Core Element: Greater New Orleans STEM Initiative

Who We Are, What We Do, and How We Do It

Overview

A revolution is needed in education. Volumes of research illustrate that students who ***discover knowledge*** are better prepared than those who gain knowledge in the traditional teacher lecture or worksheet method[i]. Core Element addresses this problem specifically for math and science subjects. Core Element helps teachers understand how to rework the instructional model such that students discover the core foundations of science and math content rather than asking them to memorize.

The Core Element process includes helping teachers deliver content in a hands-on, highly interactive environment that promotes discovery. Why discovery? The discovery experience internalizes knowledge which immediately becomes long-term. For example, even the youngest child discovers a favorite food or toy to play with – they don't have to think about it; they now own this knowledge. If a child dissects a flower, they now know that the flower is not a whole unit but is made up of different parts. This knowledge is now with the child forever, establishing a base for further knowledge and discovery.

The Problem

The U.S. is falling behind other nations in producing STEM (Science, Technology, Engineering and Math) skilled workers.

- U.S. students recently finished ***well below average*** in international rankings – 14th in science, 15th in reading and 19th in math. U.S. students ranked behind Canada, Japan, and Western Europe and emerging European countries such as Slovenia and Estonia in math and science. (Source: www.NationalMathandScience.org referencing Organization for Economic Cooperation and Development ranking)
- The number of American engineers and physical scientists graduating from our higher education institutions has ***declined by 20 percent***. The number of U.S. citizens receiving PhD's in engineering has declined by 34 percent and the number receiving bachelor's degrees in engineering has declined by 18 percent. (Source: National Science and Math Initiative "Competitiveness Brochure", 2009, www.NationalMathandScience.org)

This will cause a shortage of STEM-skilled workers in the US, reducing our economic output and competitive advantage. Nationwide, K-12 students are not obtaining proficient knowledge in science and math that are critical to maintain a solid STEM workforce in America.

- 80% of jobs created over the next decade will call for math and science skills with over ***half*** of the 30 fastest-growing occupations requiring substantial math and science skills. However, only 32% of 4th graders, 39% of 8th graders and 18% of high school seniors tested at or above proficiency in math or science. (Source: US Bureau of Labor Statistics; National Assessment of Educational Progress 2005)

In Louisiana, the situation is more dire with less than 20% of students graduating with a proficient level of math and science.

- ***Only 19% (Math) and 19% (Science) of Louisiana students*** in the 8th grade met proficiency levels compared to 29% (Math) and 27% (Science) nationwide (Source: National Assessment of Educational Progress 2005 Report Card)

Currently, teachers do not have the training to improve this situation.

- Over 50% of 8th graders receive instruction from a science or math teacher who ***does not hold a degree in the field of math or science they teach***. In high-poverty schools (84% of public schools in Louisiana) two in five math classes have ***teachers without a college major or certification*** in math. This means many teachers are barely a chapter ahead of their students. (Source: www.DefinedSTEM.com; www.NationalMathandScience.org referencing The Education Trust, 2009)

The Solution

To improve achievement and interest in STEM subjects, Core Element provides the following resources to K-12 teachers and schools:

1. ***Teacher Training***: Core Element holds summer training sessions focusing on major science concepts with strong math and literacy components. All content aligns with the Louisiana Comprehensive Curriculum (LCC) and are based on nationally recognized curricula created at leading education research universities (University of Berkeley, Harvard-Smithsonian Center for Astrophysics). Each weekly training session focuses on a single core subject with 30 hours of hands on training from professional trainers and master Core Element teachers. Follow-up training sessions are held during the school year.

   a. For elementary teachers, a full grade of Core Element subjects can be implemented in a four year period - 1 subject per year.
   b. High school teachers are trained in their math or science subject and reinforced over multiple years to develop proficiency in discovery instruction.

2. ***STEM Kits***: Core Element provides specifically designed science and math education kits to teachers participating in the training program. The kits are also based on nationally recognized learning models developed by leading research universities. Research demonstrates use of these kits raises student achievement in math and science. The kit can be utilized for multiple years affecting a greater number of students over time and shared by multiple teachers in a specific school. Replenishment of kits is managed by Core Element's Resource Center.

3. ***Laboratory Equipment***: Core Element provides training to teachers on the appropriate use of technology integrated and hands-on laboratory equipment for discovery based instruction in environmental science, physics, chemistry, biology and mathematics.

4. ***Teacher Mentoring***: Core Element has a network of Master Teachers experienced in STEM subjects who assist K-12 teachers in effectively implementing the principles and elements learned during summer training. Mentoring provides in-person classroom assistance with kits, laboratory equipment, on-line programs, materials and refresher courses, and grant writing workshops.

5. ***Academic Enrichment Activities***: Core Element supports STEM enrichment activities such as First Robotics, First Lego League and the Greater New Orleans Science and Engineering Fair. Core Element provides materials, teacher training and hands-on mentoring to help reinforce classroom study with real life applications to further enhance the students' interest and proficiency in STEM-subjects.

6. ***Resource Center*:** The Core Element Resource Center acts as the central location to prepare replenish and distribute the STEM kits. The Resource Center also acts as the training facility for the summer and refresher courses.

How You Can Get Involved

Donate

A modest investment in Core Element's program can revolutionize a classroom.

Volunteer

Volunteers are needed to help with training, replenishing the hands-on learning kits, and logistics for the enhancement activities.

Participate

Sign up for our newsletter to learn how you and your organization can participate and become involved with Core Element.

Advocate

Improve math and science education by learning and advocating the benefits of the program to local schools.

[i] Sample research papers that illustrate this statement are:

Lowery, Lawrence F. (July 2003), "Research On Hands-On Science Programs – A Bibliography"

Yates, Gregory C. R. (University of South Australia) and Lyndon, E. Harry (Department of Education and Children's Services, South Australia) (2004),"Conceptual Mediation Program in Practice: Educational Outcomes from Two Sites."

Shymansky, J., Hedges, L., and Woodworth, G. (1990). A Reassessment of the Effects of Inquiry-Based Science Curricula of the 60's on Student Performance. Journal of Research in Science Teaching, 27, (2), 127-144.