SCIENCE 21

SCIENCE FOR THE 21ST CENTURY

MANUAL FOR

ADMINISTRATORS

PUTNAM NORTHERN WESTCHESTER BOCES

Revised: 2008, 2009, 2011

SCIENCE 21: MANUAL FOR ADMINISTRATORS

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SCIENCE 21

SCIENCE FOR THE 21ST CENTURY

Why a Manual for Administrators?

Administrators and building leaders are essential to the success of any educational program. We know that even the best designed initiatives can fail if they do not have administrative support. SCIENCE 21, a comprehensive K-6 science instructional service, was developed "by teachers for teachers" as a program that all members of the school community could embrace. In order for that "school-wide" presence, school and central office administrators need to be knowledgeable about the program, its key features, and how it can enhance the educational process. That is the main reason for the creation of this *Manual for Administrators*.

Several individuals in leadership roles have asked that all of our various forms, documents, program components, and suggestions for support be incorporated into a single guidebook that can be used as a ready reference for the busy school supervisor. This manual has been contributed to by a number of educators, but is truly the result of the hard work and dedication of Dr. Abby B. Bergman, the previous Science 21 coordinator. As a leader in every respect, I'm certain you'll find his inclusions exactly what you're looking for.

Fred Ende,
Science 21 Coordinator

PUTNAM NORTHERN WESTCHESTER BOCES

Service and Innovation Through Partnership

PART ONE: ABOUT SCIENCE 21

SCIENCE 21 is an inquiry-based elementary school science program, developed "by teachers for teachers," that includes comprehensive curriculum guides, materials kits, and staff development services. As an inquiry-based program, students study the natural world and construct meaning and explanations based upon evidence that they derive from their activities.

History of SCIENCE 21

SCIENCE 21 was developed to assist local school districts meet the requirements of the state and national standards that emerged in the mid-1990's. Putnam/Northern Westchester BOCES, continuing in its tradition of helping its component districts address local and regional needs, assembled educators from nine school districts to design an integrated science curriculum that would meet these needs. After a careful review of local curriculum priorities and standards on the national and state level in the area of Mathematics, Science, and Technology, the educators, known as "designers," drafted the initial scope and sequence for a K-6 program that would integrate students' experiences from a variety of subject areas and involve them in relevant and engaging activities.

From these initial drafts, SCIENCE 21 has become a comprehensive science instructional service that includes detailed curriculum guides, materials kits, and wide-ranging staff development services. As of 2011, SCIENCE 21 is being implemented in 167 schools across 59 school districts in New York State.

Program Belief and Goals

Our Belief

"True science learning does not come from memorizing facts. Rather, good science is an active thinking process learned through teacher-guided inquiry and hands-on experiences taken from the real world."

Program Goals: To foster a learning environment in which all students acquire the skills, knowledge, and habits of mind to become independent and collaborative inquirers, problem solvers, and self-directed learners. In such an environment students will:

- engage in the active acquisition and construction of knowledge in the sciences that is developmentally appropriate and relevant to their lives.
- be encouraged to take risks, ask questions, and engage in the planning, conduct, and communication of investigations designed to explore concepts and phenomena.
- engage in identifying real world problems, designing solutions, evaluating efforts, and communicating findings in spoken, written, graphic, and mathematical forms.
- engage in a variety of child-centered learning experiences that require the application and transfer of skills and knowledge across a variety of disciplines and areas beyond the classroom.
- be assessed in a variety of ways including paper-and-pencil tests, performance tasks, exhibits, presentations, and reports that demonstrate what they know and are able to do in science.

Structure and Organization of the Program

SCIENCE 21 is a K-6 integrated science sequence in which experiences build science learnings from unit to unit and grade to grade. There are four units at each grade level. The first unit usually deals with science processes and investigative tools. The other units provide a balance of physical, earth, and life science experiences.

The curriculum manuals are comprehensive and include the following elements:

- A Forward that outlines the Vision of the program
- A Scope and Sequence chart so that users can see, at-a-glance, what units precede the current one as well as the ones that follow it.
- A Unit Introduction including the State Standards that are addressed in the unit as well as curriculum correlations, and management and planning tools.
- Home Connection letters that involve parents/guardians in the program.
- A Glossary of terms used throughout the unit.
- A Materials List for the unit.
- A Bibliography of literature and other resources that can be used to enhance the unit.
- Comprehensive Assessments for the unit.
- Readings in the Content Area for Grades 3 through 6.
- Journal Pages, the blackline masters that comprise the written component for the students.

The Use of Icons:

Throughout SCIENCE 21 curriculum manuals, the icons shown below are used to alert teachers to any advance preparations, safety issues, or items of particular note.

Advanced preparations that are needed for upcoming lessons are denoted by this symbol:

Any safety issues associated with a lesson are highlighted by this symbol:

Any special notations and/or reminders are designated with this symbol:

Home Connection Letters:

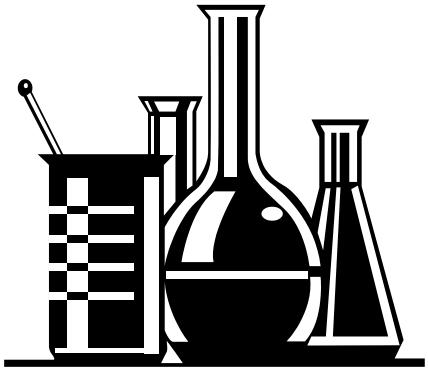
Home Connection Letters should be sent to the parents/guardians prior to the beginning of the new science unit. Subsequent letters requesting materials from home or outlining activities that can be accomplished at home comprise other home connection letters that occur throughout units.

A Note About Journal Pages:
All journal pages that are part of this curriculum should be considered as recommendations. Teachers should feel free to use them as is, modify or personalize them, or create their own from scratch with these as a model.

A Note About Blackline Masters:
Throughout a curriculum unit, a ***small version*** of a blackline master is usually depicted to provide a quick reference to a blackline master or an activity sheet from the student journal pages. Teacher blackline masters are found at the end of a lesson. Student activity sheets are found in the "Student Journal Pages" section located at the end of the unit.

Materials Kits:
At SCIENCE 21, we have a Materials Center that assembles over 12,000 science kits each year. Materials kits have been developed for all SCIENCE 21 units. The first two units are combined and packaged as one kit. Units III and IV are packaged separately as individual kits.

In order to keep costs down and to provide flexibility for school districts, the kits are organized into "shared" and "consumable" kits. All kits are packaged for class groups of 30 students. (For situations in which schools have unusually small classes, "Small Class Kits" with sufficient materials for 15 students are also available.)



SHARED KITS contain those non-consumable materials that are most difficult for teachers to obtain. These are materials such as balances, microscopes, hand lenses, and other such materials that are re-packaged and used again in other kits. Even though it is recommended that each teacher/class receive its own kit, this kit may be shared between two classes on the same grade level if the school desires.

CONSUMED KITS contain just the consumable items sufficient for a class of 30 students. One consumable kit is needed for each class. If two teachers are sharing a shared kit, then each one would still require a consumable kit.

