



# Foundational Approaches in Science Teaching

## PROGRAM DESCRIPTION

### *Content*

- physical, biological and earth science concepts
- environmental issues
- inquiry-based investigations

Foundational Approaches in Science Teaching (FAST) is an interdisciplinary science program designed to meet the developmental needs of adolescents 12- to 15-years old. While it leans heavily on a curriculum for grades 6-10, the program has an extensive, required staff development component that prepares teachers to teach science concepts in constructivist ways and helps develop teachers' content knowledge.

The program emphasizes basic concepts and methods of the physical, biological, and earth sciences and relates these to practical issues of human use of the environment. FAST is designed around three courses of study. FAST 1 focuses on the local environment; FAST 2 addresses matter and energy in the biosphere; and FAST 3 emphasizes change over time. The content is organized into three strands: physical science, ecology, and relational study. In the FAST program, students are actively engaged in conducting scientific investigations to discover key concepts and principles. FAST students also explore relationships among the various science disciplines and societal issues.

The structure of the program develops scientific literacy to provide students (1) the background necessary for understanding and appreciating concerns that arise in a technological world and (2) the essential tools for further study in the sciences. FAST stresses increasing students' ability to communicate what they are learning through the use of oral reports, project work, graphing, flow charts, and diagramming. FAST helps students develop thinking skills, laboratory skills, and increase their knowledge of the foundational concepts.

### *Context*

- 36 states
- 10 countries
- varied student populations and school contexts

## PROGRAM CONTEXT

Foundational Approaches in Science Teaching is currently used by 6,000 teachers in 36 states and 10 countries. It is being used successfully in all types of schools with a full range of students in the middle grades. The program is available in Braille and has been translated for use in Japan, Russia, Slovakia, and other countries.



## STAFF DEVELOPMENT PROGRAM

**F**oundational Approaches to Science Teaching requires intensive teacher development. Prior to implementation of any course, teachers are immersed in a 10-day inquiry investigation for each FAST course. Each segment models the variety of teaching behaviors inherent within the FAST program and provides opportunities for discussion of the learning, teaching, and assessing process. In the institutes, certified FAST instructors model constructivist teaching strategies while participants conduct the same investigations their students will conduct. The institute's content focuses on concept development and the issues, challenges, and rewards of inquiry-based instruction. Debriefing of the investigations helps teachers identify instructional strategies used during the investigation. Participants also review issues related to safety, unexpected data or results, alternative procedures, lack of appropriate science equipment, and handling students with special needs.

In addition to the institutes, ongoing support is provided. Monthly meetings are held to discuss problems associated with implementation, content, or instruction, and to provide extended training. Other electronic and print support systems are in place. Teachers have access to an 800 number, e-mail, newsletters, and a Website for continued support and information.

### *Process*

- training
- modeling
- demonstration lesson
- ongoing monthly meeting
- coaching
- electronic and print support

### **S**UMMARY OF RESULTS

The FAST program increases students' understanding of basic science concepts; laboratory skills, processes, and knowledge; and creative thinking. Primarily a curriculum program with intensive staff development support, FAST has international acclaim as a middle school science program that successfully improves science performance of all students regardless of gender, ability, race/ethnicity, or socio-economic condition.

### *Intended Audience*

- entire department
- entire team

## EVIDENCE OF INCREASED STUDENT ACHIEVEMENT



### *Success Indicators*

- norm-referenced tests
- Fukuola, Ishikawa, Nakayama (FIN) Test
- Laboratory Skills Test
- Performance Process Skills Test
- Torrance Test of Creativity
- Scholastic Aptitude Test
- Verbal and Figural Batteries of the Scholastic Testing Service



Foundational Approaches in Science Teaching has a long history of success and evidence of its impact on both teacher and student learning. In a 1988 experimental pre-test/post-test evaluation of classrooms of grade 6 and 7 students, students in FAST demonstrated significant improvement in their laboratory skills, science processes, and science achievement at each grade level. Assessment instruments included the Laboratory Skills Test, Performance Process Skills Test (POPS), Fukuola, Ishikawa, Nakayama Test (FIN), and California Achievement Test (1988).

California Achievement Test scores of students in schools using FAST were compared to those of students in non-FAST schools in one district in California. The comparison demonstrated that FAST students scored well above their highest expected scores, while students not using the FAST curriculum scored significantly below them (1987).

In Hawaii, California, South Carolina, and Washington, FAST students scored significantly better than non-FAST students on the CTBS standardized science test during assessments conducted between 1982 and 1986. In 1986, FAST demonstrated a significant impact on students' thinking skills as measured by the Torrance Test of Creativity, Verbal and Figural batteries of the Scholastic Testing Service, and CTBS Science Test. FAST significantly affects student achievement in basic thinking skills, verbal creative thinking, and figural creative thinking. However, it does not jeopardize the mastery of science concepts.

### THE BOTTOM LINE



Foundational Approaches in Science Teaching is both a curriculum and staff development program. It was recognized by the Educational Testing Service as an exemplary program for serving minority and female, middle-level students. The curriculum facilitates teachers' implementation of constructivist learning strategies within a well-defined curriculum. It was included as a model of the extensive preliminary training and ongoing support which provided teachers with the knowledge, skills, and confidence to make dramatic changes in their instructional practice.

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