

Teacher's Implementation Guide

An Overview of the *Ducks In The Flow* Storybook and Activities



Introduction

Elementary teachers are responsible for the important task of teaching their students basic literacy skills – including reading and writing. In fact, in many school districts, the focus on basic literacy skills has ‘squeezed’ out other subject areas including science. A growing number of elementary grade teachers are challenged to include science content in their daily instruction. Recognizing this challenge as an opportunity to support science instruction at the elementary level, the *Ducks in the Flow – Where Did They Go?* module was developed. The “Ducks” module includes a storybook and three related classroom activities. Collectively, the module components provide a way to introduce ocean science into the elementary classroom – an area of science that is often overlooked at this grade band.

Understanding the importance of ocean science at all grade levels, the National Oceanic and Atmospheric Administration (NOAA) developed a suite of “Ocean Literacy Essential Principles and Fundamental Concepts.” The Ducks module was created to specifically support the inclusion of physical oceanography with an emphasis on surface currents, in grades 3 – 5 instruction. A key intent of the Ducks module was to help young learners see the connections between ocean science and The Great Lakes.

Storybook Background

The Ducks module is based on a real event. In 1992, a storm caused a cargo ship to dump 29,000 plastic bath toys into the Northern Pacific Ocean. Since that time, the plastic toys (including ducks, frogs, and other animals) have travelled around the world. This accidental spill turned out to be an unexpected boon for researchers studying ocean currents. The novelty of finding the plastic toys bobbing in the ocean or washed up on shore has resulted in reports from the “finders” as to the location of the found toys, thereby helping scientists learn more about the currents that carried the plastic toys far from the Northern Pacific Ocean. One scientist from the Pacific Northwest, Curtis Ebbesmeyer, has devoted much of the past dozen years tracking the travels of the plastic toys. While fictional, the Ducks storybook is based on the real data resulting from the global travel of some of the plastic toys. The company that made the plastic toys (First Years) did offer a reward for the return of found plastic toys that were washed overboard. For more information on these ducks, please see the “References” section of the “Duck, Duck, DATA!” activity.

Storybook

The storybook features three upper elementary grade school kids – the “NOAA Kids” – who work cooperatively to explore and investigate surface currents found in the ocean and the Great Lakes.

The NOAA kids ‘live’ near Lake Michigan and the NOAA/Great Lakes Environmental Research Laboratory (GLERL) Lake Michigan Field Station. They explore currents from that vantage point.

Interspersed throughout the storybook are “What Do You Think?” boxes with questions that you can share with students before moving forward. A glossary of words and terms is included at the end of the storybook. These words and terms are highlighted in the main text of the storybook.

Learning Activities

The storybook has three learning activities that further explore the science content and provide instruction in basic science process skills. Each learning activity contains a section called “Scientifically Accepted Explanation” that provides background information and ocean science content. Teachers should familiarize themselves with the ocean science content before sharing the activity with their students. The materials necessary to implement the learning activities in grade 3 – 5 classrooms are inexpensive and easy to find.

Alignment with Educational Standards

The Ducks module spans both K-4 and 5-8 NSES standards (NRC, 1996) and the Ocean Literacy Essential Principles and Fundamental Concepts (National Geographic Society, 2007). These standards are listed in the box on the first page of each classroom activity.

Literacy Information

The Ducks module was designed to interdisciplinary - students read, write, and comprehend science information. Science and literacy are a good match in elementary classrooms. There have been a number of studies that explore the effectiveness of linking science learning and literacy skills. One study compared the characteristics of an inquiry-based science program with the list of literacy skills a student should have and indicated the lists are remarkably similar (Their, 2002). Behaviors and skills found on both lists highlight that students should have the ability to:

- note details
- compare and contrast
- predict
- sequence events
- link cause and effect
- distinguish facts from opinions
- link words with precise meanings
- make inferences
- draw conclusions

The Ducks module was purposely designed to help develop these behaviors and skills in upper elementary school students. The deliberate connections between science content and language arts provide the opportunity for students to increase their literacy skills while exploring scientific concepts and processes.

