# Engineering by Design NEWS

November Edition

Welcome to the second issue of EbD News, (Grades 3 and 4), Verona's STEM Elementary Engineering newsletter. This unit's emphasis, renewable water resources, incorporates multiple hands-on activities facilitating a practical understanding of essential engineering concepts within the teaching and learning process. The significance of learning from models, small scale replicas of standard size natural and human-made objects, cannot be overemphasized. Students are better able to absorb and understand the "big

Building models requires knowledge of scale and proportion. Students participated in graphing activities as well as increasing the scale, in centimeters, of a pumpkin three- fold while maintaining its proportion. This work enhanced understanding of these measurement concepts.

Based on the phrase, "You cannot throw anything away, it will always show up somewhere else," the student engineers constructed landform models demonstrating how rainfall causes soil, sand, gravel, rocks, fertilizer, chemicals and pollution "runoff" to travel elsewhere. This material can find its way "downstream" as small rivers merge into larger rivers and ultimately the ocean.

Students built "downstream" working models. Success was attained due to small group collaboration in tandem with an understanding of the Engineering Design Process, a multi-step problem solving design strategy; define the problem, generate ideas, select a solution, make the item, assess and evaluate the model's viability and finally, present results. The utilization of models for testing ideas, making changes to designs and aiding the designer in learning more about what would happen to a similar, real object is the ultimate goal. Students will learn how working engineers successfully design products to meet human wants and needs.

Finally, the 3rd/4th graders gain responsibility in becoming caretakers of a cleaner planet Earth.

In the November issue of Scientific American, a corporate executive with a science background stated, "I use communication and cooperation skills every day. I also have to do a lot of group work which is how things are done in the real world."

**EbD…. problem solving for the 21st century!**

Dr. Larry "Doc" Siegel

Instructor, EbD/STEM

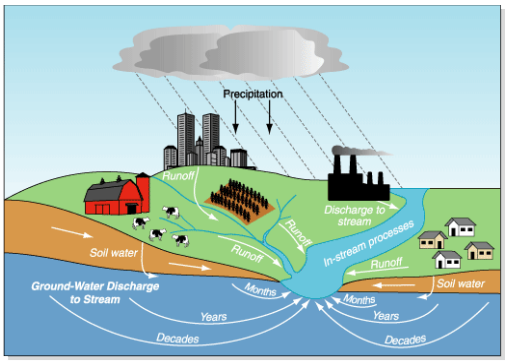


**Figure 4.** Conceptual watershed showing the relation between nutrient sources, streams, and ground water *(Nitrogen moves from point and nonpoint sources and is transported to a stream through runoff, soil water, and ground water. Once in the ground-water system, nitrogen may take less than a year to decades to be transported to a stream. The distribution of flow paths in the ground-water system will affect the nitrogen concentration and the "lag time" between implementation of management practices in a watershed and the decrease of nitrogen concentrations in a stream.)* (modified from Phillips and others, 1999).