SMART PROJECTS

A CATALOG OF WONDERFUL THINGS TO DO WITH KIDS AND COMPUTERS

Science

Office of Instructional Technology
Mark Gura
Director

New York City Board of Education
Harold O. Levy
Chancellor

version 3

Introduction

During the 1998-1999 school year, Project Smart Schools sent out a call to every 6-8th grade school teacher: Show Us Your Stuff! The feedback was overwhelming: we received so many submissions of student and class work that it took almost one year to sort through it all and compile this catalog. Every "Smart Project" demonstrates how to integrate the Project Smart Schools computers into the middle school curriculum. Not all of the software mentioned herein are Project Smart Schools titles, but the great majority of the projects can be completed using the original bundled software: ClarisWorks, HyperStudio, and CD-ROM Encyclopedia.

The projects in this catalog are categorized by subject:
- Language Arts (English, Spanish, etc.);
- Mathematics;
- Social Studies;
- Science;
- Art; and
- Interdisciplinary (Social Studies/Art, Language Arts/Math, etc.).

A sample of student work is included with each project; some of the student work was originally created in color, but submitted to us in grayscale format (the students may have retained the original work). Also, keep in mind that many HyperStudio (i.e., multimedia) projects were never meant to be printed out on paper; much of their "bells and whistles" has to be imagined. Also, photographs of students have been intentionally blurred and student names and classes have been deleted.

For information on how to make HyperStudio stacks, ClarisWorks slide shows and other computer activities, download printable handouts from our web site, http://www.nycenet.edu/oit. Teachers' telephone numbers are included with their projects for those readers desiring additional information.

If any reader knows of a teacher whose Project Smart Schools classroom activities deserve to be included in this catalog – and disseminated to teachers across New York City – please contact us. Our email address is oit@fc1.nycenet.edu.

Best wishes (and practices!)

Mark Gura
Director
Office of Instructional Technology

Exemplary Projects: Science

TITLE:	**Adopt an Element**
TEACHER:	Mr. Leaf
DISTRICT:	CSD 20
SCHOOL:	IS 187
SUMMARY:	"My students would explore the Periodic Table by adopting an element. They used the World Book Encyclopedia CD-ROM to take notes on the element, including its atomic weight, atomic mass, and uses. They then presented their element with a birth certificate created with Print Shop Deluxe and proudly declared themselves the new parent of this element. The class displayed their elements' "birth certificates" on a bulletin board. If you have any questions, I can be reached at (718) 236-3394."
PRODUCT:	Class produced chemical element "birth certificates."
STANDARDS:	S1a.
CURRICULUM CONNECTION:	Student produces evidence that demonstrates understanding of properties and changes of properties in matter, such as density and boiling point.
SOFTWARE:	Print Shop Deluxe (graphics, layout, word processing), World Book Encyclopedia (reference), and the Internet (research).
IMPLEMENTATION TIPS:	Element "birth certificates" were shared with the class and displayed on a bulletin board.
TIMELINE:	This project takes one week.

BIRTH CERTIFICATE

NAME: LEAD

ATOMIC MASS: 207.19

ATOMIC #: 82

HISTORY: *Lead (Pb) has been around since ancient times until today (1999).*

USES: *Lead has been used for Egyptian coins, weights, ornaments, utensils, ceramic glazes, and solder. Years ago lead was used for plumbing, but this was recalled when people were getting lead poisoning from the drinking water. Lead is a very abundant element which allows us to use it for many different things.*

TITLE:	**An Exploration of Space**

TEACHER:	Abby Bernstein
DISTRICT:	CSD 18
SCHOOL:	IS 68

SUMMARY:

   "I wanted to give my students a challenging assignment in astronomy, as we were completing an Earth Science unit of study. I assigned topics such as various planets, comets, moons, stars, lunar patterns and astronomy tools and had groups of students research them. Each group was responsible for exploring one topic. The teams were able to gather information on their topics, organize it, and create a multimedia method of expressing what they had learned.

   "After completing the research, each team designed a five- to six-card HyperStudio stack. These stacks included text, original illustrations, diagrams and screen-shots from the Encyclopedia of Space & Universe CD-ROM. Each team worked on the computers on a rotational basis. They concluded the project by giving an oral presentation. If you would like to contact me about the project, you can reach me at (718) 241-4800."