Units I and II are shipped out of our warehouse in September. They are to be returned in early February. Unit III is delivered in early February and returned in April. Unit IV is delivered in April and returned in June. The only exception to this schedule is Grade 2, where most of the materials are kept all year.

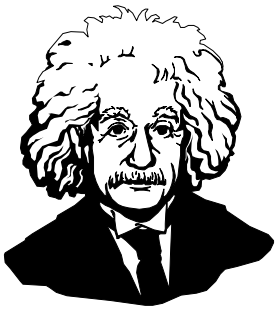
SCIENCE 21 services are "Co-Ser" aidable. That means that a significant portion of the outlay of funds for materials and services are returned to the school district in BOCES Aid in the school year subsequent to the year in which they were ordered. One of the requirements of this "Co-Ser," (Cooperative Service) is that the materials in the kits be shared amongst other schools and in other units. Kits are ordered by April 15th of the year prior to implementation.

All questions about SCIENCE 21 materials should be directed to Jean Treanor, our Materials Specialist, at 914-248-3852.

Professional Support:
At SCIENCE 21 we offer a full range of professional support services. One workshop is provided prior to the implementation of each unit at our Yorktown Heights facility. A wide variety of other offerings include in-depth content area workshops, integrating SCIENCE 21 with technology, use of the Internet and Science, making class books, SCIENCE 21 and ELA and Math connections, differentiated instruction in science, inclusion and SCIENCE 21, designing parallel tasks for State assessments, among many other options.

Unique Features

Administrators are often asked about what sets SCIENCE 21 apart from other kit-based programs. Some of the unique features of SCIENCE 21 may be summarized as follows:



- The program is tightly aligned to New York State's Learning Standards for Mathematics, Science, and Technology as well as the newly adopted Common Core Learning Standards.
- The program contains a wealth of hands-on experiences.
- The activities were carefully field tested in local classrooms.
- There is a focus on guided inquiry.
- The activities are relevant to students' everyday lives.
- The materials are engaging and intrinsically interesting.
- The kits contain nearly all of the materials that teachers need for active science teaching.
- The program includes "Readings in the Content Area" (Grades 3-6).
- The program includes "SCIENCE 21 Readers" (Grades K-2).
- A Literacy Connection Guide is available for all users.
- In-depth professional development is available in science content and process.
- The curriculum guides are "living documents" with regular updates provided.
- A SCIENCE 21 "Hotline" has been established for instant answers to questions.
- Home-School involvement is supported through Home Connection Letters.
- The SCIENCE 21 website contains many useful resources for program users.
  See: **www.pnwboces.org/science21**.

- A SCIENCE 21 Newsletter provides useful information about the program.
- Comprehensive Assessment Packets are available for all units.
- The program is supported by an E-Mail Distribution List.
- A Spanish Version of Journal Pages, Blackline Masters, and Home Connection Letters, Assessments, and Science 21 "Readers" is available.

Scope and Sequence

The Scope and Sequence for SCIENCE 21 was well thought-out by the program designers. Topics, concepts, and skills are developmentally appropriate and build upon one another from grade to grade. In-depth exploration of content occurs at each grade level adhering to the idea that "less is more." In this way, fewer topics are covered in greater depth at each grade level as opposed to simply touching upon a full survey of topics every year. In this way, students have an opportunity to explore science concepts in a legitimate manner that will allow transfer of knowledge acquisition from grade to grade through a process of active inquiry. A full Scope and Sequence chart for the program appears on the next page.

SCIENCE 21: Science for the 21st Century

SCOPE AND SEQUENCE

Kindergarten - Exploring Our World

Unit 1: Using My Senses to Learn about and Appreciate Science (Mystery Box)
Unit 2: Using My Senses to Learn about Me in My World (human body, senses, health and safety)
Unit 3: Using My Senses to Learn about Other Living Things in My World (properties of plants and properties of animals)
Unit 4: Using My Senses to Learn about Non-living Things in My World

First Grade - Order in our World

Unit 1: Organizing Ourselves to do Science Investigations
Unit 2: Investigating Attributes and Properties of Objects
Unit 3: Identifying the States of Matter
Unit 4: Investigating Living Things (Hermit crabs or Pillbugs)

Second Grade - Measuring Changes in Our World

Unit 1: Tools to Measure Our World
Unit 2: Observing and Measuring Changes in Energy
Unit 3: Observing and Measuring Changes in Living Things (Crayfish or Triops)
Unit 4: Observing and Measuring Changes in the Environment

Third Grade - Cycles in the Natural World

Unit 1: How a scientist Investigates Plant Cycles
Unit 2: How a scientist Investigates Electricity
Unit 3: How a scientist Investigates Water Cycles
Unit 4: How a scientist Investigates Animal Cycles (butterflies)

Fourth Grade - Organization in the Natural World

Unit 1: Organizing Ourselves for Doing Science
Unit 2: Digestion, Nutrients, Food Chains and Food Webs
Unit 3: Simple Machines
Unit 4: Organization of the Earth (constructive and destructive forces, rocks and minerals)

Fifth Grade - Interactions in the Natural World

Unit 1: Interactions of Chemical Matter (Focus on controlled studies)
Unit 2: Interactions in the Microworld
Unit 3: Interactions in the Human Body (respiratory/circulatory & muscular/skeletal systems and genetics)
Unit 4: Interactions in the Environment - Energy Transfer

Sixth Grade - Investigations of Science And Technology In Our World

Unit 1: Investigating the Nature of Science and Technology
Unit 2: Investigating Energy (Electromagnetism, Potential / Kinetic)
Unit 3: Investigating Earth In Space
Unit 4: Investigating the Environment (Ecosystems, Human Interactions with the Environment)

Program Components

A list of the components of the SCIENCE 21 program follows:

Instructional Kits

For each grade level, there is a kit for each of four instructional units.
For each unit, there are:

- ***SHARED KITS*** (materials that are non-consumable, such as balances, microscopes, magnets, thermometers, books, just to name a few)
- ***CONSUMED KITS*** (materials that are used up during the course of instruction, such as powders, liquids, vials, wire, bulbs, cups, soil, seeds, batteries, etc.)

A shared and consumed kit includes sufficient materials for a class of 30 students, working either individually or in groups. A shared kit may be shared between two teachers. However, each teacher will require a consumed kit. To order instructional kits, contact Jean Treanor at 914-248-3852.

