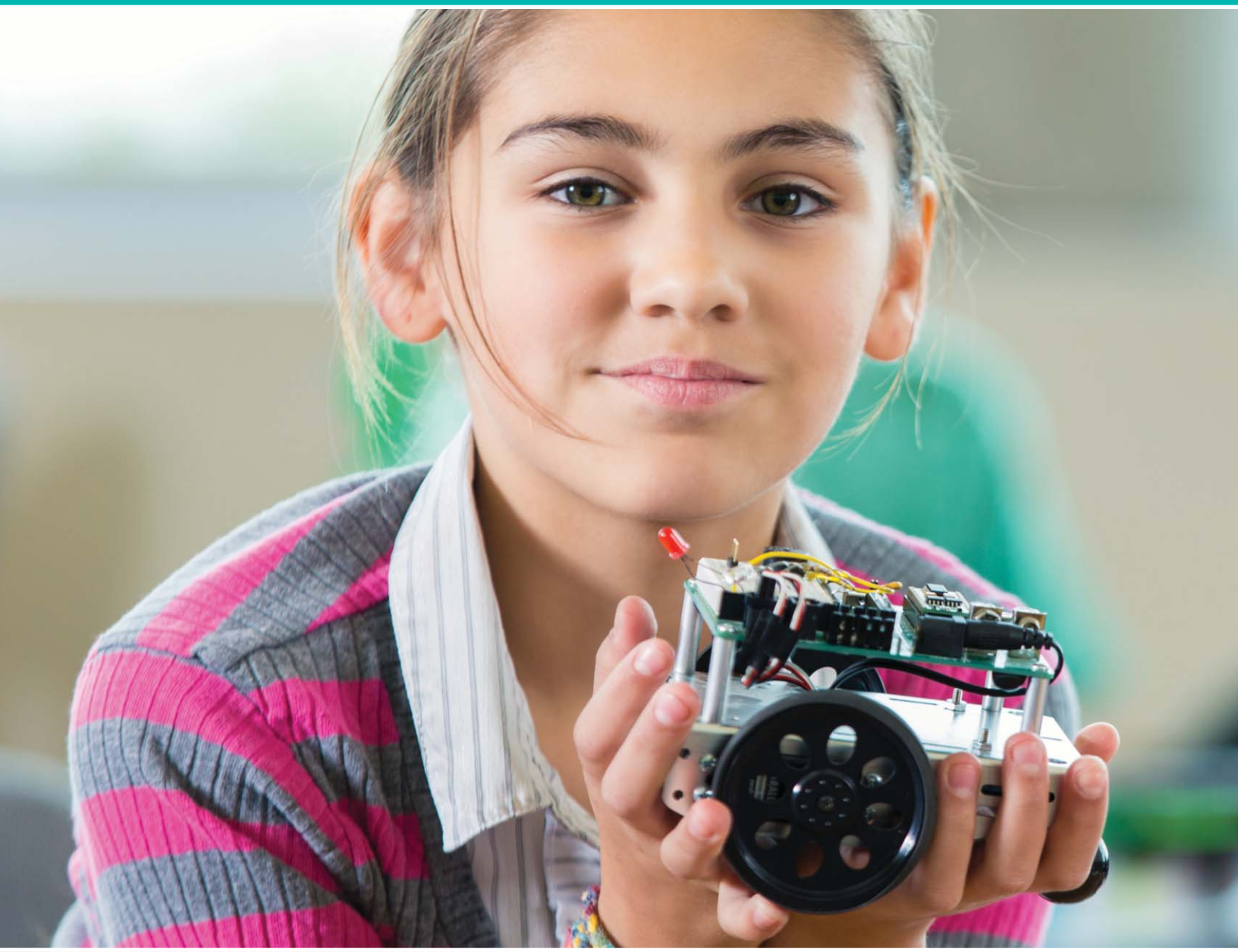
THE EDUCATION FUND
CELEBRATING 30 YEARS
2016-2017

ideas with IMPACT

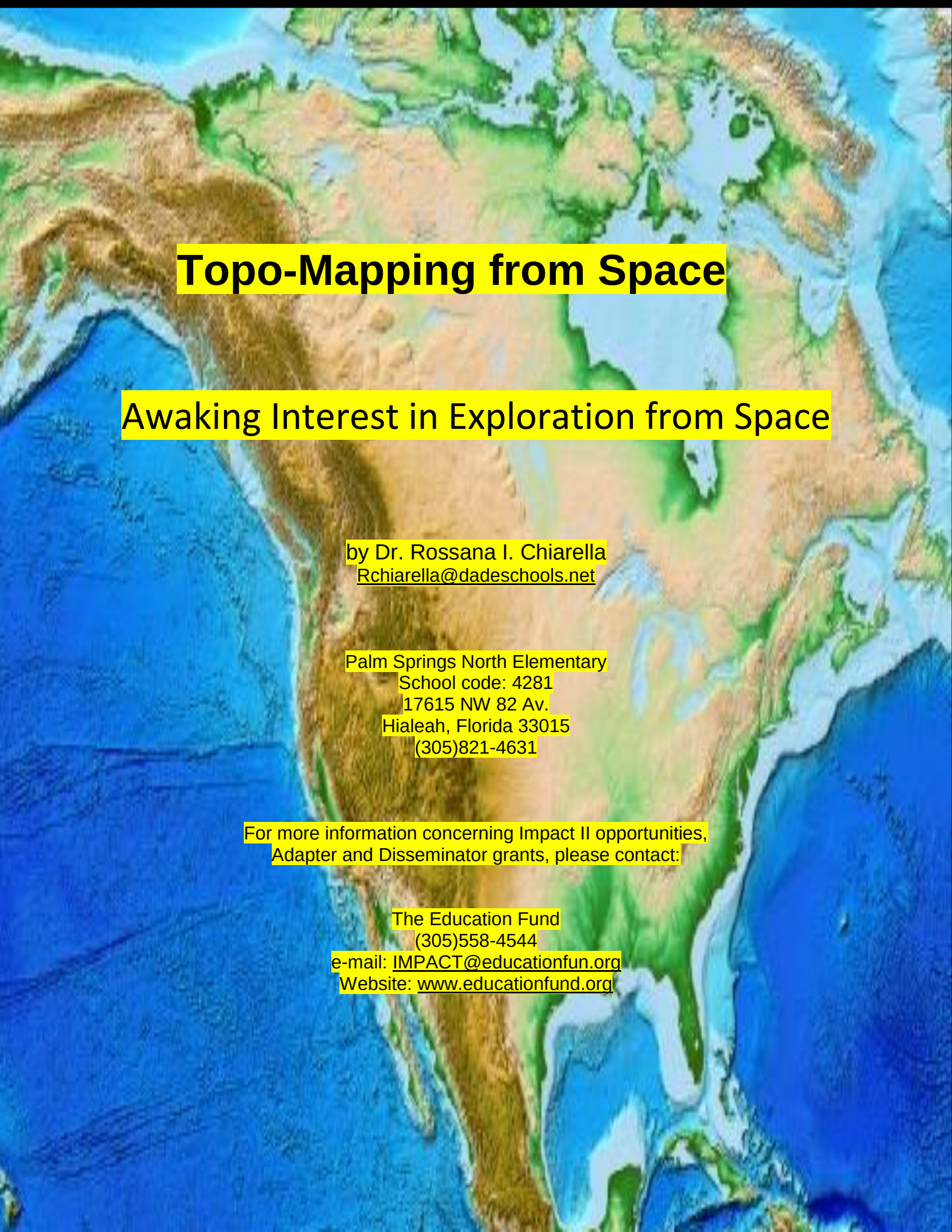


idea packet

Sponsored by:

Ford Motor Company Fund

Topo-Mapping the Space



Topo-Mapping from Space

Awaking Interest in Exploration from Space

by Dr. Rossana I. Chiarella
Rchiarella@dadeschools.net

Palm Springs North Elementary
School code: 4281
17615 NW 82 Av.
Hialeah, Florida 33015
(305)821-4631

For more information concerning Impact II opportunities,
Adapter and Disseminator grants, please contact:

