WHITNALL SCHOOL DISTRICT

TEAM SCIENCE

THE LAB REPORT

K-12 Science Newsletter | Vol. II Issue I

What are the Science and Engineering Practices?

In past issues we introduced you to the three dimensions of the Next Generation Science Standards: Disciplinary Core Ideas, Crosscutting Concepts, and Science and Engineering Practices. We talked about the importance of making sure our students are obtaining the knowledge, reasoning abilities, and skills required to be scientifically literate citizens. In this issue we'll focus on the science and engineering practices: what they are and how they are applied in a Whitnall classroom.

Has your child ever asked you why plants have flowers? Did your family ever try to improve the design of your garden? If you are familiar with these or similar situations then you've partaken in the Science and Engineering Practices. While sharing some similar qualities, the goals are unique. **Science** asks questions about the natural world and proposes answers in the form of evidence-based explanations. **Engineering** identifies problems of human needs and aspirations and proposes solutions in the form of new products or processes. Looking back at our original questions you can see that if you observed and studied various flowers and their interaction with pollinators, you would be able to draw some conclusions about why plants have flowers. You would be conducting a scientific investigation using the same practices of scientists. But, if you noticed that your garden did not attract the amount of pollinators you were hoping for and you made changes in the garden design to attract more desirable insects, you would have developed a solution to a problem and used the practices of an engineer.

During a staff development day, third grade teachers Dana Nowak (right) and Megan Stachowiak use the "Claims, Evidence, Reasoning" model to Construct Explanations and then Engage in Argument from Evidence.

Science and Engineering Practices
Asking questions (for science) and defining problems (for engineering)
Developing and using models
Planning and carrying out investigations
Analyzing and interpreting data
Using mathematics and computational thinking
Constructing explanations (for science) and designing solutions (for engineering)
Engaging in argument from evidence
Obtaining, evaluating, and communicating information

Staff Development

To better understand the Science and Engineering Practices (left), the K-12 Science Team met during a staff development day. Through written articles and hands-on experiences, the teachers increased their knowledge base and developed lessons aligned to their grade level curriculum. Working as a K-12 team allowed staff to monitor the continuity of the lessons as students progressed from emerging learners to advanced placement scholars.

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Classroom applications

From our young kindergarten scientists and engineers using simple products to design solutions, to our advanced placement physics students using computers interfaced with probes that collect data that will be used to construct explanations using mathematics, Science and Engineering Practices are being embraced in the Whitnall School District.

Kindergarteners put their engineering skill to use when faced with the following challenge during a unit on weather and climate: Use tools and materials provided to design and build a structure that will reduce the warming effect of sunlight on Earth's surface.

One lesson learned: structures built by kindergarteners often don't hold up on a windy day. As one problem was addressed another was discovered, and so goes the cycle of science and engineering.

In this classic experiment, AP Physics students calculate the amount of friction between the board and the block and then apply the lessons to real life scenarios.

The annual 8th grade rocket launch addressed the standard: *Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object*. This involved project encompasses many of the science and engineering practices such as developing and using models, mathematics and computational thinking and, designing solutions to problems.

School Forest Work Progresses

If you visited the Whitnall School Forest booth or took a golf cart tour at the Block Party, you are aware the property is overrun with invasive honeysuckle and buckthorn. The invasives bloom early in spring, blocking sunlight to the native plants. Under the direction of DNR forester Mike Sieger, a Whitnall alum, a forest management plan has been developed and now Whitnall staff and students are working together to remove these aggressive plants and improve the overall biodiversity of the property. Come and see our progress!