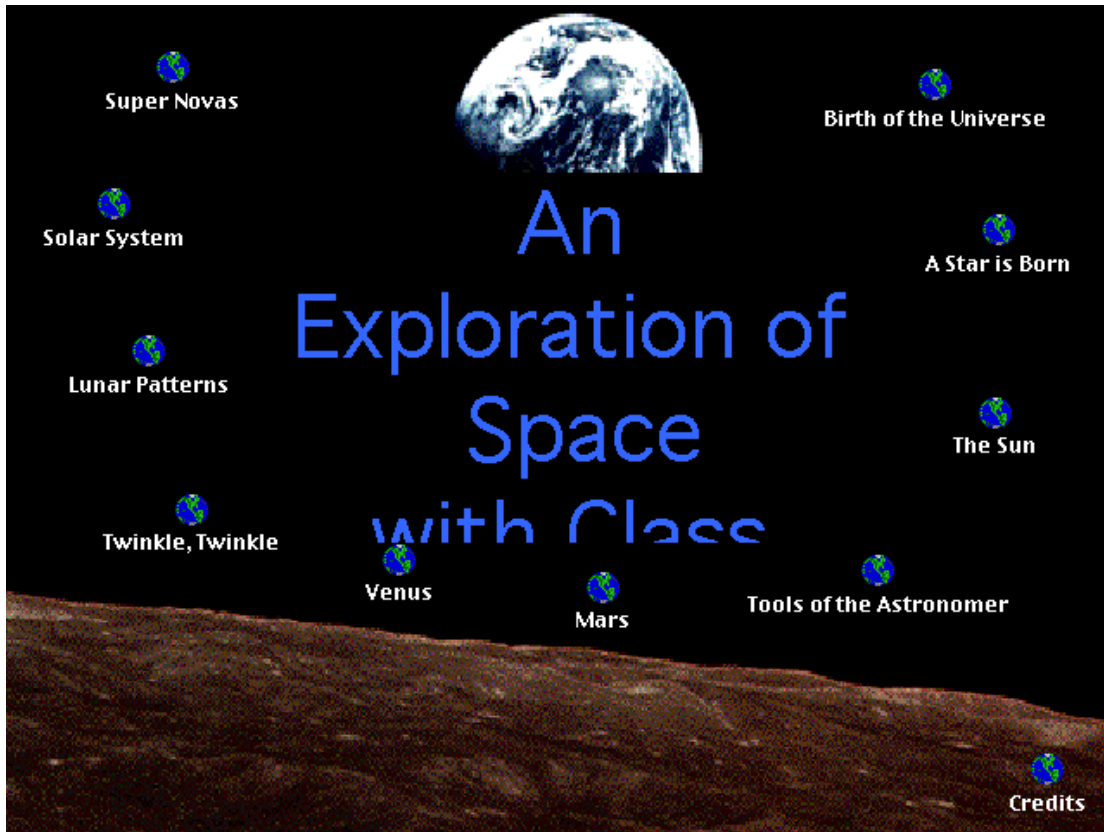**PRODUCT**: Class produced an astronomy slide show.

STANDARDS: S3c.

CURRICULUM CONNECTION

Students demonstrate conceptual understanding by using a concept accurately to explain observations and make predictions, and by representing the concept in multiple ways.

SOFTWARE: ClarisWorks (word processing), HyperStudio (multimedia), and Encyclopedia of Space & Universe CD-ROM (reference, graphics).

IMPLEMENTATION TIPS:

The students were able to gather information, organize it and create a multimedia method of expressing what they had learned.

TIMELINE: This project took eight weeks.

An Exploration of Space with Class

- Super Novas
- Solar System
- Lunar Patterns
- Twinkle, Twinkle
- Venus
- Mars
- Birth of the Universe
- A Star is Born
- The Sun
- Tools of the Astronomer
- Credits

The Sunspot Cycle takes eleven years to complete. Each passing year the Sunspots get closer and closer to the Sun's equator. As much as 100 sunspots can appear at one time. The sunspots first appear 1/3 of the way to the equator and the north and south poles.

Next Card

TITLE: **Chemical Element Booklet**

TEACHER: John Walsh
DISTRICT: CSD 26
SCHOOL: MS 172

SUMMARY: "I wanted my students to research chemical elements. After assigning an element to students, I gave them a worksheet and instructions. They were to use the World Book Encyclopedia CD to take notes on the element. I let students come in early in the morning (zero period) and stay in my room during lunch to complete their projects. After completing the research, students wrote and illustrated their chemical element booklets. If you have any questions, I can be reached at (718) 831-4000."

PRODUCT: Class produced chemical element booklets.

STANDARDS: S1a.

**CURRICULUM
CONNECTION**:   Student produces evidence that demonstrates understanding of properties and changes of properties in matter, such as density and boiling point.

SOFTWARE: World Book Encyclopedia (research) and the Internet (research).

**IMPLEMENTATION
TIPS**:   The students researched their elements on the Internet for homework.

TIMELINE: This project takes one week.

CHLORINE

Uses of the Element

Chlorine kills bacteria in water and so it is widely used to purify drinking water and the water in swimming pools. The chlorine compound, hydrogen chloride, dissolves in water to become hydrochloric acid. People use hydrochloric acid in dyeing and cleaning metal. The chlorine can be put under pressure and made into a liquid. Manufacturers use chlorine compounds to produce paper, plastics, insecticides, cleaning fluids, and antifreeze. It is also used to make medicines, paints, and petroleum products.
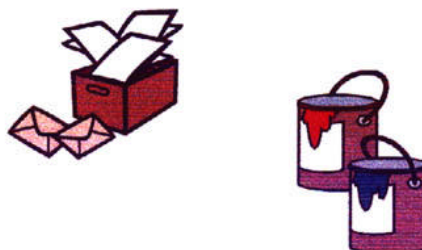
Brief History of the Element

Chlorine is a poisonous, yellowish-green gas. It has a strong, sharp, unpleasant, and disagreeable odor. It belongs to the Halogens (salt forming), group of nonmetallic elements in the Periodic Table, which also include the elements Bromine, Fluorine, Iodine, and Astatine. It causes irritation to the nose, throat, and lungs. A Swedish chemist called Carl Wilhelm Scheele first made chlorine in 1774 by treating hydrochloric acid with manganese dioxide. Sir Humphry Davy gave the name "Chlorine" from a Greek word meaning "greenish yellow" to the gas. Sir Humphry Davy had also proved in 1810 that Chlorine was an element.
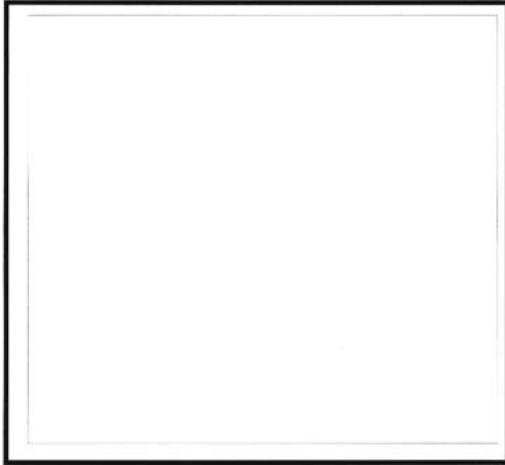
Davy, Sir Humphry