The Education Fund
(305)558-4544
e-mail: IMPACT@educationfun.org
Website: www.educationfund.org

Table of contents

1. - Course Outline/Overview

Topo Mapping from Space

Isaac Newton was the first who published mathematical studies about the possibility of an artificial satellite during the XV century. In 1903 Konstantin Tsiolkovsky published “Exploring Space Using Jet Propulsion Devices” using rocketry to launch spacecraft. The first idea of using a satellite as a mirror in space was proposed by science fiction author Arthur Clarke in 1917 that ended with the world’s first artificial satellite Sputnik 1 launched by the Soviet Union in 1957. Sputnik 1 was created to identify the density of high atmospheric layers through measurement of earth’s orbit.

There are many types of artificial satellites but intended to uses such as environmental monitoring, meteorology, map making etc. The remote sensing satellites are so powerful that they can now send back images of individual’s houses.

Mapping is a crucial part of researching the locations of major geological features. Topo-maps use a special type of line called a contour line to show different elevations on a map. Topographic maps show the location, shape and height of features like valleys, rivers, mountains, volcanoes, etc.

During the pass years, the technology has developed higher resolution that had not existed until this decade showing the surfaces over the planet using laser. Land topo-mapping surface allows us to make maps of the features of the surface of our planet. More than a dozen satellites study our planet, taking pictures with high resolution. The information these satellites gather helps scientists understand the evolution of our planet.

Earth-Space classroom connection

Many of the science teaching methods have an important place at the beginning of the elementary curriculum. The students design challenges and connect by engaging in related design challenges of their own. However, there are additional opportunities for the growth of knowledge, skills, and dispositions when children ask their own questions, conduct their own investigations, and make decisions about their activities. Science and investigation provide contexts in which children’s curiosity can be expressed openly and purposefully, and that enable them to experience the joy of self-motivated learning. Young scientists and geologists can be encouraged to represent what they have learned through brainstorming, sketching, designing, building, testing, evaluating, redesigning and sharing solutions in the classroom with some simple and inexpensive materials, through projects within communities of learning. Parents can and should be drawn into that community to collaborate and participate in the projects process by working at home and in the school community.

2. - Objectives

- Students will learn that they can produce a topographic map using simple inexpensive materials.
- Learners will become familiar with images of objects photographed from space.
- Students will explore how objects stay the same size and they appear changed when closer and farther from the object.
- Learn to identify the sequence of aerial photos and satellite images from closest to farthest and based on special characteristics such as seasons or events.
- Investigate problems within a growing city.
- Identify advantages of aerial views of a city.
- Produce an imaginary drawing of their home from above and from the side.
- Learners will share prior knowledge about methods of Earth observation, how satellites work, and geographical features on Earth.
- Learners will gain knowledge about how satellites retrieve information through remote sensing and the benefits of observing Earth from space.
- Learners will discover how information gathered by satellites can help scientists observe and predict various events on Earth, such as precipitation, urban development, natural pollution, and uncovering lost ancient civilizations.
- Learners will demonstrate their understanding by explaining how satellites are used in many careers, such as archaeology, weather forecasting, architecture and urban development, and lately in marketing.
- Use perspective to help identify objects using problem solving and classification.
- Interpret shapes and patterns to deduce the sequencing of the images.
- Understand that we are surrounded by geographical features, e.g., mountain, hill, desert, lake, river, creek, bayou, and there is specific information that identifies a location, e.g., addresses.
- Communicate that we depend on people who live far away for many necessities and information.
- Understand how maps are direction tools with symbols that help us locate objects, find where we are, and where we are going.

Next Generation Sunshine State Standards

*Earth in Space and Time

Humans continue to explore Earth's place in space. Gravity and energy influence the formation of galaxies, including our own Milky Way Galaxy, stars, the Solar System, and Earth. Humankind's need to explore continues to lead to the development of knowledge and understanding of our Solar System.

*Earth Structures

Humans continue to explore the composition and structure of the surface of Earth. External sources of energy have continuously altered the features of Earth by means of both constructive and destructive forces. All life, including human civilization, is dependent on Earth’s water and natural resources.

