Cheap Thrills: Science Activities on a Shoestring

Seminars 1 and 2 Teacher's Packet

A KET professional development workshop for educators approved for Professional Development Training by the Kentucky Department of Education.

Cheap Thrills: Science Activities on a Shoestring

Seminars 1 and 2: Inquiry Approaches to Learning Primary Science Content and Process

Overview of the Series and Seminars

Targeted Audience: Elementary science teachers

All the supplies you will need for the activities presented in this four-part series may be found in your local grocery or hardware store. Ken Rosenbaum hosts the series, with two programs for primary teachers and two for intermediate teachers. The programs demonstrate how the activities—drawn from the areas of physical, life, and earth sciences—allow teachers to embed inquiry and scientific process skills in their instruction. All seminars include extensive classroom footage of students actually doing the suggested activities.

In the first and second seminars, targeted to primary teachers, Ken discusses how using authentic inquiry with primary students develops critical thinking skills and increases student learning and motivation. In a series of classroom demonstrations, Ken models ways to use inquiry to teach the primary scientific method and the primary science process skills to students in grades K-3. Each demonstration includes an experiment using cheap and easy-to-find materials. Assisting Ken is Vera Prater, the science lab teacher at Fern Creek Elementary School in Jefferson County.

About This Teacher Packet

This packet includes agendas for the two programs, a biography of the presenter, and specific materials related to seminar content. You'll find more details in the table of contents on page 3.

Series Format

These 90-minute programs were recorded in the KET distance learning studio. Any materials or information needed for participation in the seminars is provided in the videotapes and/or included in this teacher packet.

Packet Contents

About the Seminar Presenter

Presenter **Ken Rosenbaum** is president of K R Consulting Inc. and executive secretary of the Kentucky Science Teachers Association. He also is a lecturer at the University of Louisville, Title II Coordinator for Jefferson County Schools, Region 3 PRISM Manager at U of L, and program designer for the Commonwealth Institute for Teachers at the Kentucky Department of Education. Before retiring from Jefferson County Schools in 1996, Ken spent nine years serving as K-12 science specialist and three years as K-8 science specialist. He also has 18 additional years' experience teaching science in Kentucky public schools.

Ken has been a frequent presenter at local, state, and national conferences and has participated in a number of special projects collaborating with community partners. Ken is a member of the NSTA Committee on Science Supervision and was 1995 Environmental Educator of the Year in the Jefferson County Conservation District. He can be reached by e-mail at <krosenbaum@aol.com>.

Professional Development Credit

Stage of Participant Development: Practice/Application

The Kentucky Department of Education has approved all KET Star Channels Seminars for professional development credit if schools or districts choose to include them in their professional development plans. Districts or schools may choose to include preparation and/or follow-up time as part of professional development. For example, if a teacher participates in one 90-minute program and spends an additional 30 minutes in related activities, he or she could be awarded a total of two hours professional development credit.

Individual teachers who wish to use these videotapes for professional development credit should check with their school professional development chair or with their district professional development coordinator.

Professional development can also be used to satisfy requirements for the fifth year program. Contact your local university or the Division of Teacher Education and Certification at 502-564-4606 for more information.

Seminar 1 Agenda

Welcome and introduction	Ken Rosenbaum, Presenter
Teaching the scientific method the old way	
Real science wondering: It's the question, not the answer	
The components of inquiry lessons	
The primary scientific method: Wonder-test-tell	
Questioning skills: The Yes/No Game (What's in the Bag?)	
Primary science process skills: Teaching and assessing skills through inquiry **• Touchy-Feely Bags: Classroom video** **• Pretzels: Classroom video** **• Buttons: Classroom video**	
Reading "Seven Blind Mice" to demonstrate observation skills	
The Water Cycle: Classroom video	
Concluding remarks	Ken Rosenbaum

Seminar 2 Agenda

Welcome and introduction	Ken Rosenbaum, Presenter
Review **• Components of inquiry lessons** **• Primary scientific method**	
Primary science process skills: Teaching and assessing through inquiry **• Bug-O-Copters** **• Buttons** **• Pretzels** **• Touchy-Feely Bag** **• Guess a Minute**	
Concluding remarks	Ken Rosenbaum

Introduction

Science is wondering about the world around us and asking questions about it.

Inquiry starts with "I wonder" questions and proceeds when the learner designs tests (experiments) to answer these "I wonder" questions. The tests are revised many times and often proceed in unexpected directions. This is *real* science! "I wonder why the leaves turn color in the fall?" is a good science inquiry question. "How many angels can dance on the head of a pin?" is not. Good science inquiry questions can be tested, measured, analyzed, revised, and provide information (data) that can be recorded. This process will lead us to answers (conclusions) to our questions or perhaps result in even more questions.

Our students come to us with a myriad of questions about everything; however, they lack the skills to use the inquiry process for problem solving to research the answers to their questions. Teachers must teach and model the inquiry process. Classrooms must provide an environment that encourages and values the learners' questions and promotes the "I wonder" through daily activities.