Copyright (c) National Portrait Gallery, London

Bohr Model of Chlorine

Legend

Proton

Neutron

Electron

TITLE:	**Helpful Health-Words Glossary**
TEACHER:	Susan Greenberg
DISTRICT:	CSD 25
SCHOOL:	PS 219

SUMMARY:

   "My class has been involved in a comprehensive program dealing with good health habits. We have been studying all the body systems, good nutrition and how to be "heart healthy," as part of developing good health habits. The class produced a glossary, compiling the entire vocabulary we used in our health studies. Each student has had the opportunity to create their own pages, including illustrating the vocabulary.

   "The computer health glossary has valuable information that can be used to teach health habits now and in the years to come. Therefore we have donated a copy to the school library to share with the entire school. If you have any questions you can reach me at (718) 793-2130."

PRODUCT: The students produced a health-words glossary.

STANDARDS: E1c.

CURRICULUM CONNECTION: The student reads and comprehends informational materials to develop understanding and expertise and produce written or oral work that restated or summarizes information.

SOFTWARE: Encarta Encyclopedia (research), Grolier Multimedia Encyclopedia (research), and ClarisWorks (word processing, drawing).

IMPLEMENTATION TIPS: The students tried to show other students how to make good health habits part of their lives.

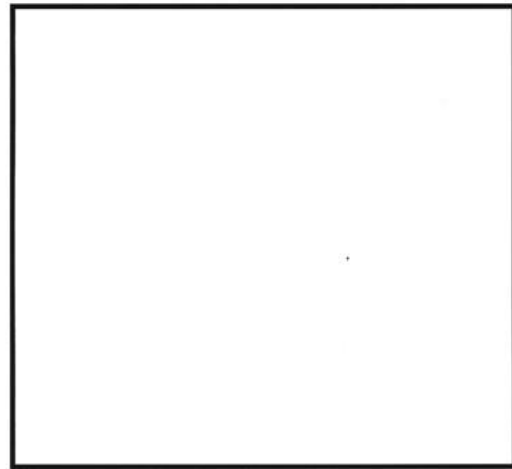**TIMELINE**: This project took the entire school year.

LI

LUNGS

The lungs are the main organs in the respiratory system. If you smoke, your lungs will get black and that is not good.

Oo

Oxygen

Oxygen is a gas that you breathe. It helps our cells. It keeps our body going. Oxygen circulates in the blood and the lungs provide oxygen to the body.

TITLE:	**Man's Best Friend**

TEACHER: Susan Urcelay
DISTRICT: CSD 27
SCHOOL: PS 146

SUMMARY:

"Many students are interested in dogs and want to know more about assorted, interesting breeds. They may have a dog as a pet, or just know someone who does. They may also be interested in having a dog as a pet and want to make know how to make the best choice. Students learned what's it means to take care of a pet.

"The students did research using books, journals, and the Internet. Whereas individual students created a dog database entry, artwork, a newsletter, and a handmade storybook, cooperative groups created HyperStudio stacks and a slideshow. If you have any questions call me at (718) 843-4880 or e-mail me at stacling1@aol.com."

PRODUCT: The students are producing a database, storybook, newsletter, HyperStudio stack, and slide show.

STANDARDS: E3c.

CURRICULUM CONNECTION: Student prepares and delivers an individual presentation.

SOFTWARE: ClarisWorks (word processing, database, slide show), Kid Pix Studio (painting), Student Writing Center (word processing, layout), HyperStudio (multimedia), Simple Sound (sound), the Internet (research), Grolier Multimedia Encyclopedia (reference), and All Dogs Go To Heaven CD-ROM (reference).

IMPLEMENTATION TIPS: The students used technology to support their inquiry, composition and collaboration. My classroom continues to be student-centered because technology is not taught separately but is integrated into the overall instruction.

TIMELINE: This project takes three months.

WWW: http://www.dogbreedinfo.com

Man's Best Friend

Man's Best Friend

Breed
Cavalier King Charles Spaniel

Origins
The Cavalier King Charles Spaniel came from England. He got its name from the word Cavalier which means honorable Knight who was loyal to King Charles. He was a spaniel so when you put the definition with spaniel you get his name.

Size and Weight
Height -12 to 13 inches , weight - 13 to 18 pounds.

Coat and Color
This dog has many coat colors that are Belenheim (chestnut red and white), tricolor(black and white with tan), ruby (a rich reddish brown , etc.

Temperament
This dog is active, graceful ,fearless, happy, gentle,affectionate and elegant. He behaves well with children.

Illustration

Grooming
You should always groom your dog when you see loose fur. If you don't it would get worse. When you groom the dog be gentle or the dog might get angry and would not let you continue.

