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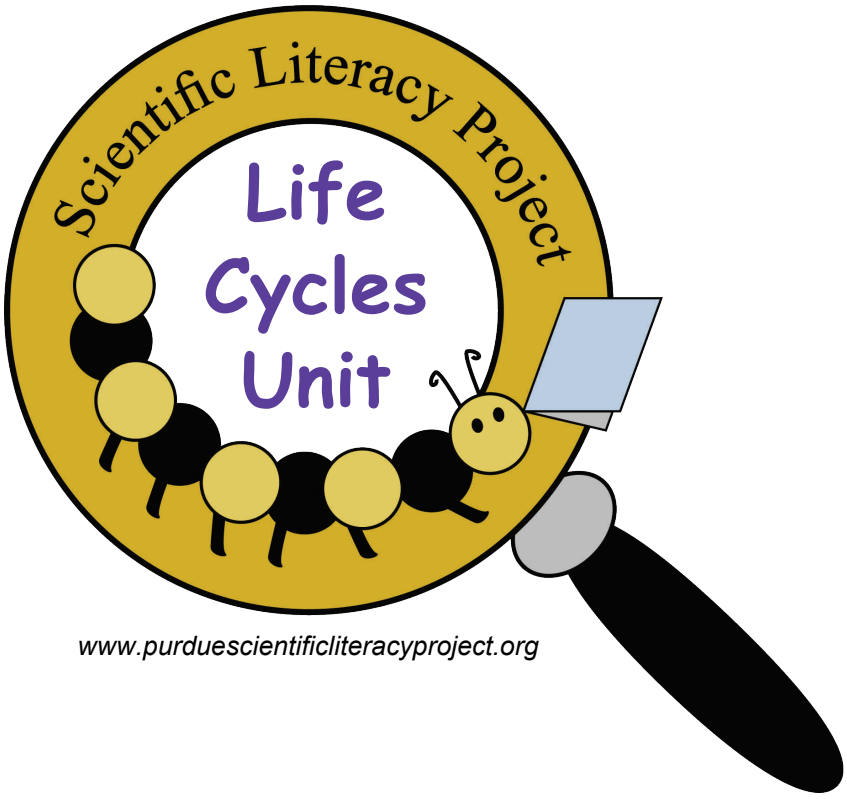
Classroom Activities

Learning Science Through Inquiry

Teacher Guide for the Life Cycle of a Chicken



www.purduescientificliteracyproject.org

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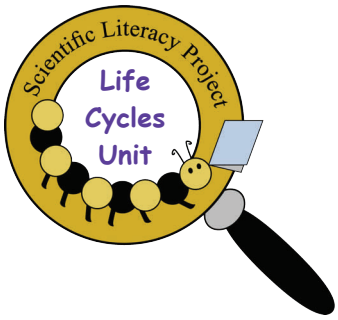


Using Scientific Literacy Project Materials in Your Classroom

The unit guides developed by the Scientific Literacy Project (SLP) are provided as examples of how an inquiry-based science curriculum might be implemented in kindergarten classrooms. We do not offer classroom kits or curricular materials. Rather, the examples used in the SLP project are meant as guides that teachers can modify, adapt, and extend to suit their needs and those of their students.

Learning Science Through Inquiry

Introduction

The Scientific Literacy Project (SLP) is designed to help young children learn science through a series of developmentally appropriate inquiry units. The SLP structure provides an integrated science learning environment that supports the development of literacy as well as scientific and mathematical knowledge. As children conduct scientific investigations on a specific topic, they read science books related to that topic. Each inquiry unit is designed to engage the child in reading, writing, oral communication, and quantification in the natural course of conducting and reporting on an investigation. The inquiry units help young children gain insight into the processes of scientific inquiry. They support the development of important scientific reasoning skills such as asking questions about the natural world, designing investigations that can answer those questions, collecting data, and drawing conclusions from data.

