

MAISA and the REMC Association of Michigan Best Practices in Technology Integration Plan

Title: Butterfly Wings & Technology: A flight Across a Continent

Subject(s): Science, Social Studies, Language Arts

Intended Grade Level(s): 1, 2, 3 or Primary multi-age

Description:

In late summer and early fall among the multitudes of milkweed plants in the mid-Michigan landscape, teachers can find Monarch butterflies in various stages of their life cycle and an almost perfect focus for a rich unit of study. The natural curiosity of young children about the insects in their environment and the unique behaviors of the Monarch can stretch our knowledge across the continent. Some of the learning experiences included in this unit are:

- creation of group and individual inquiries about Monarchs
- a visitation to a local meadow to observe habitat of Monarch recorded with video and digital cameras
- observations of Monarchs in various stages of their life cycle for classroom observations and data collection (daily entries in personal student "caterpillar diaries", caterpillar size changes measured in Cuisenaire rods, length of pupation period graphed)
- experimentation with adult butterflies learning about color preferences, sugar solution preferences and tagging adults for migration to Mexico
- collection of data tracking butterfly migration routes by marking classroom map with sightings found on web site
- investigation of butterfly gardens and initiation of butterfly garden on school property
- creation of songs, drama, and art created around information learned about Monarchs
- addition to school web site of photos and information pertaining to Monarchs
- participation in symbolic migration sponsored by Monarch Butterfly Sanctuary Foundation, which is working to preserve winter home of monarch by creating paper butterflies to be sent to Mexican children and by helping raise funds from pop can collections and popcorn sales

Curriculum Benchmarks:

(Note: All benchmarks are from *early elementary or elementary* strand)

Science

SCI.I.1.E.1. generate questions about the world based on observation

SCI.III.2.E.3. describe life cycle of familiar organisms

SCI.III.2.E.1. compare and classify familiar organisms on the basis of observable traits

SCI.II.1.E.2. explain common pattern of interdependence and interrelationships of living things

SCI.II.1.E.2. show scientific concepts interpreted through creative expression

SCI.III.5.E.5. describe positive and negative effect of humans on the environment

Language Arts (Early Elementary)

MI.ELA.10.EE.3. use varied texts to identify and explore community issues

MI.ELA.10.EE.1 generate questions about important issues that affect them

Math (Early Elementary)

MI.MAT.III.2.E.1. locate objects on a map

MI.MAT.III.1.E.1. collect data through counting and measuring

MI.MAT.III.1.E.2. organize data using graphs

Social Studies

MI.SOC.II.5.EE.1. describe world events that have an impact on local community

MI.SOC.III.5.EE.2. recognize that events in other countries can affect Americans

MI.SOC.V.1.EE.2. acquire information from observation of the local environment

Specific technology skills:

- sharing knowledge in multimedia format
- use telecommunications sources for research

Materials/Hardware/Software:

Technology: computers, modem, internet software, disks, digital camera, video camera, VCR

Software:

Reference CD's : *Explorapedia*,
Encarta96, (Microsoft)
Encyclopedia of Nature

Production Software: *The Graph Club* , (Tom Snyder)
The Timeliner, (Tom Snyder)
KidPix Studio (Broderbund)

Internet Sites:

<http://www.Learner.org/jnorth>
<http://www.a-two-z.com>
<http://www.Butterflyworld.com>

Other materials: maps, butterfly specimen, butterfly cages, butterfly tagging kits, butterfly rearing kits, Cuisenaire rods, magnifying glasses, art materials

Activities/Procedures: To launch this study, at least one Monarch caterpillar and pictures of the Monarch "roosts" are introduced into the classroom. As a group, the class shares what they "know/assume" about Monarchs or other butterflies and what they would like to learn. This information is recorded on a KWL chart which will be in the classroom for the duration of the study.

(Throughout many of the activities of this unit, students in this multiage classroom will be put in groups of four with two older children and two younger children. In addition, an older "Study Buddy" from another classroom will be on call to help out with some of the activities which may require more sophisticated reading or writing abilities.)

In anticipation of the arrival of their own caterpillar (from local meadow and/or mail order sources), each group prepares a cage for a caterpillar from recycled materials. Information from books and videos is gathered on what will be needed to meet the basic needs of the caterpillars. After the arrival of the caterpillars, groups of four students spend time closely observing the behavior of their caterpillar and generating information for the KWL chart. Students will regularly share their information in a group setting while the teacher records what they "know" and still "want to know" on the class chart.

As part of the observation process, each child keeps a caterpillar diary written as though the caterpillar was the author. (Models of this type of writing will be shared with students prior to doing this.) Time is spent each day carefully observing the behavior of the caterpillar. A timeline is kept for each caterpillar to highlight developmental stages, and the growth of each caterpillar is regularly measured with Cuisenaire cubes and recorded. The period of each butterfly's pupation is graphed on a group graph using *The Graph Club* computer program.

A field trip to a local meadow allows students to experience the natural habitat of the Monarchs. Milkweed plants are identified and closely examined for evidence of insect life. Other signs of fall are noted and recorded in pictures after returning to school. Both the digital and video cameras are used to document discoveries. These pictures are posted on our school web site and/or included in other projects.

