

“Where in the World Is My Science Project?”
A Multidisciplinary Science Project

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Abstract

This article describes a multidisciplinary science project about the world biomes. This project is 6-month long project which is carried out in 6th grade public school classrooms. Students begin their work by reading about a chosen biome. Students then do research on an animal represented by a given stuffed animal and write a research project about the animal's biome. Then they make a habitat for that animal in a shoe box. Thereafter, the project in the shoe box is mailed to an adult friend or relative along with a letter requesting a postcard from the recipient and the project be sent to another person. The project goes from person to person, state to state, country to country and in some cases to other continents and comes back to the student in Mid-April. This project helps develop students' reading and writing skills. Students also receive cultural and geographical information through postcards and letters from other states and countries. Project assessment is done through their papers they write and their science journal. This project not only integrates several disciplines but also connects the learning to students' life experiences, and this motivates students as well.

Key Words: Environmental science
Interdisciplinary teaching
Interdisciplinary science project
Inquiry science project

Where in the World in My Science Project?

This article describes a multidisciplinary project carried out in various sections of a 6th grade public school science class in a small Mid-western town. This science project integrates concepts of social studies and language arts and lasts for several months. This project was launched by the 6th grade classroom teachers who felt that as a result of state/federal test requirements there was not enough time allocation for science and social studies in their classrooms. In fact, this is becoming a common practice in today's time of high stakes standardized testing; teachers in K-12 schools spend more time teaching math and language arts and less time on science, social studies, and other subjects (Akerson, 2001; Plummer and Kuhlman, 2008). This loss of instructional time may affect the science proficiency among US students (Hart, Liggit, & Daisy, 2002). To make up this instructional loss educators have been suggesting integration among various content areas (Romance & Vitale, 2012). The National Science Education Standards (NSES) provides some guidelines for integration among subject areas: "The program of study in science should connect to other school subjects" (NRC 1996, p. 214). Similarly the NSTA Position Statement on Science Education for Middle Level Students also recommends to "integrate science with other curriculum subjects in a multidisciplinary approach, such as through theme-based learning." (NSTA Position paper, 2003). Recent studies in classrooms also indicate that integrating different content areas helps improve student understanding of the content as they learn the content in different ways with multiple perspectives using the real world context (Borrego & Cutler, 2010; Rooks & Winkler, 2012). It helps improve student involvement and motivation, as a result, they are able to retain the science content information over time (Hart, Liggit, & Daisy, 2002; Frykholm

& Glasson, 2005), and enables them to better recognize the relationships among various subject areas (Richards & Shea, 2006). Research studies also point out that integrating language arts while teaching science topics is also an effective instructional strategy in a science classroom (Jordan & Barnes, 2006) because students are not only learning science concepts but also improving reading and writing skills. For these reasons, educators and researchers are looking for ways to integrate instruction in order to have more time allocation for science education especially at the elementary level. This will help provide a good foundation for education at higher levels (Romance & Vitale, 2012)

From the above studies, the NSES document, and the NSTA Position Statement it is evident that integrated, theme-based teaching approaches are helpful in improving not only science content knowledge but they also help improve student involvement and motivation in the learning process. Moreover, these approaches help science education get more instructional time in classroom. Following the ideas from the literature, a few six grade teachers in a small Mid-western town launched a multidisciplinary project in their science classes a few years ago.

“Where in the World Is My Science Project?” is a project that incorporates science, social studies, and language arts. Science concepts include: habitat, animal adaptations, loss of habitat, carrying capacity, and endangered species. Students are required to use reading and research skills and standard/proper English to write a paper. Students learn about geography of the United States and the world by researching an animal’s biome and by tracking their project as it travels from one environment to another. This project applies some facets of scientific inquiry because students during the project ask questions; examine books and other sources of information; are involved in planning and

implementing the project, gather, analyze and interpret data; construct different explanations, communicate the results through class discussions and journal writing; and use critical and logical thinking in completing the product (NSES, 1996 p.23).

Goals and Objectives of the Project

Multidisciplinary Goal: In this multidisciplinary thematic project, the students will conduct research and apply it to create a biome project for a selected animal. They will also learn about geography and culture of other places as the project travels across the US and around the world.

Objectives of the Project: The following content specific objectives will help meet the multidisciplinary goals of the project.