Ken Rosenbaum
KR Consulting Inc.

The most beautiful thing we can experience is the mysterious. It is the source of all true art and science. He to whom this emotion is a stranger, who can no longer pause to wonder and stand rapt in awe, is as good as dead: his eyes are closed.

Albert Einstein

Scientific Method (the old way)

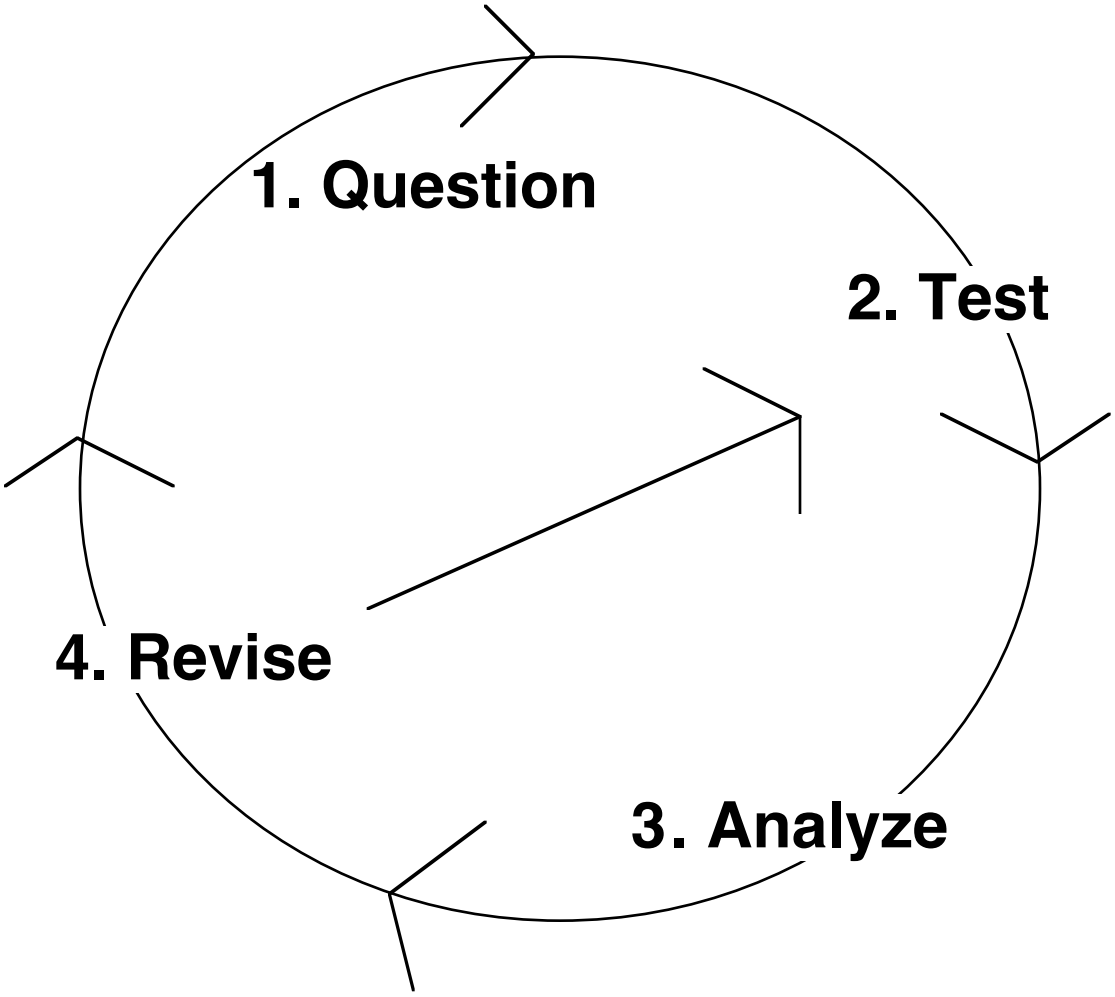
1. **Problem**

2. **Hypothesis**

3. **Experiment**
   - **Materials**
   - **Procedure**
   - **Data**

4. **Conclusion**

Inquiry Approach



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Question:

Why, how, and when does something happen?

What is the cause and effect?

Test:

Observe; collect, display, and interpret data; measure; identify and control variables

Analyze:

Predict, infer, draw reasonable conclusions

Revise:

Verify results, redesign

Question, Test, Analyze, Revise . . .