The Role of the Teacher

In the SLP framework, the teacher acts as a facilitator to support children's learning throughout the inquiry units. The teacher scaffolds the children's learning by asking questions, providing hints and reminders to children through the process of investigation, and modeling skills for children as needed. The teacher also helps children communicate by encouraging small-group and whole-class discussion and by developing a system for students to share what they have learned in each inquiry unit cycle.

Assessment

The teacher uses informal, dynamic assessment procedures to monitor student work and to provide feedback and support through each inquiry unit. Informal procedures include observing children and talking to them as they work. The informal assessments help the teacher identify children's conceptual difficulties and provide instructional feedback that supports conceptual development.

To develop reflective thinking, the teacher engages students in self-assessment. Students are encouraged to discuss and evaluate their own work and to identify what they did well and what they could improve.

Formal assessments employ a portfolio system. An annotated portfolio checklist is used to keep track of student skills and knowledge. Teacher comments and indexed samples of student work for each evaluation provide supplemental information on performance.

About this Unit

In this unit, children will investigate the life cycle of the chicken. This inquiry unit is linked to the biological theme of **growth and development**. Prior to beginning this inquiry unit, children should have discussed important themes in the study of living things and read the science book "Living Things" by Alan Trussell-Cullen (Dominie Press, 2001). In the SLP progression, this book is introduced during the Living Things Unit.

During this inquiry unit, children will observe the development of chicken eggs to learn about different patterns of growth and development in animals. Science book readings are assigned throughout the unit to enrich children's knowledge about the life cycles of living things.

Please note that there are two versions of the SLP Life Cycles Inquiry Unit. Both sets of classroom activities address life cycles in general, but each focuses on observing a specific species: the chicken or the monarch butterfly. Each life cycle inquiry guide can be used singly, concurrently, or at different times of the year. (If using both versions, note that the pre-inquiry activities are the same for both versions and should be conducted only once.)

The inquiry unit is broken down into three parts:

- **Pre-inquiry activities:** These are ***whole-class or small-group*** activities that serve to activate prior knowledge, introduce the purpose of the investigations, and provide children with the task framework.

- **Inquiry activities:** These are ***whole-class or small-group*** activities through which children conduct their investigation of life cycles. They include asking questions or making predictions, discussing how the planned investigation will provide relevant data, collecting and recording data, and drawing conclusions from the data.

- **Post-inquiry activity:** This is a combined ***small group and whole-class*** activity that allows children to communicate and share the results of their investigations. This allows teachers and children to identify unresolved issues or questions.

Chicken Life Cycle: Background Information on Embryo Development for Teachers

Major Events in the Life Cycle of a Chicken

Day 1:

- 18 hours: The alimentary tract appears.
- 21 hours: The brain and nervous system begin to form.
- 22 hours: The headfold begins to form.
- 23 hours: Blood islands appear.
- 24 hours: The eyes begin to form.

Days 2–5:

- The heart forms and starts to beat.
- External organs such as ears, toes, and legs start to form.
- Internal organs such as the liver and kidneys begin to form.

Days 6–10:

- Feathers develop.
- External organs such as eyes and legs continue to develop (e.g., leg bends at knee).

Days 11–16:

- The embryo grows to occupy the entire egg except the air cell.
- The beak and tail develop.

Day 17:

- The beak turns toward the air cell.

Day 18–19:

- The beak breaks through the inner shell membrane.
- The lungs begin to function.

Day 20:

- The lungs are using the air cell for breathing completely.

Day 21:

- The chick hatches.

Egg Incubator for Chicken Life Cycle: Background for Teachers

The R-com 3-Egg Digital incubator:

- For details on using the incubator, refer to the incubator manual.

Candling (using the R-com EZ Egg Scope):

- Candling refers to shining a bright light source on the shell to examine the inside of the egg. It is important to eliminate dead embryos and infertile yolks from the incubator.