Communication Art: During the project, the students should be able to:

- Demonstrate their research skills using a variety of media
- Write a friendly letter using standard letter format and standard English

Science: During this project the students should be able to:

- Explain food chains, food webs, habitats and biomes of the world
- Describe the relationship of living and non-living things in the environment

Social Studies: In this project the students should be able to:

- Differentiate among cultures/customs of different countries of the world with the help of letters, postcards, photos and items they receive from people around the world.

- Identify and describe various geographical features of different countries using the postcards, other artifacts and through class discussions.

Design of the Project

The project generally starts in the mid-fall after students have studied the relevant topics and established background knowledge needed to complete the project. In the beginning, each student is given a stuffed animal toy. The reason for using the animals is to give students something concrete that they can hold. The students research what type of biome their animals live in. This information is used to prepare a written research project. Then, each student transforms a shoebox into an environment or a biome for his or her animal using craft materials. Each biome box is shipped to a responsible adult who can be a family member or a friend who is willing to help. Usually people are willing to help with educational activities, sometimes it is struggle to find one. However, the teachers try to get help for students from other sources such as other staff members and their relatives. The box is accompanied by a letter that describes the project and requests the adult to send a postcard back to the school. These adults can be anywhere in the world. When the adults receive the box they return a post card to the student as an acknowledgement and send the box on to another responsible adult. The person who receives the project after April 15 returns the box to the student whose name is given in the accompanied letter. The adult recipients also send students information about their local environment. The incoming information is compiled on graphic organizers and shared with students.

Planning for the Project: Things we do before starting the project

Before beginning the project we ensure that students have background knowledge of the topics of food chains, food webs, habitats, carrying capacity, animal adaptations, and endangered species that are needed to study about various biomes. We also review the topics such as geography of the United States and the world and tips for doing research and writing a paper using standards English. After they have studied biomes, the students are ready to start the “Where in the World is My Science Project?” Stuffed animals are generally acquired in the beginning of the year. Some of the places to get stuffed animals inexpensively are garage sales and thrift stores. They can also be purchased at retail stores. If the price of the animals is beyond the budget limits, animal pictures printed from the internet can be used. Sometimes parents also help in obtaining the stuffed animals.

The next thing in the preparation of the project is to locate enough shoe boxes for the students. A note is sent to the parents asking for shoe boxes. Sturdy shoe boxes that will stand up to shipping, are preferred. At this time a letter is sent out to parents explaining the project so the parents are informed and in most cases excited about the students’ projects. The note sent out to parents for shoe boxes can also be a part of this information letter.

Some supplies will be needed before students begin constructing their box biomes; these include construction paper, paint, feathers, toilet paper tubes, colored plastic wrap, cotton balls, aluminum foil, colored pencils or markers and other similar items. Students use these supplies to decorate their shoe box biome. There are many ways to get these

supplies. These include: the school storage, students' parents for donations, art teachers, and the school custodians. If budget allows, supplies can be purchased at retail stores.

Before starting the project, students will be doing some research on their biomes.

Relevant materials such as books and encyclopedias can be checked out ahead of time for this purpose. If the school has a computer lab, that facility may also be used to carry out the research.

An important thing that needs to be arranged before the project begins is postage for shipping the shoe boxes. If the school budget allows, the boxes can be shipped using the school postage. The school PTA may be asked to help with postage or individual parents could be approached to ship their child's biome box. Another way is to write a grant or have community members and businesses to sponsor one or more student's shoe boxes by paying for their postage.

DESCRIPTION OF THE PROJECT

Following is an example of the steps that are taken to carry out the project. Based upon individual needs the steps can be added, deleted, modified or their sequence can be changed.

Step 1: Students in the science class read about animal habitats throughout the world. The students take notes as they read. The notes are used for the next step in the project.

Step 2: Students prepare a research project. Each student receives a stuffed animal toy from the teacher, which becomes his or her property. Students can either choose an animal or teacher can help them with their choice. This toy determines what biome the

student will research. Students develop a simple outline from their research and produce an informational brochure, research paper, poster, or a PowerPoint presentation.

Step 3: Students prepare a project using a scoring guide. The language arts and science teachers both assist students on the research project in class. Days are set aside for editing and producing the final draft of the project. A copy of the rubric is attached in appendix A.

