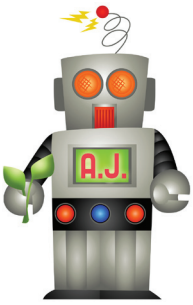
A.J. Whittenberg Elementary
School of Engineering

Information for You from Greenville County Schools

www.greenville.k12.sc.us

GREENVILLE COUNTY SCHOOLS
Where Enlightening Strikes!



A.J. Whittenberg Elementary is the first elementary school in South Carolina with a school-wide engineering curriculum. The instructional program is centered around engineering processes, skills and technology, and various engineering fields of study.

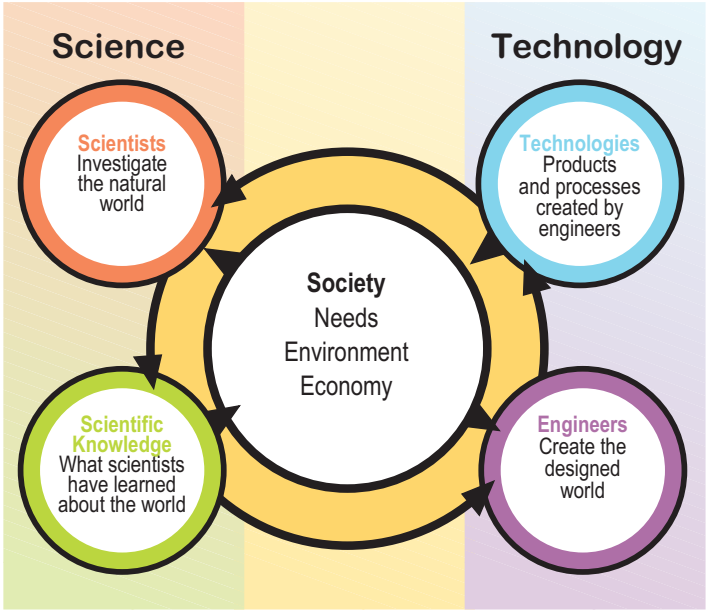
Students experience within each academic year four core units that target a specific form of engineering. Hands-on units provide real-life application of the skills students learn through the curriculum.

Within the instructional day, students participate in science lab experiences, which are an integral part of the overall curriculum design. The school program and overall culture also develop and foster collaboration among the engineering teams, as well as, leadership skills necessary for our students' future. The Whittenberg Engineers are pioneers blazing new instructional trails throughout their elementary school experience.

The school is named for A.J. Whittenberg, a pioneer for civil rights who is best known for his stand on the integration of Greenville County Schools.

Science, Engineering, and Technology

What is the difference between science, engineering, and technology? How do they interrelate?



Science:
- A body of knowledge
- Seeks to describe and understand the natural world and its physical properties
- Used to make predictions
- Uses a process - the scientific method - to generate knowledge

Engineering:
- Seeks solutions for societal problems and needs
- Aims to produce the best solution given resources and constraints
- Uses a process to produce solutions and technologies

Technology:
- The body of knowledge, processes, and artifacts that result from engineering
- Creates almost everything made by humans to solve a need – from the simple to the complex

In the real world, these disciplines – science, engineering and technology - are closely connected. Scientists often use technologies created by engineers to conduct their research. In turn, engineers often use knowledge developed by scientists to design technologies they create.

Science, engineering, and technology are part of our larger society, which determines what questions scientists investigate and what problems engineers tackle. In turn, the technological products of science and engineering influence society and change human culture.

Phone 864.452.0500
Fax 864.452.0515
Website www.greenville.k12.sc.us/ajw/
420 Westfield Street
Greenville, SC 29601

Learning at A.J. Whittenberg

The engineering problems presented to students throughout the year demonstrate how math, science, engineering, cultural understanding, and creativity are needed to solve problems. Like real-world engineering projects, most activities are in small groups. The teacher's many roles throughout each unit of study include instructor, facilitator, coach, manager, and evaluator. Throughout the year, students develop communication skills to explain their ideas, including oral presentations, written reports, drawings, and physical models. Evaluation of engineering and technological understandings and skills requires more than paper and pencil assessment. The projects encourage teamwork, communication, and thinking outside of the box. The students progress through each unit of study with the following learning cycle:

1. **Engagement:** Students are presented with a "real world" task that incorporates science, mathematics, and engineering. Each unit of study begins with reading of a book that captures the students' interests. Students share their ideas about the problems/issues raised in the stories.
2. **Exploration:** Students begin each unit of study by exploring related science and engineering principles in brief activities. During this phase they encounter problems or ask questions leading into the explanation phase.
3. **Explanation:** Students describe what they think is happening and collaborate with their peers and teachers.
4. **Elaboration:** Students apply what they have learned to meet the larger design challenge, modify their designs, and conduct additional trials as needed.
5. **Evaluation:** Students gather data to determine their level of success, reflect on what they learned, and return to a previous step in the learning cycle.

Engineering Design Process

GOAL
- Identify the need/problem.

ASK
- Identify all known facts related to the need or problem.
- Identify information that is not known but essential to the situation.
- Identify what is happening now in relation to the need or problem.
- Explore other options via the Internet, library, interviews, etc.

IMAGINE
- Brainstorm possible solutions.
- Draw on mathematics and science.
- Choose the best solution for action by using a list of selected criteria.

PLAN
- Create a list of necessary materials.
- Determine the steps in the process of creating the solution.
- Draw a diagram to match the steps.
- Troubleshoot to avoid possible problems.

CREATE
- Construct the prototype.
- Follow the plan to implement the solution.
- Test it!

IMPROVE
- Evaluate the solution.
- Redesign the prototype after each trial to gain maximum success.

Examples - Units of Study

Unit Title	Engineering Field	Grade
Towers: Creating Structures that Won't Fall Down	Architectural	4K
Backyards: Building Fences	Civil	4K
Catching a Wolf: Designing Contraptions to Safely Catch Animals	Environmental	4K
Trucks: Designing Vehicles for Large Loads	Transportation	4K
Using the Power of the Sun: Building a Solar Oven	Energy	5K
A Gusty Day: Harnessing the Power of the Wind	Mechanical	5K
Moving Objects: Building a Push Train	Transportation	5K
Where will they live? Building Farm Habitats	Agricultural	5K
Get to the Other Side: Building Bridges	Civil	1st
Recycling Materials: Building a Compost Heap	Green	1st
Need a Cool Drink on a Hot Day: Keeping Liquids Cool	Chemical	1st
Harvest Time: Creating a Harvesting Receptacle	Package	1st
Catching the Wind: Designing Windmills	Mechanical	2nd
The Best of Bugs: Designing Hand Pollinators	Agricultural	2nd
A Work in Process: Designing a Play Dough Process	Chemical	2nd
The Attraction is Obvious: Designing a Maglev System	Transportation	2nd
A Sticky Situation: Designing Walls	Materials	3rd
Sounds Like Fun: Seeing Animal Sounds	Acoustical	3rd
Thinking Inside the Box: Designing a Plant Package	Package	3rd
Now Your Cooking: Designing Solar Ovens	Green	3rd
A Long Way Down: Designing Parachutes	Aerospace	4th
An Alarming Idea: Designing Alarm Circuits	Electrical	4th
A Sticky Solution: Cleaning an Oil Spill	Environmental	4th
Lighten Up: Designing Light Systems	Optical	4th
Marvelous Machines: Making Work Easier	Industrial	5th
Just Passing Through: Designing Model Membranes	Bioengineering	5th
A Stick in the Mud: Evaluating a Landscape	Geotechnical	5th
Water, Water Everywhere: Designing Water Filters	Environmental	5th