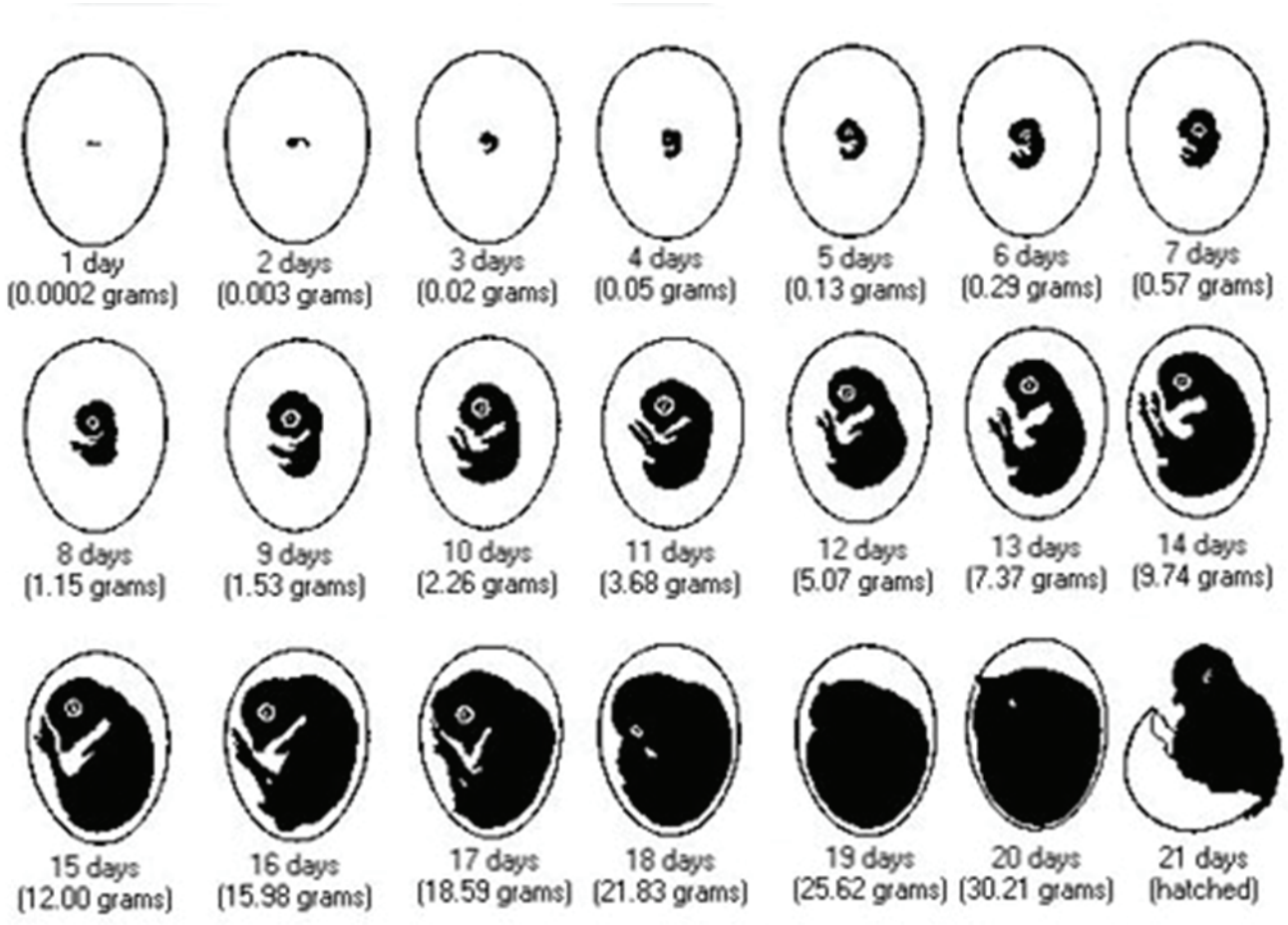
- Candling can be done daily for up to 30 minutes without hurting the egg. Suggested schedule for SLP inquiry activities is twice per week.