Curriculum Materials

The following curriculum materials are available for SCIENCE 21 teachers:

- ***Curriculum Binders*** (There is one binder, containing four units, for each grade level, K-6. These include Student Journal Pages, Assessments, and "Readings in the Content Area" for Grades 3-6.)
- ***"Readings in the Content Area"*** for Grades 3-6. Packets of Readings, appropriate to the grade level, are available that are keyed to each instructional unit.
- ***Assessment Packets*** are available for all Grades, K-6. (As units are revised, the assessments are incorporated into the body of the units.)
- ***"SCIENCE 21 Readers"*** are the non-fiction books that we produce. Eventually, one will exist for each unit in grades K-2. (One copy will be included with each kit; additional copies are available for purchase.)
- ***Connecting Literature and Science Resource Guide.*** This includes a comprehensive bibliography for books that can be used to complement SCIENCE 21 units as well as methods for connecting science and literature and sample activities. (This document can also be downloaded from the "Resources for Teachers" section of the SCIENCE 21 website: www.pnwboces.org/Science21.)
- ***Differentiation and Inclusion Guides*** assist teachers in planning for SCIENCE 21 instruction for students with special needs, aptitudes, and interests.
- ***Spanish Version.*** A set of parent letters and Student Journal Pages have been translated into Spanish for Grades K–4. These are available by special request from each school and also downloadable at the SCIENCE 21 Website.
- ***Technology Resources*** such as ***SMART Board Lessons, Websites, and Virtual Labs and Demonstrations*** linked to SCIENCE 21 lessons are available on our website.

Staff Development Services

Comprehensive staff development services are available for all SCIENCE 21 teachers. These include unit workshops and a wide variety of other related professional development opportunities. Relevant videos and websites for teacher background information also appear on the SCIENCE 21 website.

For Curriculum Materials and Staff Development Services contact Fred Ende at 914-248-2336.

Program Standards

Program Standards for the SCIENCE 21 program were established early in its development. These specify what students should know and be able to do by the end of the year for each grade level of their involvement in the SCIENCE 21 program. To view these Program Standards, visit the SCIENCE 21 website at: **www.pnwboces.org/Science21**
Once there, click on "LEARNING STANDARDS" on the navigation bar on the left-hand side of the website. This will take you to a page where you can select "Program Standards."

Alignment to State Standards

When SCIENCE 21 was first developed (and with each subsequent revision), all activities were aligned to the *New York State Learning Standards for Mathematics, Science and Technology* and the *Elementary Science Core Curriculum*. In addition, in the summer of 2011, a number of SCIENCE 21 users assisted in developing a correlation guide to the *Common Core Learning Standards*.

Each Performance Indicator and Major Understanding was analyzed and the degree to which SCIENCE 21 lessons address those indicators and understandings was specified. Rather than to reproduce these technical documents here, they are available on the SCIENCE 21 website.

To view these documents for the elementary and intermediate level alignments, go to the website at: **www.pnwboces.org/Science21**
Once there, click on "LEARNING STANDARDS" on the navigation bar on the left-hand side of the website. This will take you to a page where you can select "Elementary Core" or "Intermediate Core" to view the various alignment documents.

Themes: Horizontal and Vertical

There are several themes that form the basis of the SCIENCE 21 curriculum. Horizontal themes are ones that define the central focus of the curriculum at a single grade level. Vertical themes define over-arching skills or ideas that build throughout the program.

A horizontal theme, for example, is the Second Grade focus, "Measuring Changes in Our World." This theme appears throughout the grade level. In Unit I, students work with "Tools to Measure Our World." In Unit II, they "Observe and Measure Changes in Energy." Unit III involves "Observing and Measuring Changes in Living Things," and continuing with the theme, Unit IV focuses on "Observing and Measuring Changes in the Environment."

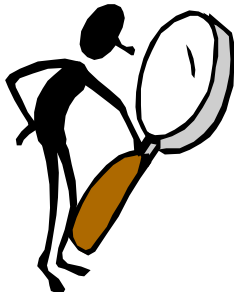
Other such horizontal themes occur at the other grade levels.

Vertical themes involve those ideas, broad concepts, and skills that build from one grade level to the next. Reproduced on the next page is one such theme: "Student as Scientist." This sheet outlines the way that this theme is infused in the SCIENCE 21 Program as students move from grade to grade.

STUDENT AS SCIENTIST

Throughout **SCIENCE 21** there are several big ideas and unifying themes that occur. One of these themes is "Student as Scientist." Beginning in Kindergarten and continuing through the grades, students approach science as a process of inquiry and investigation. They will develop tools and procedures to investigate their world.

Kindergarten - Children learn how scientists ask questions and design experiments to find answers. They will use their senses as tools to explore their world and develop tentative explanations of what they have observed. Children may adjust their understandings of objects based on their findings. They are encouraged to work cooperatively, record results and share them with their classmates.



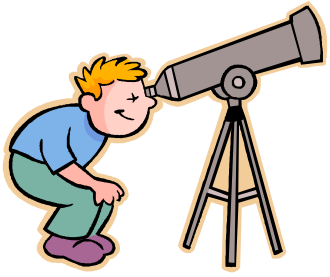
Grade 1 - Students work together to answer questions, collect and organize data, and record the collected data. They develop their skills of observation and expand their vocabulary to accurately describe their observations. Children learn a variety of ways to classify and organize data and to interpret their findings.

Grade 2 - Students learn about and develop skill in using measuring tools used by scientists as they observe, measure, classify, and graph and chart data. The use of investigative inquiry is modeled and encouraged to help children discover the questions and approaches used by scientists in learning about their world.

Grade 3 - Students engage in the process of science (scientific inquiry) which includes observing, questioning, predicting, hypothesizing, conducting investigations, analyzing data and communicating their findings in a variety of ways. They begin to develop an understanding of the importance of replicating experiments to confirm validity.

Grade 4 - Students collaborate and develop inquiry skills by exploring various aspects of the ***scientific method***. Students learn what it means to set up a valid experiment or "fair test." This involves devising experiments where only one variable at a time is tested, while all other possible variables are controlled.

Grades 5 and 6 - Students summarize the steps of the ***scientific method*** and develop an understanding of the three types of variables in a fair investigation. They apply their understanding of the scientific method to develop and carry out a controlled study to solve a problem.



Essential Questions

Broad over-arching questions for the program, for the grade level, and more specific ones for each SCIENCE 21 unit are available on the SCIENCE 21 website: **www.pnwboces.org/Science21**

Curriculum Maps

A curriculum map for each unit appears in the Curriculum section of the SCIENCE 21 website.

Unit Concepts

The concepts underlying each SCIENCE 21 unit are outlined in the Unit Concepts link in the Curriculum section of the website.

Online Curriculum Manuals

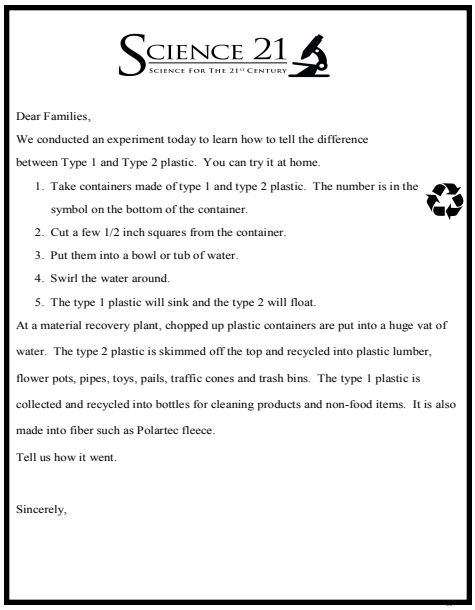
Curriculum Manuals are available online to districts that purchase access. These are password protected. For more information, call the SCIENCE 21 office at (914) 248-2346.