Sunshine State Standards

Grade: K

Big Idea 5: Earth in Space and Time
SC.K.E.5.5: Observe that things can be big and things can be small as seen from Earth.
SC.K.E.5.6: Observe that some objects are far away and some are nearby as seen from Earth.

Grade: 1

Standard 1: The World in Spatial Terms
SS.1.G.1.2: Identify key elements (compass rose, cardinal directions, title, key/legend with symbols) of maps and globes.
SS.1.G.1.3: Construct a basic map using key elements including cardinal directions and map symbols.

Grade: 2

Standard 1: The World in Spatial Terms
SS.2.G.1.3: Label on a map or globe the continents, oceans, Equator, Prime Meridian, North and South Pole.
Cluster 1: Measure and estimate lengths in standard units.
MAFS.2.MD.1.3: Estimate lengths using units of inches, feet, yards, centimeters, and meters.

Grade: 3

Standard 1: The World in Spatial Terms
SS.3.G.1.2: Review basic map elements (coordinate grid, cardinal and intermediate directions, title, compass rose, scale, key/legend with symbols).

Grade: 4

Big Idea 5: Earth in Space and Time
SC.4.E.5.5: Investigate and report the effects of space research and exploration on the economy and culture of Florida.
MAFS.4.G.1.2: Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

Pre-Kindergarten Curriculum

Objective 27: Demonstrates knowledge of the Earth's environment
Objective 32: Demonstrates simple geographic knowledge

3.-Lesson Plan

Topo-Mapping from Space

1.-**Topic:**

Earth Space Science

2. - **Subjects(s):**

- Science
- Math
- Social Studies

3. - **Timeline**

30 to 45 minutes, during small group activities. One to two class periods.

4. - **Suggested grade levels**

Pre-K - 5

5. - **Purpose**

This project has the purpose of teaching students mapping skills while exploring how probes measure landscapes. Topography map is a way to show mountains and valleys from space using imaging radars to help create picture maps of Earth right through clouds or darkness.

6.-**Background Information**

Topo mapping from space represents the highest level of this activity. This investigation is an engineering, scientific and technological marvel ushering in a new era of human space exploration. Dozens of satellites flyby the orbit of different planets to provide research and investigation tools to study the Earth and other planets.

7.-**Vocabulary**

- Topographic
- Surface
- Mountains
- Valleys
- Rivers
- Craters
- Volcanoes
- Three-dimensional (3D)
- Satellite
- Planet
- Orbit
- Biosphere
- Atmosphere
- Launch
- Wind
- Map
- Layers
- Cycle
- Squiggly lines
- Weather
- Stratospheric
- Gravity
- Ozone
- Neighborhood
- Asteroid
- Composition
- Comets
- Space
- Dwarf Planets

8. - **Materials:**

8.1. - Searching my neighborhood activity recommend for Pre-K to 2nd grade.

Empty big shoebox with lid.
Glue
Scissors
Tape (scotch and masking)
Water colors.
Paint brush
Pencil colors.

8.2. - Geology on planetary surfaces' activity can be expand to K-12 grade.

Videos of the Cosmic.
NASA image prints.
Artist drawing paper or big copy paper or white construction paper.
Soft pastels.
Gummy erasers.
Q-tips
Hand wipes.
Crayons
Markers
Hair spray (prone to wrinkling the paper) (optional) Remember, this material have to be under teacher supervision.

8.3. - Mapping in 3D activity recommend for Pre-K to 5th grade.

Photo copy of a map.
Craft foam sheets 4 different colors or white photo copy papers or four difference color construction paper.
4 crayons different colors to color the copy paper.
Glue
Scissors
Pen or pencil.

8.4. - Mapping on Clay recommend for Pre-K to 2nd grade.