- Proper candling requires a bright light source and a dark space (use EZ egg scope or LED flashlight and a roll of black construction paper (see incubator manual).

- For more information on candling, visit the following website: http://lancaster.unl.edu/4h/Embryology/candling.shtml

- See growth chart on page 7, which shows typical patterns of embryo development.

Daily Changes in the Weight and Form of the Developing Chick Embryo: Background for Teachers



Note: This chart is representative of the development of a white leghorn chicken.

Source : http://msucares.com/poultry/reproductions/poultry_chicks_embryo.html

Pre-Inquiry: Activity 1
Activate Prior Knowledge of Living Things

—Can Be Combined with Activity 2—

This activity takes 15–20 minutes.

The Activity (for whole class or small groups)

Ask children to think of what they already know about living things.

- Ask children how we can we tell if something is a living thing. Scaffold the theme of **growth and development**, if necessary:
  - ◊ One important thing to know about living things—plants and animals—is how they grow and develop: how they change from birth throughout their lives.

Introduce the idea of a lifecycle.

- Each living thing has a lifecycle. It is born, it grows and develops, and it changes throughout its life.

Indiana Science Teaching Standards used in this activity:

K.1.1 Raise questions about the natural world.

K.2.2 Draw pictures and write words to describe objects and experiences.

K.4.2 Observe plants & animals, describing how they are alike and how they are different.

Organize an idea board as shown on p. 9.

Purpose: To activate prior knowledge of living things.

- Activate prior knowledge: Remind students that people are living things and that we have a life cycle.
- Point to the pictures of the newborn, the child, and the adult. Ask how these are similar or different. *(Use personalized pictures of students, their families, or teachers, if possible.)*
- Ask students to identify the different ways in which people change from birth through adulthood.
  - ◊ Size, physical features, movement, language, food
- Ask children to recall what they have learned about living things.
  - ◊ How do they look?
  - ◊ Where do they live?
  - ◊ How do they grow?

This activity can be used along with the book:

Isn't It Strange? by Nancy Polette

Activity 1: Sample Idea Board for The Human Life Cycle



Feature	Baby	Child	Adult
Size	*Small*	*Bigger*	*Biggest*
Food	*Milk*		
Hair	*Short*	*Longer*	*Longer*
Movement	*Turns head*	*Walk, Sit*	*Same*

Note 1: Italicized entries are examples of things that might emerge from class discussion.

Note 2: Replace generic pictures with pictures of the student and their families or teachers, if possible.

Pre-Inquiry: Activity 2
Planning the Investigation of the Chicken Life Cycle

—Can Be Combined with Activity 1—

This activity takes 15–20 minutes.

The Activity (for whole class or small groups)

Organize an idea board, as shown on page 12. Record questions that children generate during the following discussion on the idea board.

- Tell children that we are going to be scientists. Scientists try to understand and explain things in the world around them.
- Explain that we are going to investigate the life cycle of chickens.
- Tell children that scientists often start by **asking questions**. Elicit questions from children by asking:
  - ◊ What are some questions that we can ask about the life cycle of a chicken?
- Explain that sometimes scientists **make predictions**. A prediction is a guess about what will happen.
  - ◊ Can we make some predictions about chickens? What does a chicken look like when it is born? How does it change as it grows older and becomes an adult?

Indiana Science Teaching Standards used in this activity:

K.1.1 Raise questions about the natural world.

K.1.2 Begin to demonstrate that everyone can do science.

K.2.2 Draw pictures and write words to describe objects and experiences.

Purpose: To activate prior knowledge of scientific inquiry and to plan the investigation.

This activity can be used along with the book:

The Life of a Butterfly
by Ann Murphy

Part 2 of 2
Pre-Inquiry: Activity 2
Planning the Investigation of the Chicken Life Cycle

Plan the Observation

- Ask children: Now that we have some questions and predictions, how can we **find the answers**? Scaffold if needed:
  - ◊ Scientists check their **predictions** by making new **observations** to see if what they predicted really happened.
  - ◊ What can we observe that will help us answer our questions about how chickens grow and develop?

