USING THE SCIENTIFIC METHOD TO GUIDE LEARNING

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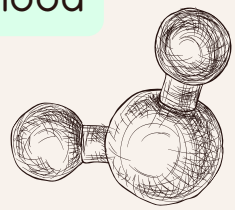
Overview

"Using the Scientific Method to Guide Learning: An Integrated Approach to Early Childhood Curriculum" written by Hope Gerde, Rachel Schachter, and Barbara Wasik provides research-based strategies to integrate the scientific method into early childhood science experiences.



01 Observation

Observation, the first step in the scientific method, involves teachers and children exploring and describing their environment with guidance to develop observational skills and vocabulary. Using non-fiction texts and diverse scientific materials enriches exploration across classroom centers, fostering curiosity and discovery. Teachers should integrate science materials throughout the classroom to ensure accessibility and ongoing engagement in scientific inquiry.

For example, introducing materials like plants encourages exploration of scientific concepts. Providing science tools, such as magnifying glasses, offers children meaningful ways to engage with these objects. Teachers should keep science materials accessible in classroom centers, like measuring cups in the dramatic play kitchen.

For example, students and teachers observe and manipulate blocks of different shapes/sizes, discussing whether they roll and noticing patterns as they identify physical properties of the blocks. Using the scientific method in the block center shows it can be applied in multiple classroom areas, not just the science center.

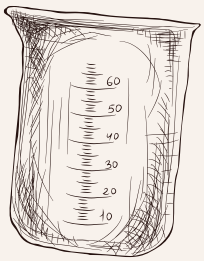
02 Generating a Question

To continue scientific inquiry, children ask questions based on their interests and observations, refined with guidance from teachers. Encouraging questioning supports language development and curiosity, guiding children to describe observations and develop scientific inquiries. Summarizing observations and using concrete objects aid in question formation, while displaying children's questions in the classroom promotes writing and enhances print knowledge.

03 Making Predictions and Arriving at a Hypothesis

In this step, children make hypotheses or predictions about their question. Teachers encourage them to use prior knowledge to infer what might happen, similar to predicting story outcomes for language development. This step supports various skills:

- Creating a visual representation of data supports writing and mathematics skills.
- Offering children opportunities to explain their thinking supports cognitive development.
- Encouraging children to use words like brainstorm, predict, and hypothesize builds vocabulary crucial for for language and science learning.



For example, teachers can ask children to predict whether objects will roll or not. The teacher can record these predictions on a t-chart with "roll" and "not roll" columns and blank space to write the names of various objects. The children put an "X" in the column corresponding to their hypothesis. This can be displayed during the study, providing a visual reference for discussion as they test each item.

04 Engaging in Experimentation and Testing

Experimentation involves children engaging in activities to answer questions.

Teachers guide children in finding patterns, comparing, organizing, measuring, and sorting to clarify ideas and concepts. This hands-on approach aids understanding of scientific concepts. Integrating non-fiction texts helps children use scientific language and gain information; participation in experiments is crucial for grasping complex phenomena.

For example, during free play a teacher provides objects for children to move. As children manipulate objects, the teacher verbally explains that as a cube block moves, it slides, but as a ball moves, it rolls.

Centers provide opportunities to experiment with materials related to the research question. Materials should remain accessible for several days to ensure multiple opportunities to experiment.

For example, children can paint with objects that roll (e.g., cars, marbles, balls), test how object move in sand or water, and investigate properties of objects that roll in the block center. During outside time, teachers and children can engage in observation and experimentation, making connections to what they are doing in the classroom.

During outdoor activities, teachers and children can observe and experiment, linking learning to classroom questions (e.g., why tricycles roll). Encouraging children to keep science journals helps document experiments they can revisit later to reinforce ideas.

For example, students use journals to record objects that roll by drawing them on pages labeled 'roll' and 'not roll'. Children can draw and label living/non-living objects, chart plant growth daily for 2 weeks, or document and count the flowers they find. Teachers can encourage discussion and reflection by having children share journal entries during group time.

05 Summarizing and Analyzing Results to Form Conclusions

During the summary, teachers help children organize and visually represent their experiment findings through listing, charting, graphing, and sorting. This helps children summarize their findings, make assumptions, and draw conclusions about science and developing concepts.

For example, teachers provide objects for children to predict if they will roll. Students sort objects based on predictions, noting similarities and differences in their shapes. Summarized responses are recorded to address misconceptions and guide conclusions. After identifying patterns, teachers review predictions and help children reflect. Teachers model responses to explain why objects did or didn't roll. The original guiding question is revisited, and children's statements are summarized verbally and on a chart.

06 Communicating Discoveries

Children sharing their findings is crucial for fostering excitement for learning and deepening understanding of scientific concepts. Teachers should offer various ways for students to communicate their results, such as discussions with peers, writing, or drawing, to enhance language and literacy skills in meaningful scientific communication.

For example, teachers share study findings through a family newsletter. Teachers and children create a newsletter together, documenting discoveries in their own words using a laptop or large paper. Including pictures of student work demonstrates skills, and using experiment charts helps explain conclusions. This fosters critical thinking, language development, literacy skills, and meaningful parent communication, while integrating technology.

Strategies supported by: Gerde, H. K., Schachter, R. E., & Wasik, B. A. (2013). Using the Scientific Method to Guide Learning: An Integrated Approach to Early Childhood Curriculum. Early Childhood Education Journal, 41(5), 315–323. https://doi.org/10.1007/s10643-013-0579-4