SCIENCE 21 Alive!

SCIENCE 21 Alive! is a collaborative program in which SCIENCE 21 units are enhanced and enriched by the staff of Putnam/Northern Westchester BOCES' Center for Environmental Education. Teachers and administrators can arrange for in-school visits by naturalists or plan field trips to the Madden Outdoor Education Center to support the SCIENCE 21 curriculum. The services secured through this program are also state aidable according to existing BOCES aid regulations. For more information about SCIENCE 21 Alive, visit the SCIENCE 21 website or contact Dorna Schroeter at (914) 248-2335.

Home Connections

It is a widely accepted principle that when parents or guardians are involved in their children's education, those students perform better in school. In order to establish connections between home and school, a variety of Home Connections exist within the SCIENCE 21 Program.



SCIENCE 21
SCIENCE FOR THE 21ST CENTURY

Dear Families,

We conducted an experiment today to learn how to tell the difference between Type 1 and Type 2 plastic. You can try it at home.

1. Take containers made of type 1 and type 2 plastic. The number is in the symbol on the bottom of the container.
2. Cut a few 1/2 inch squares from the container.
3. Put them into a bowl or tub of water.
4. Swirl the water around.
5. The type 1 plastic will sink and the type 2 will float.

At a material recovery plant, chopped up plastic containers are put into a huge vat of water. The type 2 plastic is skimmed off the top and recycled into plastic lumber, flower pots, pipes, toys, pails, traffic cones and trash bins. The type 1 plastic is collected and recycled into bottles for cleaning products and non-food items. It is also made into fiber such as Polartec fleece.

Tell us how it went.

Sincerely,

Each unit is preceded by a Home Connection letter that introduces the unit and previews some of the major activities in which the students will be involved. Then, in some cases, there are materials that students will be asked to bring to school. For example, in Grade Two, Unit One, students are asked to bring in a clean sock and shoelace. These are used so that children can compare the relative mass of these objects on a balance. A third type of Home Connection letter promotes further exploration at home. For example, as students explore standard and non-standard measurement, parents are asked to measure their child's foot and cut a ribbon marked with the child's name to that length and send it to school. Then students compare these ribbons and relate them to non-standard units of measurement. Finally, suggestions are sometimes made for how parents can enrich and extend students' school experiences in the larger community.

All such Home Connection letters appear as blackline masters that teachers can use.

PART TWO: ADMINISTERING THE PROGRAM

The Role of the Administrator in the Program

School administrators perform key functions in supporting the various programs that exist in their schools. First and foremost, administrators are involved in the selection of these programs and/or initiatives. Once this process is completed, it is then important to be knowledgeable about the curriculum, its components, and how it addresses state and local learning standards. Beyond this, attention to the countless administrative details can help or hinder the success of a program. Budgeting, ordering, delivering materials, and helping to troubleshoot any problems that arise usually fall within the domain of school administrators.

Administrators can also show support for programs by demonstrating that they value those programs. Asking to observe lessons in which the program is utilized, including teacher reports of their experiences with SCIENCE 21 on faculty meeting agendas, creating events that highlight programs, and becoming involved in projects that enhance school programs are ways that administrators can signal such support.

Hands-on science programs often require additional levels of support as some teachers are uncomfortable with the required arrangement, distribution, and collection of materials. This additional responsibility can lead to the relegation of hands-on science instruction as an "extra" in an already overcrowded school day. By demonstrating their own support for and value of inquiry-based science, administrators "send a message" that this is an area that must be given full attention and is viewed as a priority in their schools.

The Role of the Building Representatives

Building Representatives are individuals within schools who have agreed to accept additional responsibilities to communicate important aspects of the SCIENCE 21 Program to their colleagues. The program tends to function better when Building Reps are engaged and involved in helping others. They are often viewed as resources to other teachers as well as to school administrators. The selection of a Building Rep is a local decision, but if this individual is empowered to assume the various responsibilities, communication and problem-solving are more easily facilitated. The role of the Building Rep may be summarized as follows:

- Maintain communication among SCIENCE 21 teachers, principals, the SCIENCE 21 Steering Committee and the BOCES SCIENCE 21 Coordinator.

- Facilitate support for teachers by assisting and coordinating:
  - workshop scheduling
  - rescheduling of cancelled workshops due to delays or closings
  - distribution of SCIENCE 21 Curriculum Manuals
  - collecting concerns related to SCIENCE 21 kits
  - information dissemination regarding SCIENCE 21
  - collecting items for the SCIENCE 21 Newsletter

Professional Development for SCIENCE 21

High quality professional development is a key feature of the SCIENCE 21 Program. In addition to Unit Training Workshops, a wide variety of offerings are provided to meet individual, school, and district needs in science education and beyond.

Workshops can be tailored to specific school needs and turnkey training can be offered so that school or district representatives can replicate workshops in their home districts. Some of the professional development offerings include:

- Basic unit workshops: This series of 3 or 4 workshop sessions focus on implementing the lessons from each of the four units of SCIENCE 21. Each session deals with one or more of the grade units. These workshops are designed for teachers who are new to a school or a grade level.
- "Refresher" Workshops: Because the SCIENCE 21 curriculum is so dynamic and modifications are made based upon comments from the field, it is advisable for teachers who have been with the program for a few years to take a "refresher " workshop so that they may remain current with curriculum priorities and new implementation strategies.
- Modifying SCIENCE 21 for varied student needs.
- Data analysis for the SCIENCE 21 classroom teacher.
- Using Differentiated Instruction in science
- Connecting Literature to the SCIENCE 21 Program.
- Developing test questions and parallel tasks for NYS science assessments
- Developing science centers for SCIENCE 21 units
- Using a multiple intelligence approach with SCIENCE 21
- Developing on-line projects linked to SCIENCE 21
- Using Flip video cameras in the science classroom
- Selecting virtual demonstrations to support SCIENCE 21 lessons.
- Special content workshops including: weather, electricity, flower plants, rocks, microscopes, working with specific animals in the classroom, the craft of questioning, etc.
- Using the digital camera to make class books
- Using probeware with SCIENCE 21
- Teaching reading strategies through SCIENCE 21
- The use of graphic organizers in science instruction and assessment
- SCIENCE 21 and the English Language Learner
- Creating "Big Books" for use with SCIENCE 21

Each spring a supply of brochures listing Workshop Offerings is sent to each Building Rep and Principal. The list includes workshop descriptions, presenters, and a general timeframe of when they will be presented. Teachers register for the workshops using MyLearningPlan. Workshop confirmations are sent to each registrant.

Principals can facilitate this process by checking with the Building Rep to insure that the Workshop Offerings have been distributed to all teachers and discussing those sessions that would best support the individual professional development of each teacher.

Workshop offerings and schedules are posted on the SCIENCE 21 website.