Picture

Name

Class
560-311
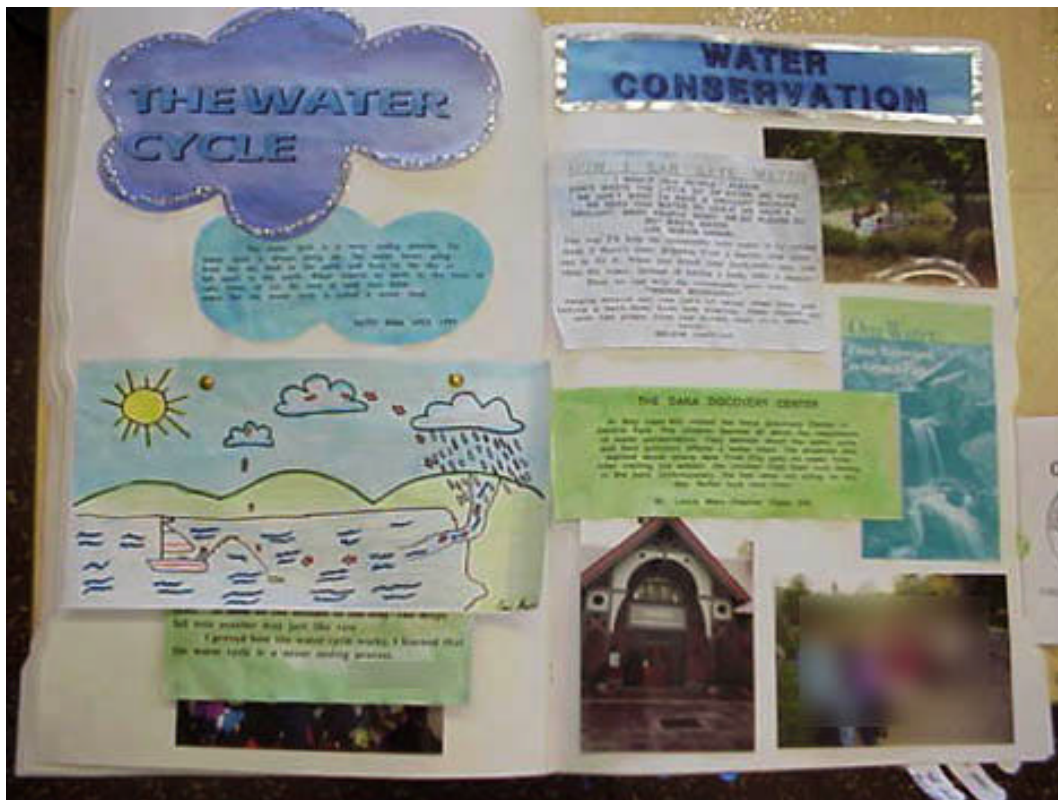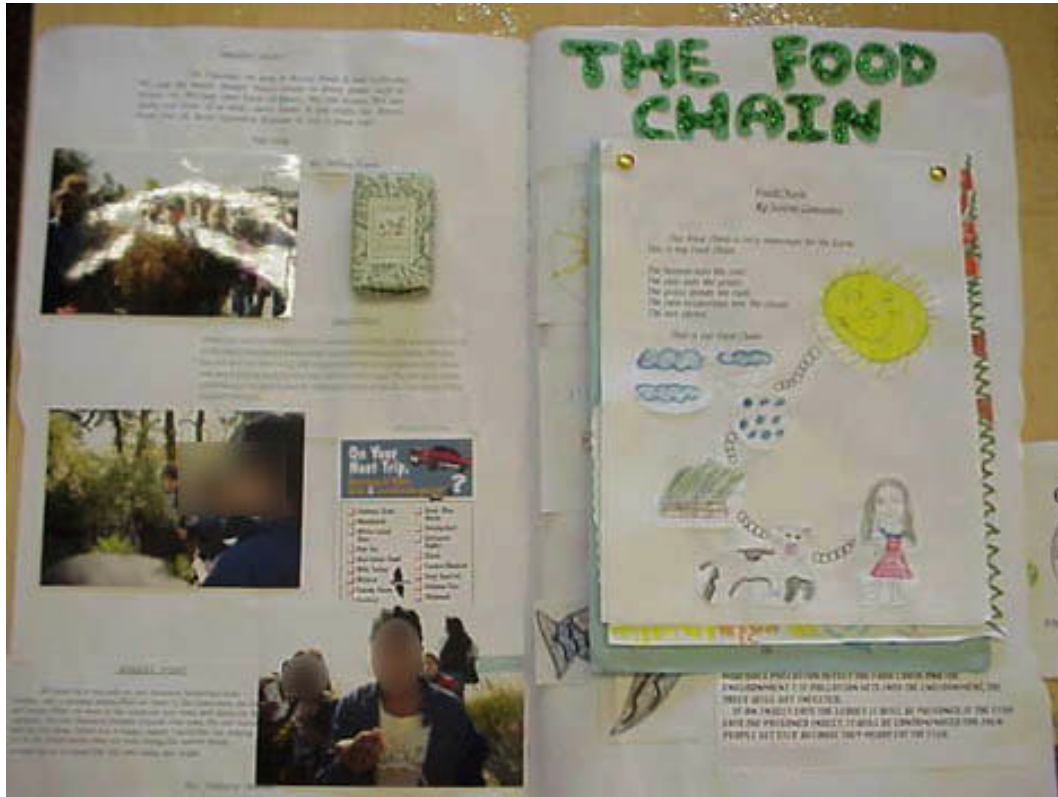

Click to Hear the Beagle Howl

Beagle:

The Beagle is my favorite kind of dog. Why? Because it is small and usually quiet. The Beagle is a hound. It is usually a quiet dog, but his howl can be really loud. The Beagle is black, white, with a main color of brown. Even though he's not very large he is an excellent tracker and hunter.
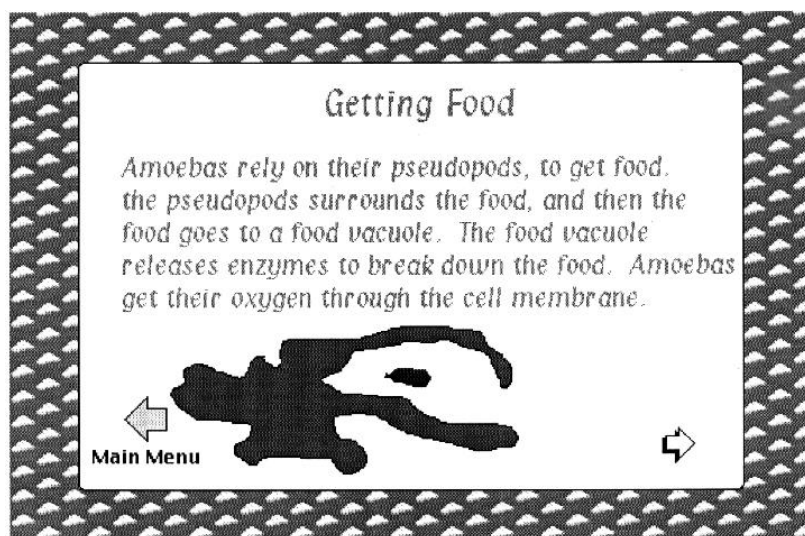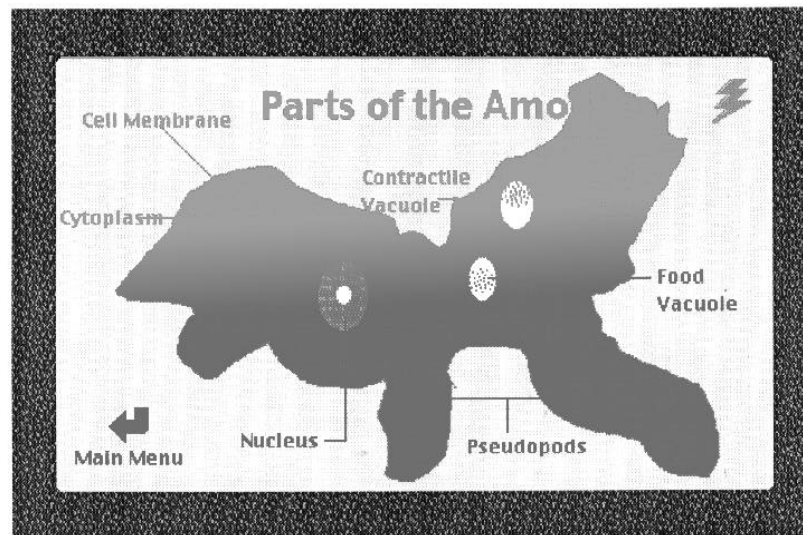
Beagle's Favortie Song

| Home | Golden Retriever | Yorkshire | Lhasa Apso |

TITLE:	**Operation Explore**
TEACHER:	Lewis Marx
DISTRICT:	CSD 14
SCHOOL:	PS 19

SUMMARY:

"Students researched different topics with Grolier Multimedia Encyclopedia and the Internet. They began by studying the environment, animal habitats, water conservation, pollution and many related activities. This was greatly enhanced by using the Internet as a research tool.

"After typing and printing reports about topics using Claris Works, the entire class developed a book and used Kid Pix Studio to create slide shows about our experiences*. Our Operation Explore* shows samples of student's writing, art and photography.

"The book was presented to the program coordinator at Gateway National Park where the students began the Operation Explore program in September. If you would like to contact me about the project, you can reach me at (718) 387-7820."

PRODUCT: Class produced a book, *Our Operation Explore*, and slide shows.

STANDARDS: S2a-e.

CURRICULUM CONNECTION Students demonstrated an understanding of the following Life Science Concepts: living systems, reproduction and heredity, behavior, populations and ecosystems, evolution, diversity, and adaptation.

SOFTWARE: ClarisWorks (word processing), Kid Pix Studio (painting, slide show), Grolier Multimedia Encyclopedia (reference), and the Internet (research).

IMPLEMENTATION TIPS: Students researched different topics with Grolier Multimedia Encyclopedia.

TIMELINE: Entire school year.

TITLE: **Protozoa**

TEACHER: Michael Scarano
DISTRICT: CSD 30
SCHOOL: PS 122

SUMMARY: "Students demonstrated and shared information on protozoa (single-celled organisms) such as the amoeba and the euglena. The students were required to fill out various categories of information on the organisms, such as methods of movement, reproduction, structure, excretion, and obtaining food.

   "I divided the class into groups of four. Some members of the group were responsible for obtaining the information using science textbooks, Grolier Multimedia Encyclopedia, and other reference materials. Others were responsible for creating the HyperStudio storyboard outlining the project and submitting it. Others were responsible for illustrating the project. Appropriate multimedia elements were integrated into the slide show.

   "When they were finished, they created interactive slide shows, which were shared with the class using a television connected to the teacher's computer. If you have any questions you can call me at (718) 721-6410."

PRODUCT: HyperStudio slide show on single-celled organisms.

STANDARDS: S2a.

**CURRICULUM
CONNECTION**:   The student produces evidence that demonstrates understanding of characteristics of organisms, such as survival and environmental support.

SOFTWARE: HyperStudio (multimedia) and Grolier Multimedia Encyclopedia (reference).

**IMPLEMENTATION
TIPS**:   The study of single-celled organisms is part of the middle school curriculum.

TIMELINE: This project takes six class periods.

Group 1 Presents:
The Amoeba

Excretion	Movement	Getting Food
Other Facts	Parts of	Reproduction

Parts of the Amo[eba]

Cell Membrane

Contractile Vacuole

Cytoplasm

Food Vacuole

Nucleus

Pseudopods

Main Menu

Getting Food

Amoebas rely on their pseudopods, to get food. the pseudopods surrounds the food, and then the food goes to a food vacuole. The food vacuole releases enzymes to break down the food. Amoebas get their oxygen through the cell membrane.