Step 4: Students turn a shoebox into a habitat, or biome, for their animal using construction paper, paint, feathers, toilet paper tubes, colored plastic wrap, cotton balls, aluminum foil, etc. Students are generally very creative. All the material used in the project is provided by the teachers. A few examples of student-made projects are provided in Appendix B.

Step 5: Students write a friendly letter to go with the biome box. A copy of the sample letter is included in Appendix C. The letter is written clearly and carefully so that the person receiving the project will understand the instructions and will know what to do with the project. The letter asks for a postcard to be sent back to the school with information about the environment of the receiving city or town. The letter must be approved by one of the teachers before that student's project will be mailed.

Step 6: Each student brings in an address of someone he or she knows who would like to participate in the project. Some of these include grandparents, people on mission trips for a church, aunts and uncles, family members, or friends in the military. If a student does not have an adult to send the project to, the teachers try to locate the address. Family members and the central office staff may also become involved in the project to help out students. The projects are packaged and shipped out by U.S. mail. The person who

receives the project sends a postcard back to the school and sends the project on to another responsible adult of their choice. The project continues on its travels until mid-April when the final person returns the project back to the school as described in the accompanied letter. A few pictures of the items received from different places around the world are shown in Appendix D.

Step 7: Incoming postcards that contains information about environment of different areas are shared with the classes. Some of the places from where the postcards have been received include Europe, the Middle East, Africa, and several states within the USA. The places that the projects visit are plotted on a map and the postcards are displayed in the school for all to see. If time allows, those places can be researched further by students and their findings can be discussed in class for more in-depth learning. Information is classified into appropriate charts and graphs. At the end of the year the students take their projects home along with all the postcards and items the animal picked up on its travels.

As suggested by both NSES document (NRC, 1996) and the NSTA position statement (NSTA Position Paper, 2003), students tend to learn more when they are engaged in a multidisciplinary project such as “Where in the World Is My Science Project?” In this project students are learning about various science concepts, using and improving their communication arts skills. It also allows students who have not had the benefit of traveling to learn about different places in the United States as well as the world. Students see pictures of an area and learn the history, geography, and other interesting facts about the area. They also learn about customs and cultures of other countries around the world.

Students get very excited when they receive these pieces of information in response to their projects.

ASSESSMENT

The objective of this multidisciplinary project are assessed through a variety of methods. Students write a research paper, report, or brochure or design a poster in the beginning of the project, which is used to assess their knowledge of science concepts as well as literacy and writing skills. The students are assessed on the product they produce. The rubric to score the brochure and poster is included in Appendix A. Students are expected to keep a journal in which they write a paragraph about each postcard the class receives. In this journal entry students tell where the postcard is from and at least two things they learned about that place. These entries can include information about climate, rainfall, animals, etc. Thus, this tool can assess students' knowledge and skills in all three disciplines, science, communication arts and social studies. The entries can also include customs and cultural information about another state, or area of the world. An example of this is when a student learned about a custom of a European country that uses a certain type of doll in a ceremony in the spring of each year. They were even more impressed when they got to see the doll, which was sent in the box along with a detailed letter telling about the customs and cultures of the country. Later on, the teacher uses this journal to assess students' social studies knowledge. They also take a quiz on the material during the project for assessment of their content knowledge.

Implementation Challenges

Where in the World is my Science Project? is a very good project in terms of its instructional values and student learning and their motivation. However, there are a few challenges that we face from time to time. These include:

- Obtaining stuffed animals for each students can be expensive.
- Sometime it is difficult to obtain sturdy shoe boxes for each student.
- Arranging for postage to ship individual projects in shoe boxes.
- Addresses of responsible adults in other states and countries can be difficult some times.
- Planning time for teacher as this project requires lots of planning before it can be started.
- Time for students to work on the project, do research, prepare the written work and edit.

Cost Cutting Measures:

Teachers rarely have all the money they need at their disposal. Some cost-cutting measures that can be used for this project include: using animal pictures instead of stuffed animals; instead of mailing the shoe boxes take photos of the box and mail it in an envelope; having students work in small groups and complete one box or project per group instead of having individual projects.

