

2002–2003 Series Overview



What is the NASA SCI Files™ ?

The NASA SCI Files™ is a research- and standards-based series of FREE integrated mathematics, science, and technology instructional distance learning programs that NASA Langley Research Center in Hampton, VA created for students in grades 3-5. The series uses Problem-Based Learning (PBL) to introduce students to scientific inquiry while providing students the opportunity to solve real world problems with the help of community experts and NASA researchers.

The NASA SCI Files™ supports the teaching of national standards identified by the National Science Teachers Association (NSTA), the National Council of Teachers of Mathematics (NCTM), the International Society for Technology in Education (ISTE), the International Technology Education Association (ITEA), and the National Council for Geographic Education (NCGE).

Who are our partners?

The series is a partnership involving organizations that are committed to inspiring America's students, creating learning opportunities, and enlightening inquisitive minds. Hampton (VA) City Public Schools, dedicated to excellence in education, generously provide the series with teachers who ensure that the content is standards based and appropriate for grades 3-5. Busch Gardens (Williamsburg, VA), committed to helping schools increase students' academic achievement, provides numerous informal educational resources and learning opportunities through its nationwide system of parks and

employees. The Society of Women Engineers (SWE), devoted to helping women achieve their full potential in careers as engineers and leaders, provides classroom mentors and role models for young girls.



What is the NASA SCI Files™ all about?

The NASA SCI Files™ story lines are developed by

educators and involve the exploits of six ethnically diverse, inquisitive children who are excited about mathematics, science, and technology. The tree house detectives, as they are known, meet in a tree house where they work together using Problem-Based Learning and scientific inquiry to investigate and solve "real-world" problems that occur in their community. To find solutions to these problems, they are guided by their mentor, Dr. D, a retired science teacher. NASA researchers, community experts, and students across the country who are members of the NASA SCI Files™ Kids Club also help with their investigations.

What are the components of the NASA SCI Files™ ?

Each program in the series has three components comprising an integrated instructional package:

Television Broadcast: Each 60-minute program is divided into four, 15-minute instructional segments that feature focus and extension questions. Content experts, experiments, museums, NASA researchers, classroom activities, and the NASA SCI Files™ Kids Club are included in every program. Each program is closed-captioned for the hearing impaired.

Educator Guide: Each guide includes a listing of the featured national mathematics, science, technology, and geography standards; a program overview, vocabulary, implementation strategy, activities, experiments and worksheets, related print; and electronic resources, and career information.

Web Site: The web site is divided into teacher, parent, and student sections and features suggested usage, Problem-Based Learning information and online PBL investigations, Dr. D's Lab, the Media Zone, Resource Rack, the Expert's Corner, and the Problem Board.

How can I get the television broadcast?

There are five ways to receive the television broadcast and/or purchase a video copy of the program.

1. The NASA SCI Files™ programs are carried by many PBS stations nationwide and on many ITV



stations. Check our web site,
<http://scifiles.larc.nasa.gov> for local listings.

- The programs are broadcast on Ku- and C-band satellite and can be downlinked by using the satellite coordinates listed on the NASA SCI Files™ web site.
- Programs are available on the web through NASA's Learning Technologies Channel,
<http://quest.nasa.gov/events/sci/index.html>(p. 8).
- You can obtain video copies of the broadcasts from the NASA Educator Resource Center in your state,
<http://education.nasa.gov/ercn> (p. 9).
- You may purchase the video copies from NASA CORE, Central Operation of Resources for Educators,
<http://core.nasa.gov> (video series) (p. 8).

How much does it cost and how do I register?

The NASA SCI Files™ is FREE to educators. Registered educators receive, via E-mail, a reminder notice of upcoming programs as an email attachment, a program summary, and can be download the educator guide. You can register for the series in one of four ways.

Electronically: <http://scifiles.larc.nasa.gov>
U.S. Mail: NASA SCI Files™, Langley Research Center, Mail Stop 400-DL, Hampton, VA 23681
Fax: 757-864-9701
Telephone: 757-864-5044

What rights and responsibilities are associated with the NASA SCI Files™ ?

The NASA SCI Files™ is a U.S. Government product and is not subject to copyright. There are no fees or licensing agreements. Broadcast and off-air rights are unlimited and granted in perpetuity.