Main Menu

TITLE: **Simple Machine Ads**

TEACHER: Kristin Thelen
DISTRICT: CSD 11
SCHOOL: PS 83

SUMMARY:

   "I wanted to bring some fun into my classroom and this part of the physics unit in the 6th grade science curriculum seemed like the perfect place for my *Simple Machine Advertisement* project. My students learned about the six simple machines in a general capacity as a class and then explored the machines in a more specific way.

   "I broke the class down into groups of six or seven students. Each group was assigned one simple machine to explore. The students had to determine the main functions of their machine, as well as everyday functions. They were expected to provide examples of usage in the real world. As a culminating event, the students created an "ad" to "sell" their machine and them presented their creations to the class. If you have any questions, you can call me at (718) 863-1993."

PRODUCT: The student is producing an advertisement for a simple machine.

STANDARDS: E1c.

**CURRICULUM
CONNECTION**:   Student reads and comprehends informational materials to develop understanding and expertise, and produces written or oral work that extends ideas and makes connections.

SOFTWARE: ClarisWorks (drawing, word processing) and Grolier Multimedia Encyclopedia (reference).

**IMPLEMENTATION
TIPS**:   Simple machines is part of the physics unit and this is a fun way to introduce the subject.

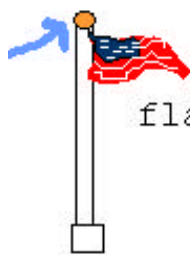**TIMELINE**:   This project takes two weeks.

FREE
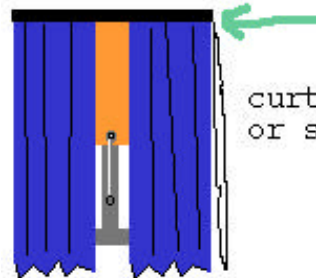yourself from back pain and
muscle strain forever!
PULLEYOURSELF into
Pullman's Pulley Paradise
for the best selection of
pulleys for:

flagpole,

curtains
or shades,

or mom's old fashioned
clothesline!

If you can't beat 'em,
PULLEY'EM!

TITLE: **The Rain Forest**

TEACHER: Rebecca Ferraioli
DISTRICT: CSD 18
SCHOOL: PS 276

SUMMARY: "I gave my class a document on the rain forest to read and asked pairs of students to summarize a paragraph for a HyperStudio card.
    "When they were finished, I had them use Kid Pix and taught them how to save a stamp and put it onto their card. They copied graphics from CD-ROM encyclopedias onto their cards. After that, I taught them how to record their voice onto the card.
    "Students added information gleaned from a video and the Internet to illustrate what they had learned. Finally, they added pictures of themselves to their cards. If you have any questions you can e-mail me at rebecca_feraioli@fcl.nycenet.edu or call me at (718)927-5236."

PRODUCT: The students are producing a HyperStudio interactive slide show on the rain forest.

STANDARDS: E1c.

CURRICULUM CONNECTION: The students read and comprehend informational materials.

SOFTWARE: HyperStudio (multimedia), Grolier Multimedia Encyclopedia (reference, graphics), and Encarta Encyclopedia (reference, graphics).

IMPLEMENTATION TIPS: Software was taught to the students throughout the project.

TIMELINE: This project takes twelve 45-minute periods.

WWW: www.pbs.org/tal/costa_rica/birds.html
kalama.doe.hawaii.edu/hern95/pt006/G4/C2/tiffanyd.html

The Rain Forest

Land

Insects

Animals

Plants

Grade Computer Talent Class II
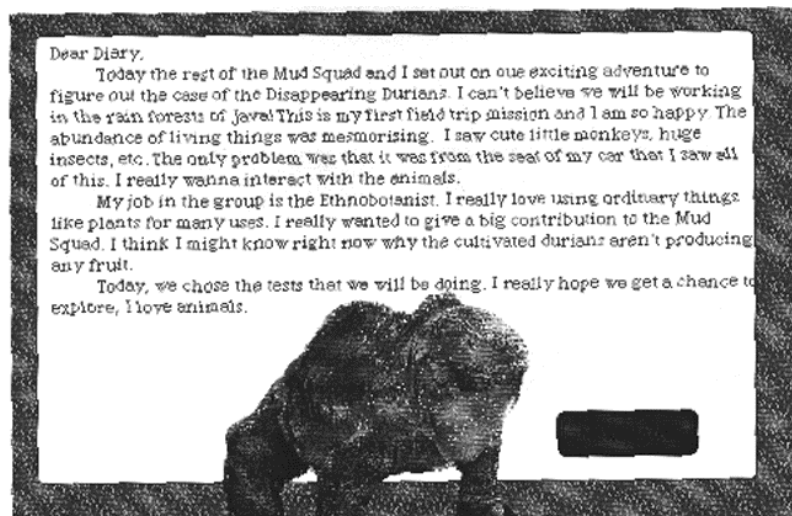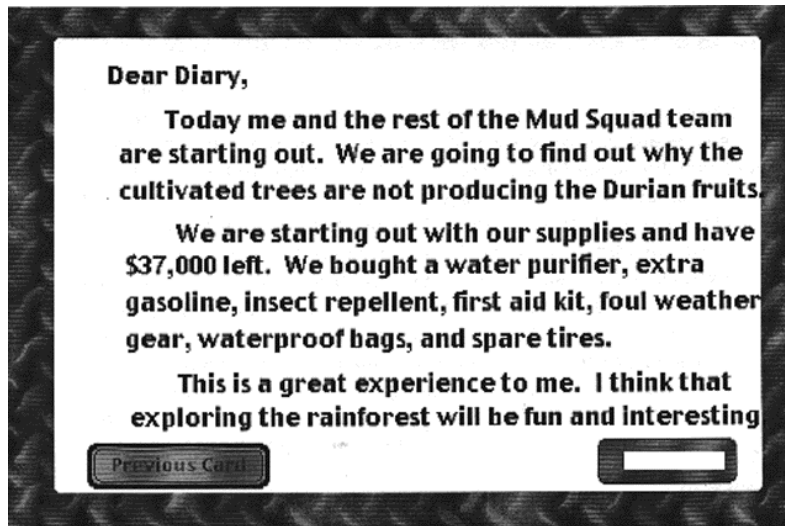
Teacher:
Staff Developer:

Listen to

A tropical rain forest can have many species of trees in one acre.
The plants in the rain forest grow according to the amount of light, water, and shade they receive.

by

TITLE:	**The Rain Forest Diaries**
TEACHER:	Michael Scarano
DISTRICT:	CSD 30
SCHOOL:	PS 122

SUMMARY:

   "I gave my class Rainforest Researchers, a science simulation program in which students assume roles of various scientists. They were grouped in fours and kept notes on their roles, their surveys, and tests. They used this information to solve 'The Case of the Disappearing Durians' and 'The Lost Compound.'

   "When they were finished, they turned their notes into "diaries" of their activities as scientists. They created a slide shows of those diaries using HyperStudio. Appropriate multimedia elements were integrated into their stacks, including voice recordings.

   "The class showed their slide shows on a television connected to the teacher's computer to share their projects with the class. If you have any questions you can call me at (718) 721-6410."

PRODUCT: HyperStudio interactive slide shows/stacks.

STANDARDS: S2a.

CURRICULUM CONNECTION: The student produces evidence that demonstrates understanding of characteristics of organisms, such as survival and environmental support.

SOFTWARE: HyperStudio (multimedia), ClarisWorks (word processing), the Internet (research), and Rainforest Researchers (simulation, reference).

IMPLEMENTATION TIPS: Rainforest Researchers (by Tom Snyder) has great directions.

TIMELINE: This project takes 5 class periods.

WWW: www.pbs.org/tal/costa_rica/birds.html
kalama.doe.hawaii.edu/hern95/pt006/G4/C2/tiffanyd.html

Diary Entries from the

The Mud Squad

Dear Diary,

Today me and the rest of the Mud Squad team are starting out. We are going to find out why the cultivated trees are not producing the Durian fruits.

We are starting out with our supplies and have $37,000 left. We bought a water purifier, extra gasoline, insect repellent, first aid kit, foul weather gear, waterproof bags, and spare tires.

This is a great experience to me. I think that exploring the rainforest will be fun and interesting

Previous Card

Dear Diary,

Today the rest of the Mud Squad and I set out on our exciting adventure to figure out the case of the Disappearing Durians. I can't believe we will be working in the rain forests of Java! This is my first field trip mission and I am so happy. The abundance of living things was mesmorising. I saw cute little monkeys, huge insects, etc. The only problem was that it was from the seat of my car that I saw all of this. I really wanna interact with the animals.

My job in the group is the Ethnobotanist. I really love using ordinary things like plants for many uses. I really wanted to give a big contribution to the Mud Squad. I think I might know right now why the cultivated durians aren't producing any fruit.

Today, we chose the tests that we will be doing. I really hope we get a chance to explore, I love animals.

TITLE:	**The Rain Forest Newsletter**
TEACHER:	Linda DeAngelis
DISTRICT:	CSD 20
SCHOOL:	IS 187

SUMMARY:

"I gave my class Imagination Express: Rainforest software and the World Book multimedia encyclopedia CD-ROM to research information on the rain forest. They were grouped in fours and kept notes. They used this information to write articles, which they outlined in ClarisWorks. I asked each student to summarize his or her research.

"When they were finished, they turned their notes into news of their activities as scientists who had studied the rain forest. They created a newsletter, publishing their news. Appropriate research on the rain forest was integrated into their reports, which included copied graphics as well. If you have any questions you can call me at (718) 236-3394."

PRODUCT: The students are producing a newsletter about the rain forest.

STANDARDS: S2a.

CURRICULUM CONNECTION: The student produces evidence that demonstrates understanding of characteristics of organisms, such as survival and environmental support.

SOFTWARE: ClarisWorks (word processing, layout), World Book Encyclopedia (reference) and Imagination Express: Rainforest (simulation, graphics).

IMPLEMENTATION TIPS: Edmark's Imagination Express: Rainforest was very useful.

TIMELINE: This project takes five class periods.

The

Ocelot

Written By:
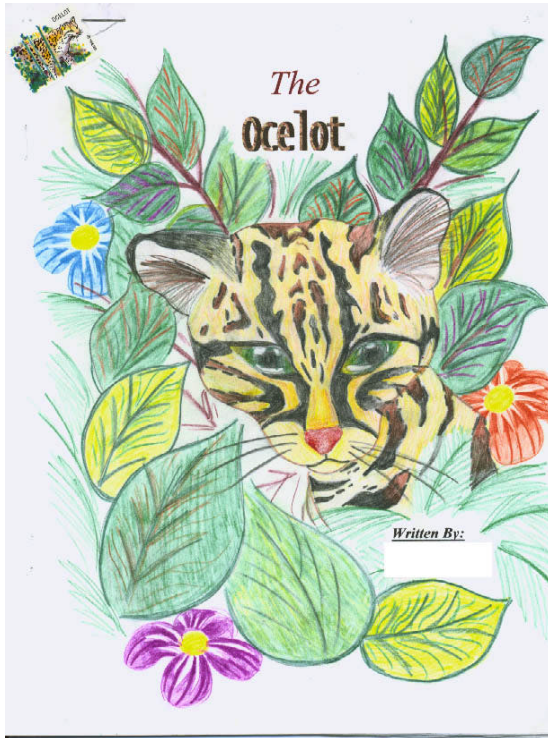
Basic Facts

? about the ?