Tips for Facilitating the Ducks Storybook in the Classroom

Of course, there are many strategies for effective implementation of the Ducks storybook in the classroom. Certainly, each classroom situation is unique. Different implementation approaches will work better in some classrooms than others. We encourage teachers to be creative in their implementation of the Ducks storybook. A few suggested tips follow:

- There is a box with a question or questions at the end of the 1st four chapters – stop here to discuss the question/responses with students.
- The “Dr. Miller’s Guide to Surface Currents” spread in the book at the beginning of Chapter 3: *Water on the Move* is a break in the storyline format, but it contains some very useful ocean science content that teachers can use to teach their students about surface currents. Before starting to read Chapter 3: *Water on the Move*, it would be a good idea to do two of the activities with your students, *Going with the Flow* and *The Ocean in Motion*.
- Before reading Chapter 5: *The Duck Finale*, do the activity *Duck, Duck, DATA!* with your students. This activity mirrors the research performed by the NOAA kids and allows students to predict the landing of the next duck before they read it in the chapter.
- If you have access to an LCD projector, you might want to project the book for use in a classroom setting.

Teaching and Learning Context for the Classroom Activities

A **discrepant event** is a demonstration or activity that puzzles the observer. This catches a student’s attention and makes him/her reconsider his/her current understanding. For example, *The Ocean in Motion* activity represents a discrepant event because most students think that the water drop will fly off the Manila folder in a straight line. It is important that young students explore and reflect, rather than simply passively observing the activity. Some teachers have found the “PEOE” model useful.

1. **Predict:** Students predict what they think will happen in the activity.
2. **Explain:** Students explain their reasoning for their prediction.
3. **Observe:** Students observe what happens in the activity.
4. **Explain:** Students explain what they saw and discuss scientific explanations with the teacher.

Additional information about using a PEOE model can be found in J. Major’s 2004 *Science Scope* journal article, “Will it float?” (October: 22-24).

It is especially important for young students to have concrete learning experiences with concepts, giving them time to bring to mind their prior ideas about the subject and challenge those ideas, if necessary. In the *Going with the Flow* activity, students may believe, at first, that blowing on the water will cause movement at all depths. The activity will challenge that preconception, leading to a better understanding of the concept of “surface current.” It is recommended to have the students work on the activity first, and then introduce them to the correct scientific information and the research terminology.

All three classroom learning activities (*The Ocean in Motion*, *Going with the Flow*, and *Duck, Duck, Data!*) use models to convey a scientific concept. When using diagrams, animations, or physical models, children must be able to relate the simulation to reality or there is a risk of promoting

misconceptions. For example, in *Going with the Flow*, ask students to describe what the parts of surface currents this shoebox model represents. Encourage them to think of how a simulation is similar and different from the actual phenomena being studied.

You might want to use a graphic organizer or use traditional analogy notation, as in standardized tests, to illustrate the relationships between simulations and reality. Use an organizer before the simulation so that students can think about the ocean and wind as they do the activity. Use the organizer again at the end so that students can connect their learning about the model to their learning about the real world.

The *Duck, Duck, DATA!* activity uses diagrams, which are stylized, two-dimensional models of reality. Students may have difficulty relating diagrams to concrete reality. To help with this, ask them to label familiar people, places, or things on the diagram. For example, students can label their state or city on a larger map of the world. For younger learners, a kinesthetic learning aid may help them to interpret a diagram. Instead of drawing arrows on a map to indicate motion, younger children may first physically move a small picture of a toy duck from point to point.

This activity involves learning how to do skills: transferring information from tables to maps, making predictions, hypothesizing, and improving predictions. One method for teaching such skills is to 1) explain the goal and purpose of the activity 2) model the skill and think aloud 3) offer guided practice and 4) offer independent practice. It is often important to include counter-examples, situations where the skill is not applicable or is performed incorrectly, so that children can learn when to use the skill in question.

A web page with the Ducks storybook and classroom activities can be found at:
www.windows.ucar.edu/ocean_education.html

Literature Cited

National Geographic Education & Children's Programs and NOAA Office of Education (2007). *Ocean Literacy: The Essential Principles of Ocean Sciences*. National Geographic Society, Washington, DC.

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