Picture of image of Earth from space.
Clay or playdoh in different colors.
Play-Doh tools.
Play-Doh mat
Toilet roll

9.-Supplies and supplemental materials approximate cost

Estimated cost: $10 - $20

10.-**Lesson Presentation**

Engage

- What will you have students do so they become interested in the lesson? **AND**
- What wonderings and questions do students have about the essential question? **AND**
- **How will you check students' background knowledge and misconceptions for the Big Idea benchmark(s) being studied?**

Explore

- Give each group of students a set of aerial photo sequence cards.
- As Amelia traveled around the city, she would see places up close and far away. When she is high above the city, the buildings are far away. When she flies down and lands, the buildings are closer. Put the cards in order to show what Amelia sees as she flies closer to the buildings.
- Give them time to explore the images then ask a few questions. Ask each group to hold up the photo of what Amelia would see when she was farthest from the building. Why? Ask them to hold up the photo of what Amelia would see when she was closest to the building. Why?

Explain

- The different shape patterns they can see in the pictures. Do the shapes that you can identify change as you move further away from the object?
- What did the students use to help them decide on a sequence?
- Draw the connection to the concept that objects stay the same size and that they only "look" different (bigger or smaller) when you are close to or far from an object.

Extend

- Give each group a set of satellite image sequence cards
- Extend the concept of being close or far from a place to a satellite view. Satellites give us a view of our Earth from very far above. Objects that are very big, like mountains or buildings, can "look" small in the images as you get farther away. When Amelia visited Central Park, she learned about what the park looked like from a satellite. Put the cards in order from closest to the park to farthest from the park.
- Discuss with the students why they chose a particular order for the sequence cards.

- Be able to build, construct, or create various geographic landscapes. Provides materials to support their ideas. For example, using sea shells, large rocks, or grass for children to use with sand and water for creating mountains, sea shores, or rivers.

- Explore neighborhoods or familiar places. Take photos of landmarks that children can use to create representations of their immediate environment. For example, taking a picture of a nearby bridge or a hill or a large mountain seen from the play yard. Attach photos with laminating paper onto blocks for children to use in block play.
- Read books and plan activities that focus on a variety of geographical regions. For example, after reading Make Way for Ducklings (Robert McCloskey) support children to work together to create a mural or diorama of the pond and island where the ducklings went to live.
- Use children's personal travels as a springboard for discussion of other places. With younger children, talk about possible landmarks such as lakes or tall mountains. With older preschool and kindergarten children, refer to the city and state, and locate children's travels on a map or globe.
- Assist older children in creating a "Where does it come from?" web or diagram. For example, kindergarten children might study and build a map on how the milk they have at school gets to the cafeteria. They might use observations, books, the Internet, and interviews to help them get the needed information.
- Guide them to identify the different shape patterns they can see in the pictures. Do the shapes that you can identify change as you move further away from the object?
- What did the students use to help them decide on a sequence?
- Draw the connection to the concept that objects stay the same size and that they only "look" different (bigger or smaller) when you are close to or far from an object.

Evaluate

- Ask the students to draw four pictures of an object. This first one closest to the object. Then draw pictures getting farther away from the object. Use student page for drawings.
- Ask students to draw a picture of where they live in the city. Can be from above or from the side view. Ask them to tell a story about how their city changed over time.

10. - **Procedure**

Procedure#1

- Set up a large poster, photograph or sign on an outside wall of the classroom at eye level of the students, in a location that allows students to view the poster from far away.
- Bring the students into view of the poster from so far away that they cannot tell what it is.
- Have the students slowly approach the poster on an appropriate distance.
- Have the students continue until they can identify the picture.
- Have the students so close to the picture that they can no longer tell what it is.
- The students will measure the distances where they are capable to see the image and have the most useful information.

Procedure #2

- Give to students a white copy paper with a picture of a map.
- Have the students color each round of the map using different colors.
- Cut each round and paste in a construction paper.

Procedure #3

- Have the students look different kind of maps.
- Provide 3 different colors of playdoh.
- Roll and flat the playdoh in a tray using three dimensional surfaces.

Procedure #4

- Have the students paint a shoes box.
- Provide the students with a copy of a neighborhood (size of the box)
- Tape the lid of the box.
- Make holes on the top of the lid.
- The students will introduce brushes using different color paint.
- Advise the students to rotate one time the brushes inside the box.
- Help the students to open the box. Talk about the radio of the circumference in the neighborhood picture.