How do I get a classroom mentor?

The Society of Women Engineers (SWE) provides classroom mentors to assist educators. Every effort will be made to match an educator with a SWE member who will assist the educators either in person or by E-mail. To request a mentor, e-mail SWE representative Kim Tholen at least four weeks in advance.

What is the instructional design of NASA SCI Files™ ?

Each program in the 2002-2003 NASA SCI Files™ series is designed to enhance and enrich the teaching of specific mathematics, science, and technology concepts. The NASA SCI Files™ series is designed to be easily integrated into an existing curriculum or used to introduce or reinforce a curriculum topic, objective, or skill. These instructional programs demonstrate scientific inquiry, Problem-Based Learning (PBL), and the application and integration of mathematics, science, and technology. The NASA SCI Files™ has three goals:

- To use PBL to introduce students to scientific inquiry and the scientific method.
- To provide students with the opportunity to simultaneously learn subject matter and develop problem-solving skills while investigating real-world problems.
- To demonstrate workplace mathematics, science, and technology as a collaborative process while raising students' awareness of careers and overcoming students' stereotyped beliefs by presenting women and minorities in challenging careers.

Each NASA SCI Files™ program models scientific inquiry and PBL and includes defining the problem, performing research and investigations, formulating a hypothesis, performing experiments, collecting and analyzing data, drawing conclusions, finding a solution to the problem, and publishing the results. Each 60-minute program is divided into four 15-minute segments that are introduced with a set of focus questions for students to answer while viewing the segment as well as "What's Up?" questions at the end of each segment. The accompanying educator guide provides a program summary and objectives; relevant national mathematics, science, and technology standards; vocabulary; suggested use of the broadcast, guide, and web site; print and online resources; and activities.



What is the NASA SCI Files™ teaching strategy?

Problem-Based Learning (PBL) and scientific inquiry are at the core of the NASA SCI Files™. Through the use of PBL and scientific inquiry, the teaching strategy is designed to encourage the development of higher order cognitive skills and a more active mental engagement with the television broadcast. Following the steps of the strategy listed below enables students to make stronger connections between the television broadcast, the activities, the web site, and appropriate mathematics, science, and technology concepts.

The strategy includes reflective discussion, student involvement, hands-on activities, journal writing, and web activities. The strategy promotes rich discourse among students. Program evaluation indicates that teachers find the strategy flexible and effective in enhancing students' understanding of complex mathematics, science, and technology concepts.

Steps in the NASA SCI Files™ teaching strategy

Step 1: Reflective Discussion

Prior to viewing the NASA SCI Files™, read the program summary to the students. List and discuss questions and determine preconceptions that students have about the program topic. Keep these questions visible during the program. List the key vocabulary words on the board or chart and discuss their definitions.

Step 2: Student Involvement

The NASA SCI Files™ is not designed for passive viewing. Rather, it is designed to actively engage students throughout the program. To provide educators a way to focus student attention on the major concepts presented in the program, the NASA SCI Files™ uses two questioning strategies.

Focus Questions: The focus questions center on the critical elements of each segment. Educators should copy the questions from the web site and distribute them prior to viewing each segment. Students are encouraged to look for the icon that will appear on the screen to tell them that an answer is near.

What's Up? Questions: At the end of each segment

there are "What's Up?" questions for students to reflect upon. Students' reflections allow the educator to determine if the students understand the concepts being introduced in each segment. By using these questions along with the focus questions, students can discuss the tree house detectives' progression in their scientific investigation and predict what will happen next. The students can also decide what additional information is needed as they begin to anticipate the solution to the problem.

Step 3: Hands-On Activities

The teacher developed and tested, hands-on activities in the guide and on the web site are designed to enhance and enrich the teaching and learning of mathematics, science, and technology concepts introduced in each segment. In the guide or on the web site, you will find an activity for each objective listed. These activities can be modified and/or adapted for the various academic levels in a classroom.