WORKSHOP CANCELLATION POLICY

DELAYS IN P/NW BOCES OPENINGS

Full Day Workshop	If there is a delayed opening at the Putnam/Northern Westchester BOCES campus, all Science 21 full-day workshops (8:30 a.m. – 3:00 p.m.) ***will begin at 10:00 AM.***
Half-day Workshop (Morning Session)	If there is a delayed opening at the Putnam/Northern Westchester BOCES campus, all Science 21 morning workshops (8:30 – 11:00 a.m.) ***will be cancelled***. All teachers registered for the workshop will be notified of the rescheduled workshop date.
Half-day Workshop (Afternoon Session)	If there is a delayed opening of one or two hours at the Putnam/Northern Westchester BOCES campus, all Science 21 afternoon workshops (12:30 – 3:00 p.m.) ***will still be held***.

P/NW CLOSINGS

All Workshops	If there is a closing at the Putnam/Northern Westchester BOCES campus, all Science 21 workshops scheduled for that day ***will be cancelled***. All teachers registered for workshops will be notified of the rescheduled workshop date.

A delay or school closing for P/NW BOCES will be announced by 8:00 AM on the following radio stations: WFAS – 103.9 FM, WHUD – 100.7 FM, WSPK – 104 FM, and WLNA – 1240 AM.

Please note that delays and closings for our workshops are also announced on our general telephone line on:

(914) 245-2700

Or on the BOCES website at:

www.pnwboces.org

The E-Mail Distribution List

What it is:

An email distribution list is a way of allowing SCIENCE 21 users to communicate with one another about matters of mutual interest. This email list is open to all professionals who use or are associated with the SCIENCE 21 program. We encourage the sharing of ideas, instructional strategies, materials issues, and the joys and inevitable frustrations of dealing with a dynamic, hands-on science curriculum.

Specifically some of the distinct advantages of this service include:

- Provide the opportunity for teachers to ask questions and/or give their input about the SCIENCE 21 program
- Allow our SCIENCE 21 staff to give continuous support by answering "science" questions, suggesting ideas, and offering alternative activities and approaches
- Provide contact with other teachers for ideas, websites, materials, and advice
- Allow for participation in data collection for class projects
- Support collaboration among teachers and students in different schools
- Promote technology as a tool for conducting science and gathering information

How it Works:

For example, when a message is sent to the email address for the First Grade Distribution List (SCI21G1@pnwboces.org), it is automatically redistributed to each of the email addresses in that group, i.e. all first grade teachers and those whose responsibilities span this grade level. The email addresses for each distribution list are specified on the next page.

When a message is sent to an email distribution list, it appears as though it is coming from the person sending the message. Thus, you may not recognize the names of many of the people initiating messages. You might want to always put "SCI21:" in the subject heading of your email so that the recipients will not assume that this is "junk mail" and delete it because they cannot recognize the sender.

Anyone on the list can send email to EVERYONE ELSE on the list (i.e. all grade levels, administrators, etc.) by sending ONE email to: SCI21ALL@pnwboces.org.

What is Acceptable:

In order to make this a truly professional enterprise, we ask that you adhere to the following guidelines for using this service:

- No commercial advertisements for a product or service.
- No "junk mail"
- Improper language is forbidden
- Information or material that is dangerous or illegal is prohibited
- Privacy violations (e.g. revealing personal information about others) are prohibited**.**

To Unsubscribe or to Change Your Email Address:

Should you wish to unsubscribe or to change your email address, please send your request to: fende@pnwboces.org.

The structure of the Distribution List will be as follows:

Kindergarten Teachers, send email to:	**sci21gk@pnwboces.org**
First Grade Teachers, send email to:	**sci21g1@pnwboces.org**
Second Grade Teachers, send email to:	**sci21g2@pnwboces.org**
Third Grade Teachers, send email to:	**sci21g3@pnwboces.org**
Fourth Grade Teachers, send email to:	**sci21g4@pnwboces.org**
Fifth Grade Teachers, send email to:	**sci21g5@pnwboces.org**
Sixth Grade Teachers, send email to:	**sci21g6@pnwboces.org**

Some administrators, coordinators, and multi-age teachers have subscribed to more than one list. These individuals will be sent all of the messages for each of the grade levels for which they have registered.

Sometimes, it is important for a message to go to ALL interested parties, in this case, a message may be sent to: **sci21all@pnwboces.org.** Please use this option sparingly as we currently have over one thousand SCIENCE 21 users subscribed to the Distribution List.

We expect that when we send out the first few messages, several will "bounce back," as email addresses are "unforgiving" in their format. Sometimes individuals put the dot or the "at" sign in incorrect places; sometimes an email address is "case sensitive." Please have patience while we clear up these issues.

We are very excited to offer this much waited for service and hope that you will find it productive, "user-friendly," and of assistance in your professional activities.

To join the E-Mail Distribution List, please copy the form below, complete it, and fax it to the SCIENCE 21 Office at (914)248-2390.

I am interested in joining the **SCIENCE 21** Distribution List.

Name: _____ Grade Level: _____

School and School District: _____

E-Mail Address: _____

Telephone Contact: _____

Date: _____

The SCIENCE 21 "Hotline"

At SCIENCE 21 we endeavor to solve problems and respond to concerns as they occur. For this reason, the following contact numbers have been established:

For general questions, call **Debra Maiorano**, SCIENCE 21 Senior Office Assistant at:

(914) 248-2346

For questions involving kits and materials, call **Jean Treanor**, SCIENCE 21 Instructional Materials Specialist at:

(914) 248-3852

For administrative questions, staff development programming, and lease arrangements, call **Fred Ende**, SCIENCE 21 Program Coordinator at:

(914) 248-2336

If e-mail is a better avenue for problem resolution, you may e-mail the SCIENCE 21 staff at:

Debra Maiorano: dmaiorano@pnwboces.org

Jean Treanor: jtreanor@pnwboces.org

Fred Ende: fende@pnwboces.org

Use of the SCIENCE 21 Website

A great deal of information about and resources for the program are available at the SCIENCE 21 website. The website contains general information about the program, as well as some truly unique features such as:

- A Copy of the SCIENCE 21 Promotional Brochure
- A List of Participating Districts
- Curriculum Guides
- A Detailed Scope and Sequence for the Program
- Learning Standards for the SCIENCE 21 Program
- State Learning Standards for Math, Science, and Technology
- Alignment Guides for SCIENCE 21 With State Standards and the Core Curriculum
- SCIENCE 21 Unit Concepts and Curriculum Maps
- SCIENCE 21 Videos
- Schedules of SCIENCE 21 Workshops
- Literacy Connections guides
- Copies of "Readings in the Content Area"
- Copies of Differentiation and Inclusion guides
- Copies of "SCIENCE 21 Readers"
- Directions and Forms for the SCIENCE 21 E-Mail Distribution List
- Assessment Packets for All Grade Levels
- Spanish Versions of Parent Letters, Blackline Masters, and Journal Pages
- Information about SCIENCE 21 Alive!

To access the SCIENCE 21 website go to: **www.pnwboces.org/Science21**
Once there, use the navigation bar on the left to find the various pages and resources. Adobe Acrobat Reader®, which is widely available, is needed to download many of the documents.