Keep Records

- Ask children: How will we remember what we saw? What can we use to remember what we saw? Scaffold if needed:
  - ◊ Remind them to use their **science notebooks** to **record** what they observe.

Draw Conclusions

- Ask children: How will we figure out the answers to our questions? Scaffold if needed:
  - ◊ Scientists review or look at their records and think about or try to make sense of what they have recorded. They use records to **draw conclusions** or figure out what happened.

Communicate Findings

- Discuss how children will **share and communicate** what they have learned to others.

Possible Vocabulary

You may want to discuss the following words with your students:

Predict
Record
Conclude
Life Cycle
Communicate
Observe
Investigate

Save the Activity 2 Idea Board to scaffold inquiry activities.

Activity 2: Sample Idea Board

Chicken Life Cycle

Questions and Predictions	*Baby looks like mom.*	*How big will it grow?*	*Will it change shape?*
Observe	*Shape*	*Size*	*Behavior*
Record	*Photos*	*Write*	*Draw*
Draw Conclusions	*Review science notebook.*		
Communicate	*Tell others what you learned.*	*Share your science notebook.*	

Note: The italicized entries are examples of things that might emerge from class discussion.

Pre-Inquiry: Activity 3
Chicken Egg Anatomy

The Activity (for small groups)

Using an idea board, draw (or print and paste) a model of the egg. See page 14 for an example.

- Ask the children to guess what the different parts are and what they do.

Talk about the anatomy of the egg and help them notice and identify the following parts: (see diagram on page 15 for background information)

- Ask children to identify which part of the egg becomes a chicken. (Answer: **germinal disc**)
  - ◊ Children may think (incorrectly) that the yolk becomes the chicken. If that is the case, help them spot the germinal disc and offer your prediction (e.g., "I think this white spot on the yellow yolk might become the chick.").
- Ask children to guess what the embryo uses for food. (Answer: **yolk**)
  - ◊ Draw children's attention to how much egg yolk there is in the beginning. Ask them to predict how much egg yolk there will be the next time they observe. Draw their attention to the decreasing yolk over observations.
- Ask children how the embryo gets air to breathe. (Answer: The **shell is porous** and allows air through.)

This activity takes about 30 minutes.

Indiana Science Teaching Standards used in this activity:

K.1.1 Raise questions about the natural world.