Step 4: Online PBL Activity

Each program in the NASA SCI Files™ is accompanied by a unique online PBL investigation designed to encourage students to apply problem-solving skills to an open-ended situation. These investigations can be found in the Kids' Tree House on the Problem Board of the NASA SCI Files™ web site. <http://scifiles.larc.nasa.gov>

Step 5: Journal Writing and Assessment

Journal writing supports students' reflective thinking process. At the end of each segment, students should reflect on what they have learned from the segment and from their own experimentation. Journal writing is one way to assess student understanding of the concepts presented in the program and the scientific process. Other assessment tools such as rubrics, checklists, charts, and evaluation tools can be found on the web site in the educator area under "Tools."

*(R) indicates a repeat show from the 2001-2002 series

What is the research basis for the NASA SClence Files™ ?

The NASA SClence Files™ draws from a growing body of research knowledge about the nature of learning; the principles of learning and teaching in general; and those principles that are specific to the teaching and learning of mathematics, science, and technology in grades 3-5. The philosophy of the series is based on the premise that teaching and learning are mutually inclusive and inseparable. Children and young children in particular are naturally inquisitive about the world in which they live. From a teaching perspective, the challenge for educators becomes that of developing strategies and methods that harness, capture, and capitalize on children's natural curiosity. Furthermore, *Science for all Americans: Project 2061* states that children can learn most readily about things that are tangible and directly accessible to their senses. It further states that, constructive, concrete experiences are most effective in learning when they occur in the context of some relevant conceptual structure (Rutherford, 1990).

Children are naturally curious and want to know and understand the "why" of their world (National Academy of Sciences, 2000). Although investigation of the natural world may take a variety of forms, the NASA SClence Files™ uses inquiry as a strategy (1) that builds on children's natural inquisitiveness; (2) that helps students understand mathematics, science, and technology as human endeavors; (3) that assists students in acquiring knowledge and critical thinking skills; and (4) that introduces students to mathematics, science, and technology career fields. The series uses Problem-Based Learning (PBL), a form of inquiry-based teaching which allows students to take an active role in the learning process. PBL empowers students with the responsibility of managing a largely self-directed learning process (Boud and Felietti, 1997). PBL also encourages students to develop skills that will enable them to understand the relationships between mathematics, science, and technology and to become adult (life-long) learners (Brine and Shannon, 1997). Coupled with inquiry-based learning, the NASA SClence Files™ uses PBL and "real world" problems to make learning mathematics,

science, and technology active, interesting, and relevant to students (Cawelti, 1999).

- (1) Cawelti, Gordon: *Handbook of Research on Improving Student Achievement*. Educational Research Service, 1999. JSBN:
- (2) Rutherford, F. James. *Andrew Ahlgren: Science for All Americans*. Oxford University Press, 1990, ISBN: 0195067711.
- (3) Boud, David and Grahame Felietti: *The Challenge of Problem-Based Learning*. Kogan Page Ltd., 1997, ISBN: 0749425601.
- (4) Brine, J. and S. Shannon: *Reflections on Problem-Based Learning*. Wild & Wooley Pty. Ltd., 1997. ISBN:



2002 – 2003 NASA SCI Files™ Programs

The Case of the Powerful Pulleys

Starts airing: Wed., Sept. 25, 2002,
11 a.m.-12 Noon EDT

One of the tree house detectives has had an accident and cannot get into the tree house. Using Problem-Based Learning, the rest of the gang investigates the world of simple machines and physical science and “pulls” together to get everyone into the tree house.

Math Standards: Measurement, Problem Solving, and Representation

Science Standards: Science and Inquiry, Physical Science, Science and Technology

Technology Standards: Basic Operations and Concepts; Social, Ethical, and Human Issues; Technology Productivity Tools; Technology Communication Tools; Technology Research Tools; and Technology Problem-Solving and Decision-Making Tools

The Case of the Mysterious Red Light (R)

Starts airing: Wed., Oct. 16, 2002,
11 a.m.-12 Noon EDT

Have you ever seen an unusually bright red sunrise or sunset and wondered why the color was so intense? That's exactly what happens as the tree house detectives accept the challenge of trying to find the source of the strange red light.