How to Support the Use of Literature Connections

Students do not artificially break up their learnings into the subject blocks that often characterize the typical schools day. For example, when confronted with new concepts, they do not say to themselves, "Now I am doing an activity about plants; now I am doing reading about plants; now I am drawing plants." Children learn in a more holistic fashion. In order to capitalize on how students' brains work, they can benefit from exposure to science concepts throughout the day -- when they are reading, when they are doing math, when they are drawing, etc. Such curriculum integration has benefits not only for students, but can also help teachers cope with the common frustration of "curriculum overload." When students experience concepts in a variety of settings and subject areas, those concepts are more likely to be internalized and learned than if the concepts are presented in an isolated format. In order to support the notion of curriculum integration, a variety of print resources are available for SCIENCE 21 teachers that can enhance and enrich their students' science experiences.

SCIENCE 21 Readers are "little books" that teachers can use at the end of units to reinforce the particular concepts that students experienced during their inquiry. The books feature actual photos from the student activities and use appropriate vocabulary. SCIENCE 21 Readers are available for duplication on the SCIENCE 21 website or can be ordered in bound format through our office. For more information, call Debra Maiorano at (914) 248-2346.

Readings in the Content Area have been developed for all units in Grades 3 through 6. These are ELA-type articles that students read, and then, based on questions supplied, respond to. Again, it is suggested that teachers use these readings **after** the students have engaged in the inquiry experience. Discussing the content of the article can help teachers and students to confront any misconceptions that may have developed from the inquiry. The readings are incorporated into the SCIENCE 21 units and are also available on the SCIENCE 21 website.

Literacy Connections Resource Guide. In 2003, SCIENCE 21 received a grant from the TERC Foundation to develop a "Connecting Literature and Science Resource Guide" to help teachers use trade books and other print materials to support classroom experiences in science. The Guide includes thee main parts. Part I details the benefits and how to connect and assess the use of literature with science. Part II includes a comprehensive annotated bibliography of books that can be used to support and extend students' science experiences. Part III includes sample activities that teachers can use to incorporate literature into their science programs. The Resource Guide is available though the SCIENCE 21 office or can be downloaded from the SCIENCE 21 website.

Accessing Literature Detailed in SCIENCE 21 Bibliographies. Teachers and administrators often ask how they can secure literature that is suggested for connection to the SCIENCE 21 Program. These resources and procedures are detailed on the next page.

How to Access Literature Links to the SCIENCE 21 Program

The list of all literature associated with SCIENCE 21 is available in the Literature Connections Resource Guide that has been sent to all SCIENCE 21 schools. The Guide can also be downloaded from the SCIENCE 21 website:

1. Go to: www.pnwboces.org
2. Click on the "Departments and Services" Tab
3. Then click on "Curriculum".
4. In the left column, click on "SCIENCE 21"
5. Then go to Teacher Resources.
6. There you will find a link to the "Connecting Literature to Science Resource Guide."

It is a huge file (over 100 pages) and has an updated bibliography for every unit. It is in .pdf format.

In order to purchase the literature, teachers/administrators can use the following procedure to obtain most of the titles from Follett Library Resources. Follett has taken all of the titles from the Literacy Connections Resource Guide for SCIENCE 21 and made master lists of the recommended titles from which teachers, librarians, or administrators can purchase these books. We do not endorse Follett Library Resources and have no formal relationship with them, but they are a book sales company that has assembled coordinated lists of titles that support state standards and individual programs. They also provide information and reviews on over one million K-Adult books.

Here's how to get started:
1. Go to http://www.titlewave.com/
2. Click on "Curriculum TITLEWAVE" on the right.
3. When the new page opens, click on New Account. Here you'll select a username and password. Your account will be activated within 24 hours, sometimes within an hour or so. If you need to speed up the process, you can call: 1-888-511-5114 Ext. 164.

Once your account is activated:
1. Go to http://www.titlewave.com/
2. Click on "Curriculum TITLEWAVE" on the right.
3. Log into Curriculum TITLEWAVE.
4. Once you've done this, click on "Customized State Lists"
5. Then select "New York" from the state list.
6. Then select "New York Bibliographies."
7. Then scroll down to: The Putnam/Northern Westchester BOCES Science 21 Program.

The books associated with SCIENCE 21 units are organized by grade level and unit.

Assessment in the SCIENCE 21 Program

Assessment provides a means for teachers and students to determine what they know and need to learn, how they are working, how they can improve, and what their strengths are. Assessment should be ongoing and relevant. SCIENCE 21 lessons include embedded assessments. Teachers should be diagnosing and using the information gained to determine what assistance and additional practice are needed as the unit progresses.

The main purposes of assessment may be summarized as follows:

- To provide an understanding of children's conceptual background, prior experience, and attitudes (Pre-assessment)
- To assess student growth in concepts, processes, attitudes, and habits of mind
- To provide feedback to teachers about program effects
- To provide opportunities for students to reflect upon their own growth in concepts, processes, and attitudes
- To provide input for a continuous cycle of programmatic examination, development, and change

Throughout the SCIENCE 21 program, several types of assessments are used for different purposes. It is not necessary to use all of the assessments that are mentioned in each lesson. Some suggestions are given under the Assessment portion of each lesson.

Every child should be assessed through some means in each unit to determine that they have reached the objectives set in the unit. Effective assessment of student accomplishment is an ongoing process that is inextricably linked to classroom instruction. Assessments take a variety or forms including:

- pre-assessment
- self-assessment
- informal group assessment
- interview assessment
- written assessment
- rubric assessment
- formal paper-and-pencil assessment
- performance assessment

The assessment design for SCIENCE 21 encompasses all of the elements mentioned above. In many cases, assessments are embedded in instructional procedures.

A comprehensive Assessment Packet has been developed of each grade level within the SCIENCE 21 Program. At appropriate grade levels, these assessments parallel the structure of New York State's assessment program and the tests include short answer questions, constructed response questions, extended constructed response questions, and performance tasks. When they were first developed, the Assessment Packets were provided to all SCIENCE 21 teachers. As unit revisions have occurred, the assessments are now incorporated into the body of the individual units in a separate assessment section.

SCIENCE 21 users may download the Assessment Packets at the Teacher Resources section of the SCIENCE 21 website. (This is a secure section of our website. The username for assessments is: **Sci21** and the password is: **Assess21**.)

PART THREE:
INSTRUCTIONAL SUPERVISION AND SCIENCE 21

The busy administrator is always "juggling" a variety of priorities. Instructional supervision is one of the many roles performed each day. Most administrators have received some kind of staff development in supervising the language arts program, but how many have benefited from direct assistance in how best to supervise science instruction at the elementary school level? This section of the SCIENCE 21 ***Manual for Administrators*** is designed to provide some useful information for supervising an active science program.