Throughout the observations of the Monarch, other insects are invited to visit the classroom. Classification of the insects by colors, sizes, habitats, defenses, and mouth structures is done. This information is shared with others through posters or other projects.

After the Monarchs emerge from their pupa stage, experiments with the appeal of various sugar/water food solutions, butterfly preferences in color, or other harmless experiments with the butterflies are conducted. Additional information about the protective coloration (aposematic) used by animals and insects will be gathered from books, CD's, laser discs and videos.

Before the group launches the butterflies on their trip to Mexico, each butterfly will be tagged with tags purchased from the **Monarch Watch** web site which is sponsored by entomologists from the University of Kansas and the University of Minnesota. Information on any tagged butterflies found from Minnesota to Mexico will be posted on the web and each originating site will be notified of where the butterfly was found. Information on wintering over sites is gathered from the **Journey North** web site. The information on the destruction of Monarch habitats in Mexico is gathered and discussions about how that destruction will impact the butterflies from Michigan is held.

Finally, songs are composed to sing the butterflies off on their journeys south. The songs can be posted on the web site sponsored by the Minnetonka, Minnesota Public Schools which is open to Monarch-related, kid-created materials.

Each group of students will compose and share a presentation using *Kid Pix Studio* describing their experiences with Monarchs. Some of these may also be posted on Monarch sites.

Connecting to the world

To follow the butterflies to Mexico we use the Internet and the two sites where butterfly information is posted daily throughout the fall. Reports are copied and posted in the classroom and the building. Currently there is a conflict in region of Mexico where the butterflies spend much of the winter between the people who use the forests where the butterflies roost to provide a livelihood for their families and the butterflies. The Mexican government started a project in 1986 to protect the area, but additional help is needed. The Monarch Butterfly Sanctuary Foundation (MBSF) fund is working to compensate loggers for not cutting trees. As part of this project, students determine how they might earn money to support these efforts. Pop can collections and selling popcorn are organized.

Another effort to help the children and adults of the United States and Mexico unite in their efforts to protect the Monarch and their habitats is a symbolic migration which was begun in the fall of 1996. Children from all over the United States made butterflies and sent them to the MBSF in Minnesota. There they were bundled and shipped via UPS (which could be tracked on the web) to Mexico where they were distributed by the Children's Museum of Mexico City to children who kept them during the time the Monarchs were in Mexico. When the Monarchs started their north, the butterflies were sent back to the students who had sent them with notes from their Mexican friends.

Each child will prepare a butterfly according to the specific directions listed on the web site to be included in the process. Any funds collected to help preserve the roosting sites will also be sent to MBSF.

Our school is currently involved in an on-going project to improve the landscaping of the building, because it has been neglected for many years. A master gardener is currently working with a group of parents, teachers, and students to add natural beauty to our campus. As part of this ongoing project, the Master Gardener will speak to the class about butterfly gardens and show us the kind of plants to which butterflies are attracted. Each student will design a garden using these flowers and submit it to the Landscaping Committee for consideration. A butterfly garden on school property will be a goal.

Sharing what we learned

The day before the paper butterflies leave for Minnesota, parents and students are invited to the **Butterfly Fair** which culminates the unit. During the ninety minute block, parents and others are invited to see our *Kid Pix* stories, our butterfly diaries, our butterflies which will be leaving for Mexico, and the web site where the butterflies' migratory progress is accessed. Each group is responsible for setting up a "booth" where they will teach parents and other students about some aspect of our study. These 10-15 stations include the following:

1. How to find a spot on the map using latitude and longitude
2. How to tell a spider from an insect and a moth from a butterfly
3. How the symbolic migration will work
4. Our classroom reports posted on the Internet
5. How to tag a butterfly, where the migration routes are and where Monarchs are currently sighted.
6. The work of the MBSF in Mexico
7. How to read a graph (line, bar, picture, pie) with butterfly data included
8. How insects eat
9. Habitat for butterflies
10. How aposematic coloration help keep Monarch safe from predators
11. Life cycle of butterflies

Finally, nectar (juice) and butterfly cookies decorated in symmetrical (non-poisonous) designs are served.

Assessment/Evaluation:

Rubrics are used to evaluate *Kid Pix* productions, illustrations of life cycles, "Butterfly Diaries," and graphs. In addition, students are responsible for creating a learning booth for a classroom Butterfly Fair.

Artifacts created and photographs taken during this unit will be added to each individual child's portfolio. Video tapes of each pair of students' learning fair project will also be available.

Assessment Rubric for description of the life cycle of the Monarch butterfly.

- 4 Contains recognizable illustrations of the four stages of the butterfly life cycle (egg, larva, pupa, adult). Each illustration is labeled with appropriate term and the life cycle is explained completely in writing or verbally.
- 3 Contains recognizable illustrations of the four stages of the butterfly life cycle. Some of the labels may appear and most of the life cycle is explained in writing or verbally.
- 2 Three of the four stages are illustrated. No labels and the description of the life cycle is incomplete
- 1 Two or fewer illustrations are given. No labels appear. Description is incomplete.
- 0 No recognizable illustrations. No labels. No explanation

Follow-up Activities:

As follow-up for this fall study, classes may track the appearance of tulips on the same web site that will track the Monarchs in the fall (Journey North). This will allow the group to see seasonal changes moving toward their location and allow practice in using longitude and latitude to locate sites.

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