Math Standards: Measurement, Problem Solving, and Representation

Science Standards: Science and Inquiry, Physical Science, Earth and Space Science, Science and Technology

Technology Standards: Basic Operations and Concepts; Social, Ethical, and Human Issues; Technology Productivity Tools; Technology Communication Tools; Technology Research Tools; and Technology Problem-Solving and Decision-Making Tools

The Case of the Shaky Quake

Starts airing: Wed., Nov. 20, 2002,
11 a.m.-12 Noon EST

Troubled by a strange tremor in the area, the tree house detectives investigate earthquakes. Join them as they delve into geography, geology, and plate tectonics to discover why they're “all shook up.”

Math Standards: Measurement, Problem Solving, and Representation

Science Standards: Science and Inquiry, Physical Science, Science and Technology

Technology Standards: Basic Operations and Concepts; Social, Ethical, and Human Issues; Technology Productivity Tools; Technology Communication Tools; Technology Research Tools; and Technology Problem-Solving and Decision-Making Tools

The Case of the “Wright” Invention (R)

Starts airing: Wed., Dec. 11, 2002,
11 a.m.- 12 Noon EST

Travel back in time with the tree house detectives to learn about the process of invention from two of the greatest inventors of all time, Orville and Wilbur Wright. The tree house detectives find that inventing is not as easy as it seems, and it really does take the “Wright” stuff to be a good inventor.

Math Standards: Measurement, Data Analysis and Probability, Problem Solving

Science Standards: Science and Inquiry, Physical Science, Science and Technology

Technology Standards: Basic Operations and Concepts; Social, Ethical, and Human Issues; Technology Productivity Tools; Technology Communication Tools; Technology Research Tools; and Technology Problem-Solving and Decision-Making Tools

(R) Indicates a repeat show from the 2001-2002 season.

The Case of the Barking Dogs (R)

Starts airing: Wed., Jan. 22, 2003,
11 a.m.- 12 Noon EST

The tree house detectives accept the challenge of determining why dogs have unexpectedly started barking in the morning and late at night. In determining the "why," the detectives learn about sound — what it is, how it is transmitted, and how human beings and animals hear.

Math Standards: Algebra; Geometry; Measurement; Data Collection and Analysis, Connections, and Representation

Science Standards: Science and Inquiry, Physical Science, Life Science, Science and Technology

Technology Standards: Basic Operations and Concepts; Social, Ethical, and Human Issues; Technology Communication Tools; and Technology Research Tools

The Case of the Inhabitable Habitat (R)

Starts airing: Wed., Feb. 19, 2003,
11 a.m.- 12 Noon EST

Come help the tree house detectives as they enter a contest to design a habitat that will sustain life on Mars. They discover there is a lot more to habitats than habits. Join them as they learn about various habitats on land, in the water, and even in space.

Math Standards: Measurement, Data Analysis and Probability, Problem Solving

Science Standards: Science and Inquiry, Life Science; Earth and Space Science, Science and Technology

Technology Standards: Basic Operations and Concepts; Social, Ethical, and Human Issues; Technology Productivity Tools; Technology Communication Tools; Technology Research Tools; and Technology Problem-Solving and Decision-Making Tools

The Case of the Biological Biosphere

Starts airing: Wed., Mar. 19, 2003,
11 a.m.-12 Noon EST

One of the tree house detectives is about to take a trip to foreign shores and is both excited and concerned. This is a chance of a lifetime, but he doesn't want to get sick and miss the trip. Come help the detectives learn about the human body as they discover that "no man is an island," not even a treehouse detective.

Math Standards: Measurement, Data Analysis and Probability, Problem Solving

Science Standards: Science and Inquiry, Life Science, Earth and Space Science, Science and Technology

Technology Standards: Basic Operations and Concepts; Social, Ethical, and Human Issues; Technology Productivity Tools; Technology Communication Tools; Technology Research Tools; and Technology Problem-Solving and Decision-Making Tools

The Case of the Phenomenal Weather (R)

Starts airing: Wed., April 9, 2003,
11 a.m.- 12 Noon EDT

Join the tree house detectives as they plan a trip to Florida and encounter problems trying to predict the weather. Learn about violent storms, such as hurricanes and tornadoes, weather fronts, global wind patterns, and climates. While solving the case, they will discover that predicting the weather is not predictable at all!

