

FOUNDATIONS AND CHALLENGES TO ENCOURAGE TECHNOLOGY-BASED SCIENCE (FACETS)

Foundations and Challenges to Encourage Technology-Based Science (FACETS), is a set of 24 stand-alone, interdisciplinary investigation guides. Each guide presents science, mathematics, and other curricular topics on what is called a “need to know” basis. The nature of the modules suggests that teachers work with other content area teachers in the school to design cross-curricular experiences for the students.

Topics present inquiry, technology, and science in a personal and social perspective. Units focus on a set of problem-solving skills that reflect the processes and strategies used by scientists in investigative research: defining a problem, finding information, testing explanations, using models and simulations, designing and making, collecting data, analyzing and checking data, drawing conclusions, communicating findings, and reflecting and connecting. Modules typically begin with an introduction to the topic followed by an average of six activities, taking 2–4 weeks to complete.

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Grade Levels: 6–8
Scientific Domains: Earth, life, and physical science

CONTENT *FACETS* emphasizes both science and technology in an effort to develop an understanding of the relationship between the two, including the role of technology in the evolution and learning of science. Much of the program’s focus is on science from personal and social perspectives, but modules also address concepts related to “Science as Inquiry” and the “History and Nature of Science” as suggested by the *National Science Education Standards*. Some modules have a life-science perspective, while others focus on physical or earth science.

The curriculum is student-centered and project-based, putting the responsibility for designing and carrying out investigations into the hands of the students. Each module provides middle school students with a variety of choices for investigating the natural and designed world. Topics include very personal and immediate subjects, as well as more global issues and societal challenges. The curriculum has three grade-level series, each with eight modules.

SERIES 1, GRADE 6	SERIES 2, GRADE 7	SERIES 3, GRADE 8
<ul style="list-style-type: none"> ▪ Keeping Fit ▪ Food Substitutes ▪ Packaging ▪ Weather and Health ▪ Investigating Buildings ▪ Earthquakes ▪ Changing Shorelines ▪ Shrinking Farmlands 	<ul style="list-style-type: none"> ▪ Communicable Diseases ▪ Growling Older ▪ Structures and Behavior ▪ What’s in Our Food? ▪ Food from Our Land ▪ Cleaning Water ▪ Acid Rain ▪ A Sunken Ship 	<ul style="list-style-type: none"> ▪ Threads ▪ Oil Spills ▪ Managing Crops Pests ▪ Investigating Populations ▪ Climate and Farming ▪ Energy for the Future ▪ Transportation Systems ▪ Handling Information

FORMAT **Teacher’s Guide:** The introduction to each Teacher’s Guide provides overview information about the *FACETS* program—its philosophy, curriculum connections, module collection, and investigations strategies. A section

entitled Working with *FACETS* discusses “*FACETS*’ Instructional Style” and “Reflection on Learning” and provides advice about time management.

Specific to each module are the following sections:

- *Investigation Strategies*: a range of processes and procedures with specific scientific strategies relevant to each investigation to help students engage in an organized scientific study.
- *Module Contents*: a description of the activities specific to each module.
- *Module Time Line*: a chart that suggests the number of class periods and days needed for each activity.
- *Materials*: a list of all the materials necessary to teach the module.
- *Background Information*: content material for the teacher about the topic under study and tips about logistics.
- *Sidebars*: tips and hints for guiding particular activities and discussions.

Student Book: Each module has a student book. It contains the investigations and activities that students will do and provides students with questions to investigate, suggested activities, sample charts, data tables, presentation formats, “special notes,” and student readings.

INSTRUCTIONAL DESIGN Every module uses the following instructional approach:

- *The Big Question*: provides students with background information relevant to the topic under study.
- *The Introduction*: sets the scene for the investigation/activities.
- *The Activities*: provides a set of hands-on experiences. Each activity has three sections:
 - How To Go About It: a range of processes and procedures to help students engage in a scientific study in an organized way.
 - Conclusions: key questions about the activity for students to consider.
 - Reflections: important points at the end of each activity that provide students with an overall look back at the module, helping to provide an answer to the Big Question.
- *Looking At*: provides content sections teachers and students can access when they need additional information throughout the module.

FACETS is built on investigations that are: topic-focused, student-centered, hands-on/minds-on, cooperative, and in many instances, cross-curricular. Each module puts the responsibility for designing and carrying out investigations into the hands of students. *FACETS* investigations provide students with opportunities to explore questions in depth and to use a variety of problem-solving skills throughout their investigations. The curriculum presents a range of processes and procedures that students use to organize their investigations.

Thus, the job of the teacher is that of investigation-facilitator, more a consultant and organizer than provider of information. Students work in collaborative groups of three or four to explore questions and define problems.

The curriculum materials offer suggestions to both teachers and students for how to work in groups most effectively.

Although the content orientation of the modules varies, the problem-solving skills needed to complete the investigations are common to them all. These skills are called “investigative strategies” and are flagged throughout the individual activities. They include: defining a problem, finding information, testing explanations, using models and simulations, designing and making, collecting data, analyzing and checking data, drawing conclusions, communicating findings, and reflecting and connecting.

The investigations in *FACETS* offer cross-curricular opportunities. Technology, math, language arts, and social studies connections are established. All subjects are seen as tools that teachers and students can use to aid the investigative process that characterizes teaching and learning throughout.

Opportunities are provided for teachers to take advantage of the local environment and special resources, including knowledgeable colleagues, representatives from the community, and parents to enrich the experiences that students may encounter in the classroom.

FACETS components are conducive to being used either as a complete curriculum package, or as curriculum supplements. Although each of the modules can stand alone as an instructional unit, they work best when used in the recommended sequence.

ASSESSMENT The hands-on activities evoke critical-thinking skills, which assist students in tracking the learning process. Reflecting and Connecting sections built onto the end of each activity are also useful in assessing student learning. They help students see how all the work they are doing fits into one big investigation picture. They give the teacher a chance to take a look at how the investigations are progressing, so that instruction can be re-adjusted.

The modules also suggest other methods for assessing student progress. They recommend alternative strategies such as portfolios, performance assessment, debates, or a set of questions.

A separate *Assessment Guide* has been developed to accompany *FACETS*. It provides teachers with information about embedding assessment into *FACETS* activities, developing scoring tools, scoring and grading, and how to involve students in assessment.