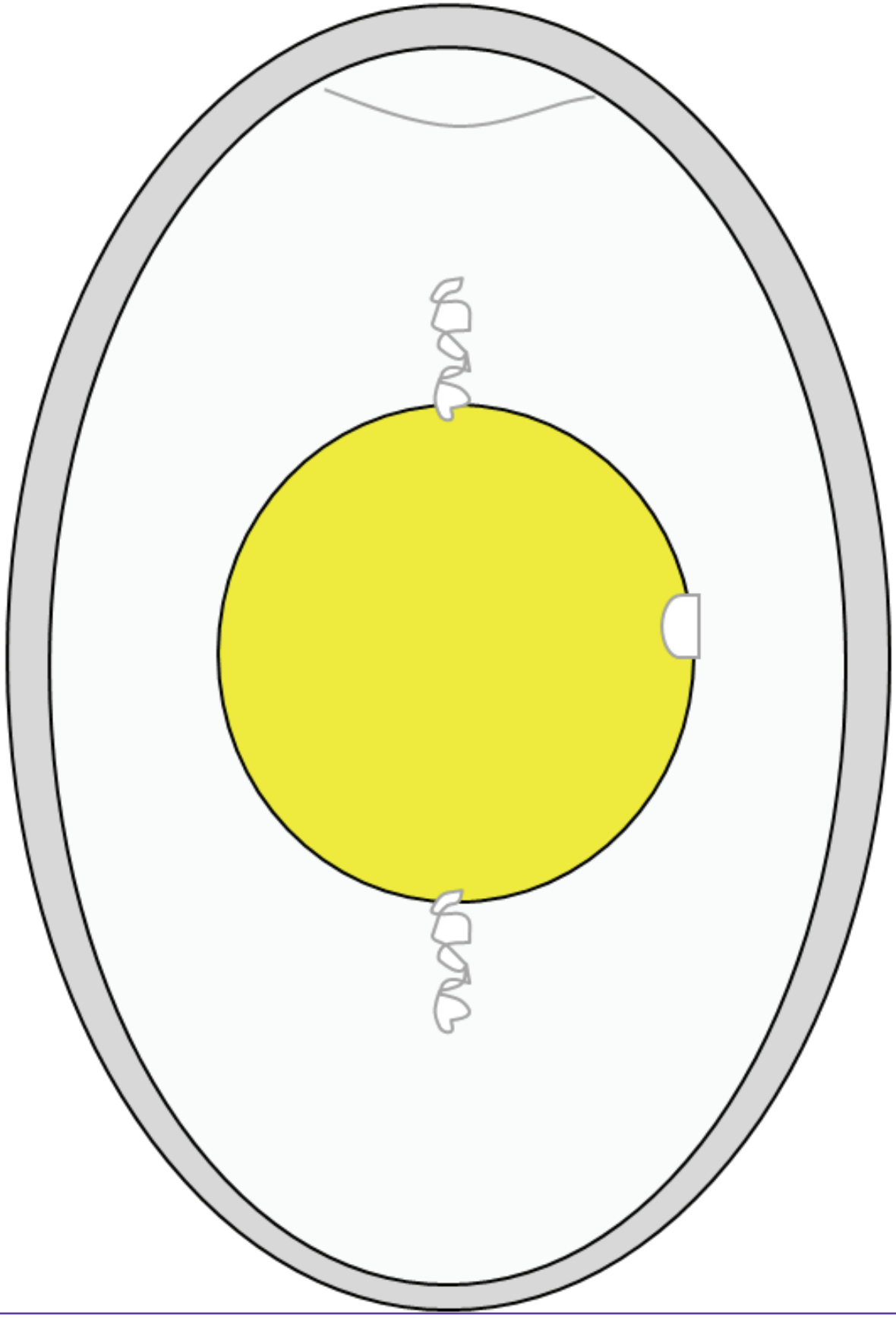
K.1.2 Begin to demonstrate that everyone can do science.

K.4.2 Observe plants & animals, describing how they are alike and how they are different.