Math Standards: Geometry, Measurement, Data Analysis and Probability, Problem Solving

Science Standards: Science and Inquiry, Life Science, Earth and Space Science, Science and Technology

Technology Standards: Basic Operations and Concepts; Social, Ethical, and Human Issues; Technology Productivity Tools; Technology Communication Tools; Technology Research Tools; and Technology Problem-Solving and Decision-Making Tools

(R) Indicates a repeat show from the 2001-2002 season.



The Case of the Galactic Vacation

Starts Airing: Wed., May 14, 2003,
11 a.m.-Noon EDT

The Tree House Detectives go galactic with their latest project, creating travel brochures for our solar system. What do you pack for a weekend on Jupiter or a spring on Saturn? Find out as the tree house detectives explore life beyond the atmosphere.

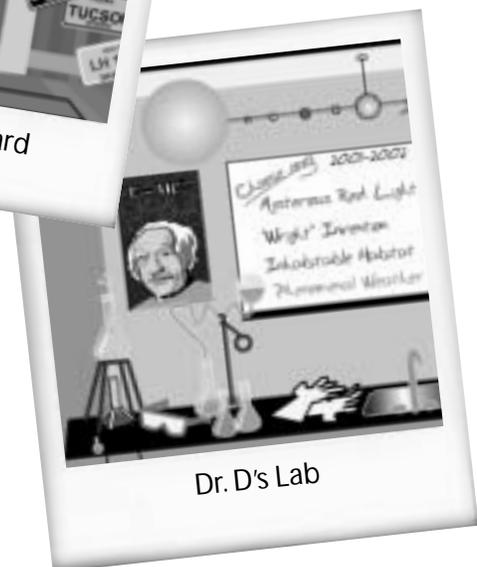
Math Standards: Geometry, Measurement, Data Analysis and Probability, Problem Solving

Science Standards: Science and Inquiry, Life Science, Earth and Space Science, Science and Technology

Technology Standards: Basic Operations and Concepts; Social, Ethical, and Human Issues; Technology Productivity Tools; Technology Communication Tools; Technology Research Tools; and Technology Problem-Solving and Decision-Making Tools



The Problem Board



Dr. D's Lab

NASA Resources for Educators

NASA's Education Home Page

(<http://education.nasa.gov>) serves as the cyber gateway to information regarding educational programs and services offered by NASA for educators and students across the United States and provides specific details and points of contact for all of NASA's educational efforts and Field Center Offices. Those using the site will have access to a comprehensive overview of NASA's educational programs and services, as well as home pages offered by NASA's four areas of research and development.

NASA Langley Research Center, Office of Education (<http://edu.larc.nasa.gov>) offers a wide variety of opportunities for educators at all levels of instruction. The Office of Education seeks to enhance the teaching of mathematics, science, and technology through its distance learning programs, all of which are described on the web site. Educators can also search NASA educational resources for the classroom, including activities, curriculum-enhancing projects, and equipment. From this site, you can link to our NASA SCI Files™ web site.

NASA Spacelink (<http://spacelink.nasa.gov>) is one of NASA's electronic resources that is specifically developed for use by the education community. This comprehensive electronic library offers teacher guides, wall sheets, listings of videos, computer software, and other materials that have been developed to meet national education standards. Educators can search specific curriculum materials by grade level and subject matter. Current and historical information related to NASA's aeronautic and space research can be found on Spacelink. Links to NASA Educator Resource Centers (ERCs), the Central Operations of Resources for Educators (CORE), news releases, current state reports on agency projects and events, and television broadcast schedules for NASA Television are also provided.

Quest (<http://quest.nasa.gov>) is the home of NASA's K-12 internet initiative. This electronic resource specializes in providing programs, materials, and opportunities for teachers and students to use NASA resources as learning tools to explore the Internet. One of its unique projects is Sharing NASA, a series about online, interactive units

where students can communicate with NASA scientists and researchers to experience the excitement of real science in real time.

The Learning Technologies Channel (LTC) (<http://quest.nasa.gov/ltc/>) is a NASA location on the Internet that allows you to participate in online courses and to remotely attend some NASA workshops and seminars. A primary focus of the LTC is to broaden the uses of the Internet to include in-service teacher training and to bring new internet experiences into the classroom.