Conclusion

This article describes a multidisciplinary project carried out at a small middle school in rural Mid-Western town. This project uses science related themes and integrates topics of language arts and social studies. It is important to note that the middle school in this study serves an area of relative poverty. “Where in the World Is My Science Project?” is a low-cost activity that effectively demonstrates learning through scientific inquiry. The hands-on and multi-disciplinary approach reaches students with various learning styles. While they are learning about the science concepts, students are also doing research, writing letters using proper language and following their projects around the country or in some cases around the world. These practices will help improve their literacy skills which can help increase their scores in the state standardized tests (Romance & Vitale, 2012). Students are not only engaged in the learning process but also experience meaningful learning outside of the subject area boundaries. Moreover, students are more motivated to carry out their work than they are in the traditional settings. During the project students get very excited when they receive a postcard or some artifacts related to their projects. Some examples of the artifacts received in response to various projects are placed in appendix D. Students are proud of their products and feel ownership of their work. More importantly, teachers are covering three sets of standards with one thematic project which can save them time and efforts.

Alignment with Standards

Objectives	National Standards	Indiana Standards
<p>Communication Art:</p> <p>During the project, the students should be able to:</p> <ul style="list-style-type: none"> - Demonstrate their research skills using a variety of media - Write a friendly letter using standard letter format and standard English 	<p>This project meets the following Common Core State Standards:</p> <p>W.K.2: Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic.</p> <p>W.K.7; Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them).</p>	<p>6-8.LST.1.2: Write routinely over a variety of time frames for a range of discipline-specific tasks, purposes, and audiences.</p> <p>6-8.LST.5.2: Write informative texts, including scientific procedures/experiments or technical processes that include precise descriptions and conclusions drawn from data and research.</p> <p>6-8.LST.7.1: Conduct short research assignments and tasks to answer a question (including a self-generated question), or test a hypothesis, drawing on several sources and generating additional</p>

		related, focused questions that allow for multiple avenues of exploration.
<p>Science: The students should be able to:</p> <ul style="list-style-type: none"> - Explain food chains, food webs, habitats and biomes of the world - Describe the relationship of living and non-living things in the environment 	<p>NSES Alignment: Life Science Standards Level 5-8: Populations and Ecosystems; Diversity and Adaptations of Organisms.</p> <p>NGSS Alignment: MS-LS2 Ecosystems: Interactions, Energy, and Dynamics. Disciplinary core Ideas; LS2.A: Interdependent Relationships in Ecosystems LS2.C: Ecosystem Dynamics, Functioning, and Resilience.</p>	<p>6.LS.3 Describe specific relationships (predator/prey, consumer/producer, parasite/host) and symbiotic relationships between organisms. Construct an explanation that predicts why patterns of interactions develop between organisms in an ecosystem.</p>
Social Studies: The	Through experience,	6.3.8 Identify major

<p>students should be able to:</p> <ul style="list-style-type: none"> - Differentiate among cultures/customs of different countries of the world with the help of letters, postcards, photos and items they receive from people around the world. - Identify and describe various geographical features of different countries using the postcards, other artifacts and through class discussions. 	<p>observation, and reflection, students will identify elements of culture as well as similarities and differences among cultural groups across time and place.</p> <p>The study of people, places, and environments enables us to understand the relationship between human populations and the physical world.</p>	<p>biomes of Europe and the Americas and explain how these are influenced by climate.</p> <p>Describe and compare major physical characteristics of regions in Europe and the Americas.</p> <p>Describe and compare major cultural characteristics of regions in Europe and the Western Hemisphere.</p>
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Appendix A

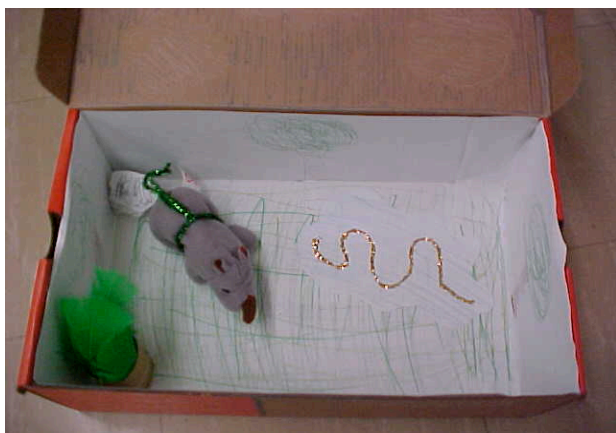
Research Report: Biome Brochure or Poster

Teacher Name: Mrs. V.

