Squad*. *Design Squad* lessons were carefully aligned with the Fitchburg Public School District's Science curriculum stand-

ards, and followed the 8 -Step Engineering Design process.

These project-based lessons were delivered through differentiated instructional methods that included co-teaching, direct instruction, and team based collaboration. Lessons were taught in small groups and for entire grade level classes.

To enhance the study of the water cycle, 5th Grade AALI students designed and built harmless, six-pack holders for cans. Through this process students learned about man-made waste, eco-friendly materials, and environmental activism.

Also, to extend the study of energy and motion, all 8th Graders built rubber band cars. Students applied the engineering design process to build cars to deepen their understanding of potential and kinetic energy.



Building a Gateway To Technology (GTT) Infrastructure: Computers and Community Partners Added to the Network

As the Fitchburg Public School (FPS) District's Technology Specialist, Patrick Reardon and Fitchburg State University building and maintenance employees worked to assemble computers, work stations, configure the network and install software for GTT, Ms. Day worked to develop a network of community partnerships.

The first and most obvious connection made was between FPS Middle Schools and the FSU

Technology Education department. Dr. James Alicata, Industrial Technology Professor at FSU, Mr. Michael Koski, FPS STEM Specialist, and Ms. Danette Day, MAA AALI Coach met and discussed a plan to create learning opportunities for FPS middle school students and FSU technology education students. McKay AALI students plan to visit the Tech Ed department on the FSU campus this spring. FSU Tech Ed students plan to visit the district's

middle schools as part of their research for practicum sites.

"Community networks connect K-12 students & teachers with world-class science, technology, engineering and mathematics resources that will prepare students for STEM jobs and careers. STEM jobs are among the highest paying and fastest growing in the United States. We must help students develop the skill sets to perform well at and grow STEM jobs, pursue STEM degrees and careers."

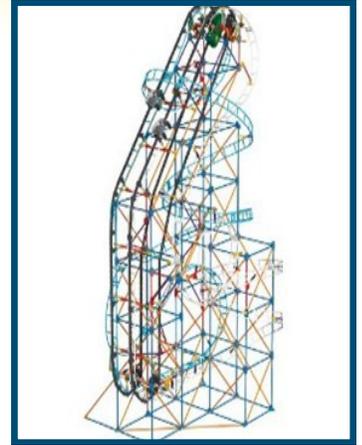
Ms. Danette Day, McKay AALI Coach

Additionally, MAA's 6th graders partnered with **DIGITS**, a classroom program that pairs STEM (science, technology, engineering, and math) professionals with sixth-grade classrooms throughout the state to increase students' interest in math and science subjects and careers. Finally, MAA joined the Central Mass STEM Network.

AALI at Memorial Middle School

AALI Students Constructed Model Roller Coasters

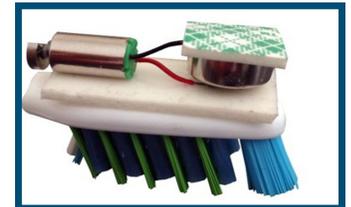
Students participating in Ms. Jean Beckner's Gateway to Technology Special were part of across-the-grades teams working on the construction of a model roller coaster made of K'nex parts. Students worked collaboratively in small groups and learned to use a "Construction Log" to communicate progress to fellow team members working other "shifts." The students used the completed models to simulate real-life examples of potential and kinetic energy. After completing web-based research on the history of roller coaster technology, students prepared and shared Powerpoint presentations.



Sonic Blizzard Roller Coaster

Introduction to Robotics and Engineering Careers

During January, students were introduced to robotics in society and have taken part in the hands-on 4-H National Science Experiment, "Ecobot Challenge." Co-taught by Ms. Jean Beckner, Memorial's AALI Coach, and Mr. Michael Koski, FPS STEM Support Specialist, students were challenged to program an autonomous robot to clean a simulated oil spill. Students applied the Engineering Design Process as they designed and constructed barriers to control the robot's movement. Students are also exploring careers in engineering and will continue to benefit from classroom visits of former and current professional engineers.



Ecobot

Engineering Notebooks and the Design Process

GTT students have used the Engineering Design Process to evaluate potential design solutions and have been using conventions of engineering graphics in following and creating assembly instructions and parts list/diagrams. Students use Engineering Notebooks to sketch design ideas and to document construction progress and troubleshooting history.

Forms of Energy and Wind Energy

The roller coaster unit leads to a study of forms of energy and an introduction to the GTT module: Energy and the Environment. Next, students' roller coasters will be transformed into working windmills. After researching the history of windmill technology, students will follow the multi-step Engineering Design Process to design and construct blades for their windmill. Once constructed, students will then determine which blade design is most efficient for producing motion energy.



7th Grade Students Troubleshooting Prototype