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Primary Scientific Method

Wonder

Test

Tell

Primary Science Process Skills

Classifying

- **Creates groups by using a single attribute.**
- **Creates groups and sub-groups by using a single attribute.**

Observing

- **Describes objects' attributes.**
- **Describes changes in terms of actions.**

Communicating

- **Expresses opinions.**
- **Explains using sense data.**

Questioning

- **Raises uncertainty focusing on attributes of objects.**
- **Focuses on relationships, patterns, and events.**

Predicting

- **Guesses based on observable fact.**
- **Guesses from minimal supporting evidence.**
- **Guesses based on cause and effect relationships.**

Inquiry Science

Steps to Follow:

- **Exploration and discovery**
- **"I Wonder" questions**
- **Choosing one question**
- **Experimental design**
- **Conducting experiment**
- **Repeating experiment**
- **Presenting results**
- **Peer review and experimentation**

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Designing a Science Experiment

- **Research first.**
- **Gather materials.**
- **Keep records of procedures.**
- **Collect data/measure.**
- **Set up controls.**
- **Allow only *one* experimental variable.**
- **Include many trials—repeat the experiment.**
- **Share your data and results with others to support the conclusion: Data tables, graphs, charts.**

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Inquiry Science Tips to Remember

- **Learners start with hands-on activity for exploration and discovery.**
- **Learners ask "I wonder" questions.**
- **Learners design experiments to investigate their own questions.**
- **Learners measure, collect, and record data and display data.**
- **Learners present their results for Peer Review.**
- **Peers review and question.**
- **Peers repeat the experiment to verify results.**

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Words to Know

- **Inquiry**
- **Experiment**
- **Research**
- **Materials**
- **Procedures**
- **Data**
- **Control Group**
- **Experimental Group**
- **Variables**
- **Trials**
- **Peer Review**
- **Analyze**
- **Revise**
- **Conclusion**
- **Observation**

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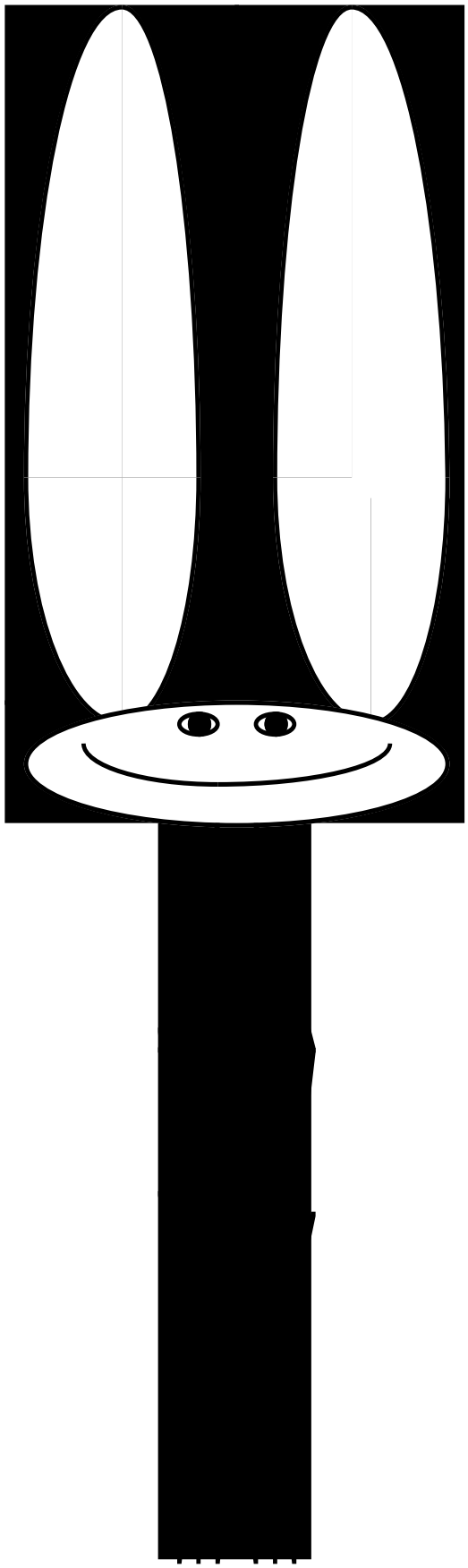

Process Skills with a Capital "P"

Pretzel Pick

Objective: To compare and contrast attributes of pretzels.

Materials: Five varieties of pretzels (vary size, shape, etc.)

Procedure:

1. Divide class into 5 or 6 groups and distribute a variety of 5 pretzels to each group.
2. Have students place pretzels into 2 groups and name the attribute they used to divide the pretzels.
3. Have students place pretzels in 3 groups and name the attribute used.
4. Have class determine which group came up with the most original attribute.

Process Skills:

Classifying, observing, communicating, using numbers

Objective: To develop an understanding of the relationships of shapes found in objects.

Materials: Variety of pretzels
Paper and pencil

Procedure:

1. Distribute a variety of pretzels to every two students.
2. Have students count the number of shapes they can find in their pretzels.
3. Have students construct additional shapes from their pretzels.
4. Have students share their findings with the class.

Process Skills:

Recognizing space/time relationship, observing, classifying, communicating, using numbers

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