4. - Resources/ Bibliography

Books

"The Adventures of Amelia the Pigeon"

“There’s a Map on My Lap” by Tish Rabe

“My on the Map” by Joan Sweeney

“Maps and Globes” by Jack Knowlton

Associated Websites/Videos

https://www.youtube.com/watch?v=EPyl1LgNtoQ

https://www.youtube.com/watch?v=bTt4mVFN5Bg

https://pubs.er.usgs.gov/publication/fs20133058

http://astrogeology.usgs.gov/geology/mars-dunes/mars-dune-image-galleries

http://nationalmap.gov/historical/index.html

https://www.youtube.com/watch?v=wJEtd9f1FUY#t=100

Organizations

Civil Air Patrol: Aerospace Education
http://ae.capmembers.com

NASA Education
http://www.nasa.gov/offices/education/about/index.html

Space Foundation
http://www.spacefoundation.org/education-programs/teacher-liaison-officers

Patricia and Phillip Frost Museum of Science
http://www.miamisci.org/

Speakers:

Request a Florida Wing Civil Air Patrol/ United States Air Force Auxiliary's speakers:
Contact:

Request a NASA speaker:
John F. Kennedy Space Center (KSC):
Layla Higgins (321)867-7711
Layala.m.higgins@nasa.gov

5. - Student Work Sample


NEIGHBORHOOD MAP
Park
Dale Lane
Catherine's House
Jon's House
Elm Court
Library
Supermarket
Main Street
Jenny Street
Sally Street
SCHOOL
Twisted Lanes
Buffy's House


Mars
NEIGHBORHOOD MAP


SOLAR

THE EDUCATION FUND
CELEBRATING 30 YEARS

APPLY FOR AN IMPACT II ADAPTER GRANT!

M-DCPS teachers, media specialists, counselors or assistant principals may request funds to implement an IMPACT II idea, teaching strategy or project from the Idea EXPO workshops and/or curriculum ideas profiled annually in the ***Ideas with IMPACT*** catalogs from 1990 to the current year, 2016-17. Most catalogs can be viewed at The Education Fund website at www.educationfund.org.

- Open to all K-12 M-DCPS teachers, counselors, media specialists
- Quick and easy reporting requirements
- Grants range from $150 - $400
- Grant recipients recognized at an Awards Reception

To apply, you must contact the teacher who developed the idea before submitting your application. Contact can be made by attending a workshop given by the disseminator, communicating via email or telephone, by visiting the disseminator in their classroom, or by having the disseminator visit your classroom.

Project funds are to be spent within the current school year or an extension may be requested. An expense report with receipts is required by Friday, May 5, 2017.

APPLICATION DEADLINE:
Monday, December 12, 2016

Apply online at www.educationfund.org

For more information, contact:
Edwina Lau, Program Director
305.558.4544, ext. 113
elau@educationfund.org

FORD MOTOR COMPANY FUND

Driving a **Brighter Future**

For more than 65 years, Ford Motor Company Fund has worked to improve people's lives, investing $1.5 billion to support innovative programs in Community Life, Education, Safe Driving and the Ford Volunteer Corps.

For opening minds, creating opportunities, and helping to create a brighter future, Ford Salutes The Education Fund.

www.community.ford.com · @fordfund_ · @ford

THE EDUCATION FUND
CELEBRATING 30 YEARS

Contributors with IMPACT

Platinum Star

School District Education Foundation Matching Grant Program

Gold Star

TD Bank
America's Most Convenient Bank®

Ford Motor Company Fund

Humana Foundation

ASSURANT®

P L Dodge Foundation

FPL

FLORIDA 123 ABH SUPPORT EDUCATION

Silver Star

Learning A-Z

PEREZ TRADING COMPANY

Rod and Lucy Petrey

Raj Rawal and Anne Marie Miller

Robert Russell Memorial Foundation

Bronze Star

The Jack Chester Foundation

PNB

Miami Sportfishing Tournament/ Gary M. Pappas

NSU NOVA SOUTHEASTERN UNIVERSITY
Abraham S. Fischler College of Education