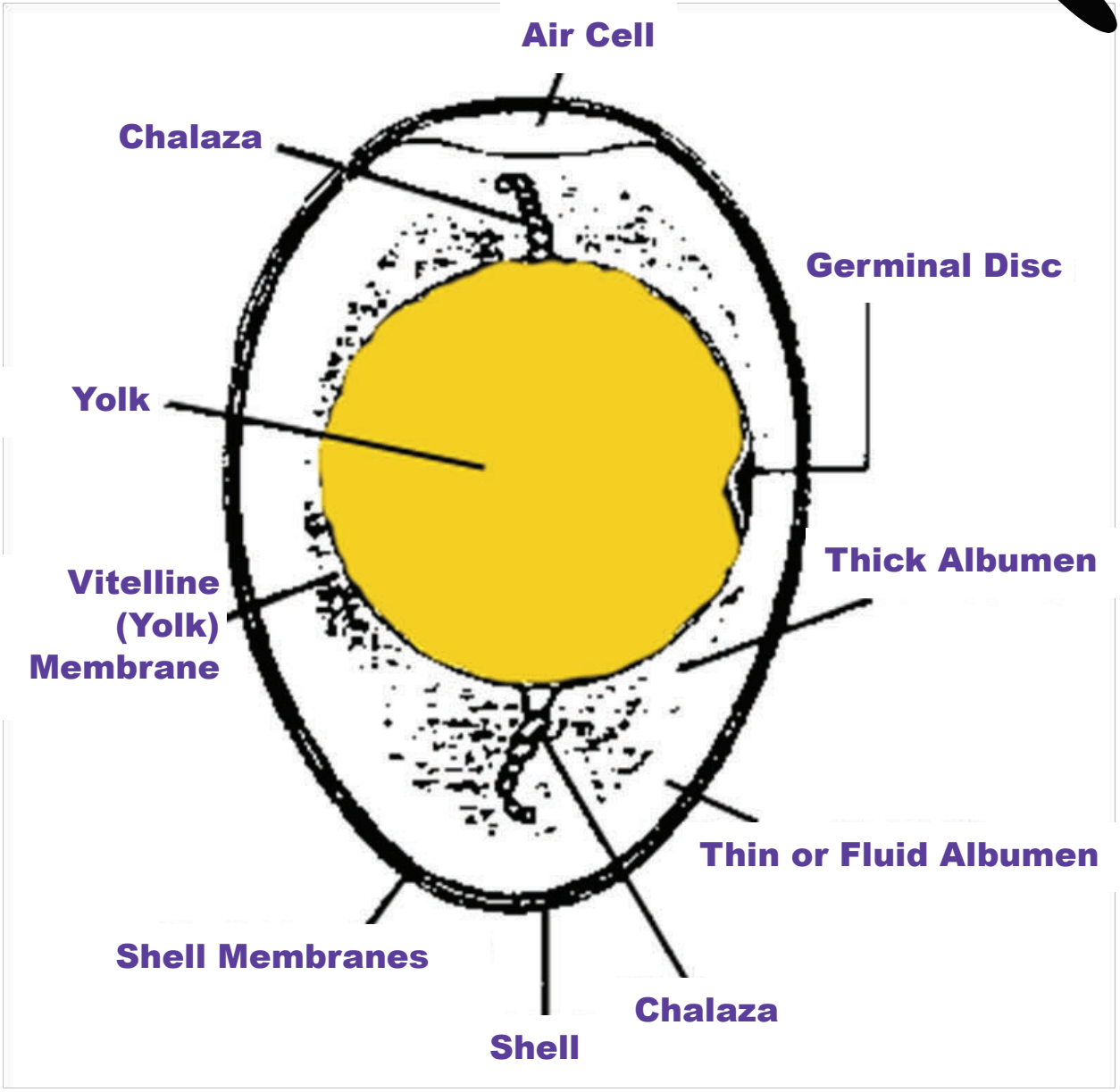
Purpose: To introduce children to key features of egg anatomy in order to prepare them for their observations of embryo development.

This activity can be used along with the book:

The Penguin Chick
by Marilyn Woolley



Anatomy of a Chicken Egg: Background Information for Teachers



From University of Illinois Extension: Incubation & Embryology
http://www.urbanext.uiuc.edu/eggs/res16-egg.html

Inquiry: Activity 4
Introduce Observational Setting
Record Questions & Predictions

Observations of embryo development through candling should occur at least once a week.

This activity requires 30 minutes.

The Activity (for small groups)

At the incubator, children should engage in a group discussion about the egg.

- Ask children what it is. Where does it come from? What happens to it over time? Why?
- Ask children to **predict** how long it will take for changes to occur.
- Ask children to **record** their questions and predictions in their science notebooks. Have an adult help them, if necessary.

Indiana Science Teaching Standards used in this activity:

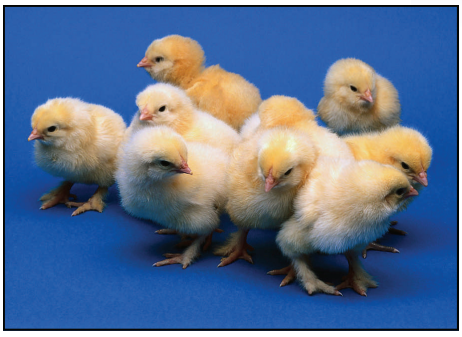
K.1.2 Begin to demonstrate that everyone can do science.