The Key Elements of Science Inquiry

SCIENCE 21 is, at its heart, an inquiry based science program. But what does "inquiry" mean? Many educators will offer different definitions for this seemingly well-understood term. Basically, it encompasses a hands-on approach to the teaching of science that mirrors the way research is conduced by scientists in the field. Through this approach, students explore the world around them. They ask questions, make discoveries, form theories, and collect data to test those theories through further research.

According to the National Science Education Standards (National Academy of Science, 1996), inquiry is defined as follows:

> Scientific inquiry refers to the diverse ways in which scientists study the natural world and propose explanations based on the evidence derived from their work. Inquiry also refers to the activities of students in which they develop knowledge and understanding of how scientists study in the natural world.
>
> Inquiry is a multifaceted activity that involves making observations; posing questions; examining books and other sources of information to see what is already known: planning investigations; reviewing what is already known in light of experimental evidence; using tools to gather, analyze, and interpret data; proposing answers, explanations, and predictions; and communicating the results. (p. 23)

Similarly, in the New York State Learning Standards for Mathematics, Science, and Technology (University of the State of New York, 1996), the following key ideas are identified as the basis of student inquiry:

1. The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.
2. Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.
3. The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena. (pp. 2-3)

There is evidence that inquiry-based instruction enhances student performance and attitudes about science and mathematics. If administrators demonstrate their active support for inquiry-based science programs, teachers will be more likely to incorporate these ways of thinking and teaching into their instructional programs.

What Science Inquiry "Looks Like" in the Classroom

Walk into a classroom where inquiry is valued and practiced and there is no mistaking what you will see. An inquiry-based classroom will reflect the nature of inquiry. Lots of questions will be raised and a wealth of resources to answer student questions will be available. Students will often be engaged in designing the learning environment. Together with their teacher, students will identify the attitudes that reflect the nature of inquiry. Students will:

- Display and demand respect for diverse ideas, abilities, and experiences
- Model and emphasize the skills and attitudes that foster wonder, curiosity, and inquisitiveness
- Cooperate and collaborate in the design of research and investigation
- Design logical ways to test ideas and find answers
- Use a broad variety of resources and materials in the classroom and in the school
- Look beyond the classroom walls for resources, both human and inanimate, that can help to broaden understanding and exploration
- View errors as natural to the process of investigation and as "springboards" for inquiry
- Reflect upon the significance and applicability of findings
- Freely exchange data, impressions, and findings

Teachers have an essential role in setting up and guiding the inquiry-based classroom. They manage and provide structure for the conduct of classroom procedures. In an inquiry-based classroom, the following can be seen:

- Management strategies that result in a safe, well-organized, and effective environment in which all students can learn
- Interactions where students are valued, encouraged, and supported
- Student behavior and efforts are carefully monitored
- Open-ended questions are being raised
- Directed questions to help students focus on the essential elements of their investigations
- Guiding of students to get at the core of the content they are exploring
- Active participation as well as independence
- Making time for sharing and presentation of results as well as discussing and developing new questions

Clearly, classrooms will not always look this way. There is a common misconception that in order to foster an inquiry approach, the direct instruction of factual material would not occur. There are some basic concepts and tools that can be best acquired through teacher lecture and demonstration. For example, children cannot "see" the lines of force when experimenting with a magnet, but would benefit from seeing a model of how such forces operate. Models provided by teachers, and sometimes the explanation of phenomena and facts, have important places in the instructional day.

What will be evident in an active, engaging classroom is the use of a variety of approaches. Students learn in many different ways, and certain material in science is best presented in specific formats. The effective teacher will have at his or her disposal a large "tool kit" of approaches that fit particular material, students, and contexts.

Understanding "Guided Inquiry"

SCIENCE 21 is by no means an exclusively inquiry-based program. Nor is it a "direct instruction" program. Its strength lies in the fact that it is a blend of these two approaches that have unfortunately been pitted against one another in the popular press. At one end of the spectrum is the "discovery method," or exploratory learning, wherein students learn for themselves by conducting self-designed experiments. At the other end is the direct instruction approach in which all concepts are "explained" to the students without the need for them to carry out any of their own investigations. As with many things in life, this "all or none" thinking can only lead to the impression of a dichotomy of instructional practice that does not really exist. Good teachers, like good scientists, use a variety of techniques that are well suited to a variety of students, content areas, and contexts.

In SCIENCE 21, we are promoting the notion of "Guided Inquiry" as a means for utilizing the best of several instructional methods in science. But what is "Guided Inquiry?" In promoting student independence in investigation in science, there is also a need to provide directed instruction in how to conduct an investigation. This is a complex dynamic. How much direction is necessary for students to have successful experiences in investigation? To what degree should students be left to define their own experiments? A good balance point may reside in the notion of "guided inquiry." Much like "guided reading," students require assistance, support, and scaffolding as they develop new skills and attitudes and knowledge. In guided inquiry, the subject matter and materials available should lend themselves to active exploration. Given models of sound investigations, and being guided and prompted as they conduct such investigations, students will be better able to incorporate the essential elements of scientific inquiry.

Formulate Questions. To begin guided inquiry, students need to have already experienced active exploration. They need to have concrete experiential reference points for questioning, the formulation of hypotheses, the definition and control of variables, the collection of data, and reflecting upon results. When students have experience in developing investigable questions (often through a "K-W-L" (I **K**now, I **W**ant to Know, I **L**earned) process, they can then begin to design investigations based on these questions.

Model and Coach Investigation. Once questions are formulated, teachers can conduct step-by-step demonstrations of how to take a question and design an investigation to secure relevant data to answer the question. With coaching and group editing, such investigations can then be designed and refined. Through teacher-led discussions and practical efforts to design investigations to answer these questions in a group setting, students can learn how to render their questions investigable. Teacher demonstrations and readings can also play a critical role in formalizing the students' knowledge, and introducing them to more abstract scientific explanations or theories regarding the subject of their investigations.

Collaboration and Advice. It is important for students to engage in collaborative processes throughout the investigation cycle. The teacher needs to set the stage modeling the conduct of the investigation, step-by-step, in a clear and deliberate manner. Students can then become effective critics and offer valuable advice to one another as they sharpen their abilities to create workable investigations.

Reading and Deepening. It is recommended that students read relevant literature at various points during their investigation. At the beginning, they can get ideas to formulate additional questions. During an investigation, students may wish to find out more about phenomena under study. At the end, students can read articles, summaries, and non-fiction books about their topic to check whether the results of their investigation match with established knowledge about the topic under study or to deepen their understanding of underlying concepts.

Uncovering Misconceptions. Conversations about findings and conclusions help teachers to uncover misconceptions that students may have developed. Teachers and students can then work together to mediate and correct some of the erroneous understandings that emerge. (Research has shown that once misconceptions have formed, they are very difficult to correct.) Students also need a chance, at the close of an investigation, to share what they have learned with each other. This is an opportunity to debate different understandings and come to consensus about what was actually learned, and should be part of the creation of a comprehensive conclusion summarizing their results. Despite the tremendous value of "free exploration with materials," left to their own devices, young children often develop inaccurate concepts about physical reality, (e.g. "water comes from the wall" – the place where most faucets are positioned). The role of teacher mediation, even at the earliest stages of inquiry, is key to setting the stage for further inquiry.