Student Name: _____

CATEGORY	4	3	2	1
Title	Title of project clearly stated and displayed.	Title stated, but not prominently displayed.	Title not stated, but subject of project is apparent.	No title, and subject of project is not apparent.
Organization	Information is very well organized with well-constructed paragraphs and subheadings.	Information is organized with well-constructed paragraphs.	Information is organized, but paragraphs are not well-constructed.	The information appears to be disorganized.
Quality of Information	Information clearly relates to the main topic. It includes several supporting details and/or examples.	Information clearly relates to the main topic. It provides 1-2 supporting details and/or examples.	Information clearly relates to the main topic. No details and/or examples are given.	Information has little or nothing to do with the main topic.
Amount of Information	All topics are addressed and all questions answered with at least 2 sentences each.	All topics are addressed and most questions answered with at least 2 sentences about each.	All topics are addressed, and most questions answered with 1 sentence about each.	One or more topics were not addressed.
Mechanics	No grammatical, spelling or punctuation errors.	Almost no grammatical, spelling or punctuation errors.	A few grammatical, spelling, or punctuation errors.	Many grammatical, spelling, or punctuation errors
Sources	All sources (information and graphics) are accurately documented in the desired format.	All sources (information and graphics) are accurately documented, but a few are not in the desired format.	All sources (information and graphics) are accurately documented, but many are not in the desired format.	Some sources are not accurately documented.
Diagrams & Illustrations	Diagrams and illustrations are neat, accurate and add to the reader's understanding of the topic.	Diagrams and illustrations are accurate and add to the reader's understanding of the topic.	Diagrams and illustrations are neat and accurate and sometimes add to the reader's understanding of the topic	Diagrams and illustrations are not accurate OR do not add to the reader's understanding of the topic.

Appendix B: A few Examples of Student-Made Projects Inside Shoe Boxes



These shoe boxes travel from state to state and sometimes continent to continent before they come back to their senders.

Appendix C

This is a sample letter accompanying the science project sent by each student to an adult.

1900 Thilenius St.

City, State, Zip

(Today's Date)

Dear Responsible Adult,

My name is (first name and last initial). I am a sixth grader at C G public schools in city, state. Our class has been studying animals and the biomes in which they live. This is a biome project with which I hope you will be helping me.

This is (what kind of animal it is and the animal's name). He (or she) lives in (tell type of biome). (Tell what the biome is like—types of plants, other animals, seasons, rainfall, etc....)

The way you can help with this projects is to do two things. First, send me a postcard (to the address below) telling me how my animal is doing in your biome. Please include the name of the town, state, and country (if outside the U.S.A.), the name of the capital, the approximate population, climate of the area and at least one interesting fact about the area. Secondly, would you please send my animal and his (or her) biome on to another responsible adult who would be willing to help me to learn about geography, biomes, and other facts about our world? Please be sure that this letter continues on with the animal and its biome.

If you receive this project on or around April 15th, please return it to the address below. This should give my animal plenty of time to make it home before the end of our school year.

Thank you for your help in this project.

First Name, Last Initial

Mrs. V's Science Class

C/O School Name and address

Teacher's email address.

Appendix D

A few examples of artifacts students receive from around the world

These artifacts provide information about the areas or the countries where the projects have travelled to. Students are allowed to keep them at the end of the year along with their biome projects. Students receive many more artifacts along with their postcards each year.



Appendix E

List of Materials

Following material is used by students in our classes:

- A stuffed animal for each student
- Books, magazines and encyclopedia for research. Computer lab can also be used.
- A sturdy shoe box that can stand shipping and traveling across the US and/or around the world. Shoe boxes should be arranged before starting the project.
- Supplies for constructing and decorating the biome box include construction paper, paint feathers, toilet paper tubes, colored plastic wrap, cotton balls, aluminum foil, colored pencils or markers. Other decorating items can also be added.

Human Resources

We have found following resources very helpful in carrying out the project.

- Friends, families and relatives for shipping addresses.
- Sponsors to cover the postage cost, these may include the school PTA and outside community members.
- Parents for possible help in obtaining the material, shoe boxes and for postage.
- Art teacher for craft materials and custodians for toilet paper tubes
- Local businesses for donations and for art and craft supplies.

Note: You might not want to purchase everything at retail stores. We suggest to look for other more economical sources such as garage sales and thrift stores.