K.2.2 Draw pictures and write words to describe objects and experiences.

Purpose 1: To introduce children to an observational setting (incubator).

Purpose 2: To reflect on the observations needed to answer important questions about the chicken life cycle.

Purpose 3: To encourage children to identify important dimensions of growth and development such as changes in physical characteristics.



This activity can be used along with the book:

The Penguin Chick
by Marilyn Woolley

Inquiry: Activity 5 Data Collection

—Activity should be conducted twice per week—

This activity takes 30–40 minutes.

The Activity (for small groups)

Introduce the observation chart in the children's science notebooks. (See example on page 18.)

- ◊ Ask children to **record** what they **observe** on the science notebook observation chart for each day.

Have the small group gather around the incubator. .

- ◊ Candle the eggs and let each child observe them. *(See page 6 in this guide for candling instructions.)*
- ◊ Help children identify the different parts of the egg.
- ◊ **Note: Do not candle from Day 18 to hatching (Day 21**).

Indiana Science Teaching Standards used in this activity:

K.1.2 Begin to demonstrate that everyone can do science.

K.2.2 Draw pictures and write words to describe objects and experiences.

K.4.2 Observe plants and animals, describing how they are alike and how they are different.

Purpose: To participate in an ongoing scientific observation in order to answer questions about the life cycle of a chicken.

Each day students should record their observations in their science notebooks.

- ◊ Be sure to watch for signs of development as you choose the days to enter records.
- ◊ Use information on pages 5 and 7 of this guide to track embryo development.

This activity can be used along with the books:

Life Cycle of a Frog
by
Angela Royston

Life Cycle of a Chicken
by
Angela Royston

Activity 5:
Sample Observation Chart

Name: _____ **Date:**_____

Chicken Egg

Saw heartbeat

Post-Inquiry: Activity 6
Make a Poster and Share It

The Activity (for small groups & whole class)

Divide the class into small groups.

- Ask the children to create a poster showing the development of the chicken egg.
- Ask each small group to discuss and then create a poster showing what they learned through their observation of the chicken egg.
- Students can paste photographs or draw and label their diagrams.

This activity takes about 45 minutes.

Indiana Science Teaching Standards used in this activity:

K.1.1 Raise questions about the natural world.

K.1.2 Begin to demonstrate that everyone can do science.

K.2.2 Draw pictures and write words to describe objects and experiences.

Bring the class together for a whole-class poster presentation and wrap-up discussion.

- Have each group display their poster where all the students can see it. After the posters have all been set up, use them as a springboard to discuss what children learned about the life cycle of a chicken.
- Have each student take a turn sharing something they learned from the investigation.
- Ask students to describe some ways in which the life cycle of a chicken differs from the life cycle of humans or other animals that they have learned about.
- Ask students if they have new questions about life cycles.
  - ◊Ask if they can think of ways that they could answer these questions.

Purpose: To help students understand that communicating results is an important part of science.

This activity can be used along with the book:

Life Cycles of Animals
by Nisha Da Silva

Appendix
List of Classroom Materials and Supplies

Inquiry Activity Supplies for the Life Cycle of a Chicken Unit

Quantity

Inquiry Activity Supplies Specific to this Unit

Science notebooks: one per child…….…… 30

Egg Incubator and scope for candling: one per class……..…… 1

Unit Activity Materials

Activity 1: Activate Prior Knowledge of Living Things

- Set of pictures…….…… 1

Activity 3: Introduce Chicken Egg Anatomy

- Egg anatomy diagram from page 14 of this guide: 2 per group…… 12

Activity 6: Make a Poster and Share It

- Poster paper (11"x14"): 4 sheets per group……..…….. 24

General SLP Classroom Supplies & Equipment for this Unit

- Digital camera……... 1
- Color photo printer…… 1
- Box– Crayola™ colored pencils (12 colors)…… 6
- Idea Board (Post-It™ 30"x25", plain white easel pads)…… 1