NASAexplores (<http://NASAexplores.com/>) provides science, mathematics, and technology lessons that are published weekly. NASAexplores gives teachers timely educational content based on current research, development, and related events. The web site provides an e-mail subscriber list service to notify subscribers of weekly content. Teachers sign up to receive e-mail notices linking them directly to the web site where the lessons, along with related resources and materials, are posted. Teachers without e-mail can also access the lessons by visiting the NASAexplores web site.

NASA CORE, Central Operation of Resources for Educators (<http://core.nasa.gov>) is a worldwide distribution center for NASA multimedia educational materials. Educational materials include videotape programs, slide sets, and computer software. For a minimal fee, NASA CORE will provide educators with materials through its mail order service. A free NASA CORE catalog is available.

NASA CORE

15181 State Route 58 South, Oberlin, OH 44074,
phone: (440) 775-1400, fax: (440) 775-1460,
E-mail: nasaco@leeca.org



The NASA Educator Resource Center Network (ERCN) is composed of Educator Resource Centers (ERCs) located on or near all NASA field centers, colleges, museums, or other nonprofit organizations. These centers provide educators with inservice and preservice training, demonstrations, and access to NASA instructional products.

For a list of ERCs in your state, visit the NASA Educator Resource Center Network, <http://education.nasa.gov/ercn>. Educators may also contact one of the ERCs at the following NASA Centers.

AK, Northern CA (southern-most counties of Inyo, Kings, Monterey, Tulare), HI, ID, MT, NV, OR, UT, WA, WY
NASA Ames Educator Resource Center
Mail Stop 253-2
Moffett Field, CA 94035-1000
(650) 604-3574
<http://amesnews.arc.nasa.gov/erc/erchome.html>

AZ, Southern CA (northern-most counties of Kern, San Bernadino, San Luis Obispo)
NASA Dryden Educator Resource Center
45108 North Third Street East
Lancaster, CA 93535
(661) 948-7347
<http://www.dfrc.nasa.gov/trc/ERC>

CA
NASA JPL Educator Resource Center
Village at Indian Hills Mall
1460 East Holt Blvd., Suite 20
Pomona, CA 91767
(909) 397-4420
<http://eis.jpl.nasa.gov/eao/>

CT, DE, DC, ME, MD, MA, NH, NJ, NY, PA, RI, VT
NASA Goddard Educator Resource Center
Mail Code 130.3
Greenbelt, MD 20771
(301) 286-8570
<http://pao.gsfc.nasa.gov/gsfcd/educ/trl/welcome.html>

VA's and MD's Eastern Shore
NASA Wallops Educator Resource Center
Education Complex - Visitor Center
Building J-17
Wallops Island, VA 23337
(757) 824-2298
<http://www.wff.nasa.gov/pages/visitor.html>

FL, GA, Puerto Rico, Virgin Islands
NASA Kennedy Educator Resource Center
Mail Code ERC
J.F. Kennedy Space Center, FL 32899
(321) 867-4090
<http://www-pao.ksc.nasa.gov/kscpao/educate/edu.htm>

CO, KS, NE, NM, ND, OK, SD, TX
NASA Johnson Space Center
1601 NASA Road One
Houston, TX 77058
(281) 244-2129
http://www.spacecenter.org/educator_resource.html

KY, NC, SC, VA, WV
NASA Langley Educator Resource Center
Virginia Air and Space Center
600 Settlers Landing Road
Hampton, VA 23669
(757) 727-0900, ext. 757
<http://www.vasc.org/erc>

IL, IN, MI, MN, OH, WI
NASA Glenn Educator Resource Center
21000 Brookpark Road, MS 8-1
Cleveland, OH 44135
(216) 433-2017
<http://www.grc.nasa.gov/WWW/PAO/html/edteachr.htm>

AL, AR, IA, LA, MO, TN
NASA Marshall Educator Resource Center
U.S. Space and Rocket Center
One Tranquility Base
Huntsville, AL 35807
(256) 544-5812
<http://erc.msfc.nasa.gov>

MS
NASA Stennis Educator Resource Center
Building 1200
Stennis Space Center, MS 39529
(228) 688-3338
<http://education.ssc.nasa.gov/htmls/trc/trc.htm>

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