Finally, opportunities abound for students to formulate additional questions and to "dig deeper" into concepts and ideas that have intrigued them, thereby developing a context for, and habit of, lifelong learning.

What to Look for in Observing SCIENCE 21 Lessons

Science teaching, particularly inquiry-based science teaching, has some unique characteristics that set it apart from lessons in other subject areas. Questioning and predicting may be common to a variety of subjects, but in science, there are specific things on which administrators may wish to focus in order to provide constructive feedback to teachers.

Teachers who focus on inquiry are comfortable with the approach themselves. They possess a sense of wonder and a desire for inquiry in their own lives. They encourage student observation and withhold judgments until several ideas have been explored. They help students to reflect upon their learning and apply this to new situations.

As administrators observe SCIENCE 21 teachers and later confer with them, the checklist on the following page may prove beneficial. This device can be modified or used with a scale such as "often, sometimes, seldom, not observed," etc.

Science Inquiry Indicators Checklist

Name _____ **Date** _____

- ☐ Asks students about prior knowledge, ideas, and experiences
- ☐ Records and collects information provided by students throughout
- ☐ Provides multiple resources and materials for students to explore
- ☐ Encourages students to talk, think, write, observe, sketch, and ask questions
- ☐ Demonstrates safe procedures for conducting activities
- ☐ Asks both open-ended and convergent questions of the students
- ☐ Helps students to formulate their own questions
- ☐ Guides in the selection of investigable questions
- ☐ Establishes goals with students for collaborative work
- ☐ Assists in the development of a plan for investigation and data collection
- ☐ Provides ongoing focus and prompts for explanation and reflection
- ☐ Provides "mini-lessons" as needed for clarification
- ☐ "Pushes" student thinking
- ☐ Records and assesses student involvement
- ☐ Helps students to analyze and synthesize work to form conclusions
- ☐ Helps students to apply learnings to new contexts
- ☐ Assists students in the formation of generalizations
- ☐ Guides students in recording and communicating findings
- ☐ Guides students in self-assessment
- ☐ Utilizes a variety of assessment techniques including paper and pencil tests, performance assessments, self-assessment, journal writing, etc.

Supporting Teachers in their Implementation of SCIENCE 21

Science teaching, particularly among elementary school teachers who have not had much training in the methods of teaching science, can be a challenging experience. Teachers are often insecure about their ability to teach science. Sometimes, they are unclear about the concepts that underlie the material that they are exploring with their students. Effective science teaching involves risk-taking on the part of the teachers. They need to feel free to try new approaches and even deal with content with which they might not be totally comfortable in order to help students conduct investigations that may lead to unanticipated results.

One way that administrators can promote science teaching in their schools is to ask to see science lessons for "formal observations." This will signal to the teacher that the administrator values the science curriculum and also understands some of the risk-taking behavior that might be involved. At post-observation conferences, the administrator can probe for some of the decisions that teachers made during the lesson and try to match what was observed with some of the basic elements of inquiry.

Administrators occasionally volunteer to "co-teach" science lessons with teachers. This willingness is usually very much-appreciated and also signals to the teacher that the administrator is willing to learn more about the science curriculum and how best to involve students in it.

Of course, supporting teachers by helping them to secure the materials that they need for science teaching is essential. SCIENCE 21 kits are generally ordered by April 15th for the following school year. Adequate budgeting can help to ensure that teachers will have the required materials. Administrators should work closely with their Building Reps to plan for future needs, project the number of new sections for the next school year, and make sure that manuals for new teachers are requested.

Science instruction is very exciting for students and for teachers. Adequate planning and administrative support can make this area more "user-friendly" for teachers.

PART FOUR:
SCIENCE 21AND THE BROADER COMMUNITY

Helping Local Administrators and Policymakers Understand SCIENCE 21

The various components and services offered by SCIENCE 21 can often seem bewildering to those who are not directly involved in its implementation. District administrators and policymakers should realize that SCIENCE 21 is a comprehensive service that provides a curriculum, instructional materials, and staff development that is closely aligned to the New York State Learning Standards. The information in this ***Manual for Administrators*** contains much of the material that school leaders might need to make presentations about the program. A key element of SCIENCE 21 is the fact that it was developed "by teachers for teachers" to meet the expressed need of local school districts. If district administrators and local policymakers are well-informed about the program and its advantages, they are more likely to support it.

Helping Parents/Guardians Understand and Support SCIENCE 21

Parent support for the SCIENCE 21 program should not be overlooked. Each unit in the program begins with a Home Connection Letter that explains some of the content in which the students will be involved. Research shows that when parents/guardians are involved in their children's education, those youngsters tend to achieve at a higher level. Usually, a few home connection letters are included within the various units. Teachers are free to modify these letters to suit their individual needs.

At parent/teacher conferences, teachers should be encouraged to share with parents items from the curriculum, completed journal pages, science notebooks, and projects that demonstrate student involvement in the SCIENCE 21 program. Some teachers are comfortable asking for parent assistance in setting up materials for science teaching and serving as assistants in program implementation.

Community Involvement in Science Instruction

Students and teachers have countless opportunities to extend SCIENCE 21 into the larger community. Field trips to nature centers, museums, science centers, zoos, and the like can greatly enrich children's experiences in SCIENCE 21. The collaborative service, **SCIENCE 21 Alive!**, offered with BOCES' Center for Environmental Education affords many opportunities to extend science learning at school or in the field (see the description of this program on page 10 of this manual).

Parents, guardians, or other community members who have particular expertise in the areas under study can be invited into the classroom to enrich and enhance student learning. This serves the purpose of benefiting the students, but also displays to the community that science is valued at the school. Such presentations also help to expose youngsters to career options in the sciences.

Several large corporations, particularly those that are involved in science and technology, energy facilities, and local museums often have outreach components that can supplement the SCIENCE 21 curriculum. It is usually best to begin by calling the public information officer or the community relations department of these companies or institutions.

Sharing and Celebrating the Program

Many schools have done a great deal to share student accomplishments in the SCIENCE 21 program. A few schools created websites through which students shared photos and essays of some of their SCIENCE 21 experiences. These efforts can be interactive and other students who visit the website can react to the work posted. Students can also work, long distance, on joint projects. For example, if third graders are studying the local temperature at 9:00 AM, it might be interesting for the students to compare the temperature in a Dutchess County school with one on the Eastern end of Long Island. What might account for the differences observed? Such relationships can be established by posting inquiries for such collaboration through the SCIENCE 21 Distribution List (see p. 16).

Other schools have created "Family Nights" in which teachers (and/or students) engaged visiting parents in SCIENCE 21 activities. A guest speaker can be invited to address the group as a "kick-off" experience and then parents and students can go to individual stations to observe demonstrations, share activities, or view examples of student work.

Several teachers create class newsletters in which they highlight student work in SCIENCE 21. Others have even created a class newsletter entirely devoted to science.

Teachers and administrators can be particularly creative, through shared experiences, or the use of technology, to celebrate student work in the program.