Ocelot

Name: The Ocelot
(Felis Pardalis)

Diet: Rabbits, Small rodents, Birds, Lizards,
Fish, Young deer, etc.

Habitat: North and South America. Hunts
in trees, in water, and on forest floor. This is
a tropical animal. Dense, thorny, low brush
such as hackberry, lotebush, and blackbrush.

Life Span: In captivity, 17-20 years
In Wild, 8-11
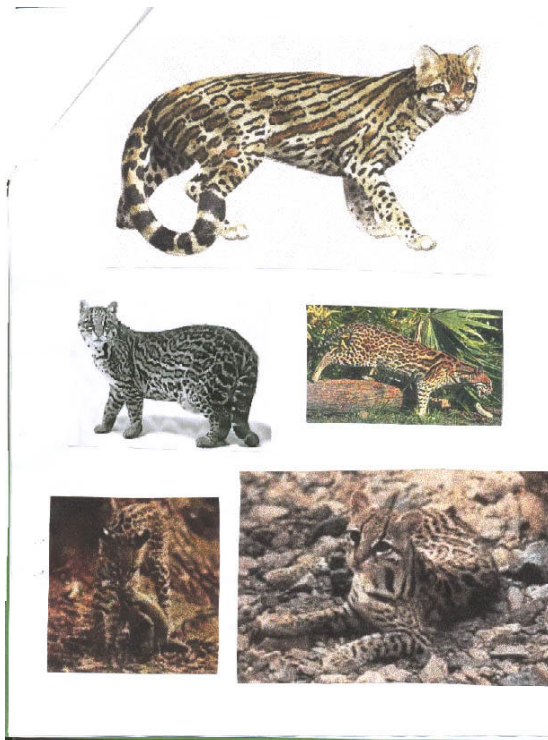
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"Ocelot". Microsoft Encarta (1996), Article #1, Pg.1.

"Ocelot". All the World's Animals (1984), Vol. 1,
Pp. 43-47.

TITLE:	**Vitamin C Testing**

TEACHER: Linda DeAngelis
DISTRICT: CSD 20
SCHOOL: IS 187

SUMMARY: "I wanted my students to use the computer for their science lab reports. After assigning students to research information about Vitamin C, I gave them a worksheet and instructions. They used the World Book Encyclopedia CD-ROM to take notes. I reminded them that if the information was not available in an article, they should try clicking on related articles. They were also reminded that information was to be rephrased into their own words. Students searched the Internet for homework – many students chose to use the Internet available through the public library.

"After they had been given this assignment, students had to complete such sections as introduction, hypothesis, materials used and processes. After finishing the research, students inserted pictures and clip art to enhance their work. If you have any questions, I can be reached at (718) 236-3394."

PRODUCT: Class produced lab reports.

STANDARDS: S1a.

**CURRICULUM
CONNECTION**: Student produces evidence that demonstrates understanding of properties and changes of properties in matter, such as density and boiling point.

SOFTWARE: World Book Encyclopedia (reference) and the Internet (research).

**IMPLEMENTATION
TIPS**: The students researched Vitamin C on the Internet for homework.

TIMELINE: This project takes one week.

Lab Report

Name:

Date: Feb. 23, 1998

Introduction: For our project we are testing different materials for vitamin C. Many different foods and products. One very healthy vitamin for the body is vitamin C. Vitamin C is a water soluble compound that is required for several metabolic processes especially for the maintenance of healthy connective tissue.

Hypothesis: The citrus juice containing the most Vitamin C will be the Tropicana Orange Juice.

Materials used: 1) Tropicana O.J. , 2) indophenol(vitamin C testing chemical) 3) beakers, 4) graduated cylinders, 5) pipettes, 6) Shira Ki Ku, 7) orange, 8) Motts o.j. 9) Snapple OrangeAde, 10) Minute Maid O.J 11) Sunny Delight.

Processes: 1) Pour each citrus juice into any one of the beakers.
2) Add the Vitamin C testing chemical (Indophenol) to each beaker
3) After this is done record the amount of drops of Vitamin C chemical each beaker is needed to change the color of the juice and to indicate how much Vitamin C each juice contains.

TITLE:	**Young Scientists**
TEACHER:	Roy Arezzo and Chris Jensen
DISTRICT:	CSD 14
SCHOOL:	IS 318

SUMMARY:

   "We wanted our students in the morning science program to conduct real world research projects. The project starts with choosing a topic, then gathering background information in our library and via the Internet. Cooperative groups of students design experiments to test their hypothesis. Some of the Ecology Center research topics include Aggressive Behavior of the Siamese Fighting Fish, Aquatic Life Cycles, and Parasites. The early morning enrichment class in the Weather Center researches topics in meteorology.
   "Students used Page Mill to create personal web pages reflecting these activities and findings. They conducted experiments in both centers and compiled the data. Our students used ClarisWorks to compile the data into graphs and to publish reports of their findings. The student web site is complete with photos taken from the I.S. 318 weather station. If you have any questions, you can call us at (718) 782-0589."

PRODUCT: Students produce experiments posted on our web site.

STANDARDS: S4a.

**CURRICULUM
CONNECTION**: Students provide evidence that demonstrates understanding of big ideas and unifying concepts such as cause and effect.

SOFTWARE: Adobe Page Mill (web page development) and ClarisWorks (spreadsheet).

**IMPLEMENTATION
TIPS**: We recommend using Adobe Page Mill to create personal web pages for experiments.

TIMELINE: This project took from October to June.

WWW: http://cpmcnet.columbia.edu/dept/physio/schools/318/