Scientific Method in Early Childhood Curriculum Article Review

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Introduction and Article Focus

Hope K. Gerde, Rachel E. Schachter, and Barbara A. Wasik's article "Using the Scientific Method to Guide Learning: An Integrated Approach to Early Childhood Curriculum" argues that scientific inquiry can organize learning across the preschool curriculum rather than remain a separate subject offered only during occasional experiments. The authors respond to a persistent problem: young children are naturally curious about objects, living things, weather, motion, and change, yet early childhood classrooms may devote limited time and confidence to science. Teachers may feel unprepared, lack materials, or assume that scientific reasoning is too advanced for children who are still developing language and self-regulation. The article's most valuable contribution is its presentation of inquiry as a flexible cycle of observing, questioning, predicting, investigating, interpreting, communicating, and asking new questions (Gerde et al., 2013). The scientific process is not a rigid seven-step recipe that every preschool activity must follow in order. Current Head Start guidance similarly explains that steps may occur repeatedly, simultaneously, or in different sequences (Head Start). Young children use scientific thinking when they compare which balls bounce, watch seeds change, notice shadows, test what floats, or revise an explanation after observing something unexpected. The teacher's role is to protect curiosity while helping children make observations more careful and ideas more communicable.

Early science learning matters because it develops more than factual knowledge. Observation requires sustained attention and descriptive language. Classification involves recognizing similarities, differences, and relevant categories. Prediction connects memory with possible outcomes. Investigation develops planning and persistence, while discussion requires children to listen, justify ideas, and revise them. These abilities support literacy, mathematics, executive function, and social learning. A child measuring plant growth uses numbers and comparison; a child drawing changes in a caterpillar uses representation and sequencing; a group deciding how to test a ramp negotiates language and rules. The article correctly rejects the idea that children must master reading before they can participate in science. Young learners investigate through bodies, senses, talk, drawings, objects, photographs, and teacher dictation. Science can actually create reasons to read and write. A class may consult a simple informational book after finding an insect, label a diagram, record the weather, or dictate a question for later research. Integration is strongest when the science question remains intellectually meaningful rather than when an activity is given a superficial science label (National Research Council).

Inquiry as a Flexible Process

The article's sequence begins with observation, but good inquiry often begins anywhere. A child's unexpected question may lead to observation; an accidental result may create a new prediction; a story may prompt a test. Teachers can model this flexibility by saying, "We thought the ice would melt faster in the shade. It did not. What should we look at next?" Revision should be treated as successful thinking rather than failure. Children learn that evidence can change an explanation and that adults do not always know the answer before an investigation begins. Hypotheses in early childhood are best framed as reasoned predictions, not miniature formal research statements. Asking "What do you think will happen, and why?" invites children to connect prior experience with a testable expectation. An experiment should compare conditions clearly enough for children to notice a pattern. If the class changes the type of soil, amount of water, container, sunlight, and seed at once, the result becomes difficult to interpret. Teachers can introduce the idea of changing one factor while keeping others similar without requiring technical vocabulary prematurely.

The Teacher's Role: Scaffolding without Controlling

Teachers need content knowledge and pedagogical judgment, but effective inquiry does not require delivering every fact before children explore. The teacher prepares safe materials, notices children's ideas, asks questions, introduces useful vocabulary, records thinking, and helps compare evidence. Questions such as "What did you notice?" and "How could we find out?" are usually more productive than questions with one obvious answer. At the same time, open-ended instruction should not become passive supervision. Children benefit when adults draw attention to important features and correct serious misconceptions sensitively. Scaffolding should match the learner. One child may need a model of how to use a dropper; another may need a challenge to measure more precisely; a multilingual child may communicate through gesture and home-language vocabulary before using English terms. Teachers can provide sentence frames, visual sequences, paired discussion, and repeated opportunities. The goal is not to make every child produce the same answer but to increase access to the shared investigation. Documentation helps the teacher see whether participation is distributed or whether the most verbal children dominate (National Association for the Education of Young Children).

Integrating Science with Language, Mathematics, and Play

Science integration works when other domains support the investigation. During a study of ramps, children can compare distance, count blocks used to change height, draw designs, tell stories about vehicles, and negotiate turns. During a garden study, they can measure growth, identify patterns, read informational texts, observe insects, and discuss what living things need. These activities are not separate worksheets attached to one theme; they emerge from a sustained question that gives skills a purpose. Play is central because it permits repeated testing without making every trial feel like evaluation. Water tables, blocks, sand, loose parts, outdoor areas, and dramatic play can become sites of inquiry. However, the claim that all play automatically produces science learning would be too broad. Learning becomes more visible when teachers observe, extend vocabulary, introduce a new material, or revisit a pattern during group discussion. Children need time to explore freely and moments when an adult helps transform experience into an idea that can be remembered and applied.

Equity, Culture, and Access to Scientific Learning

The article identifies teacher confidence and resources as barriers, but equity deserves deeper attention. Schools serving low-income communities may have fewer materials, unstable staffing, larger groups, or limited outdoor space. Expensive commercial kits are not the only solution. Everyday objects—containers, shadows, leaves, water, fabric, magnets, kitchen tools, recycled materials—can support strong inquiry when teachers have planning time and professional learning. Safety and accessibility must guide selection, particularly for children who mouth objects, have allergies, or use mobility or sensory supports. Culture also shapes which questions are familiar and how knowledge is communicated. Families possess expertise about cooking, farming, weather, animals, repair, health, crafts, and local environments. Inviting this knowledge makes science more connected and avoids presenting it as a collection of discoveries made only by distant specialists. Teachers should not use family traditions as decoration or treat cultural explanations as immune from evidence. Respectful curriculum allows children to compare observations, learn how scientific claims are tested, and recognize that communities have long developed systematic knowledge of their environments. Early science assessment should examine process as well as correct answers. A child may show development by making a more detailed observation, explaining a prediction, using a tool safely, comparing results, or revising an idea. Teachers can collect photographs, drawings, transcripts, checklists, and samples of collaborative work. Documentation should inform the next experience rather than become a display created mainly for adults. If children repeatedly notice that some objects sink, the teacher might introduce material, shape, or trapped air as the next focus. Assessment should avoid turning inquiry into a performance test. Young children's language, attention, confidence, and familiarity vary from day to day. One observation cannot establish scientific ability. Teachers should look across situations and provide multiple ways to communicate understanding. Documentation can also expose instructional problems: if children are following directions without making decisions, the activity may demonstrate a result but offer little inquiry. A visually impressive experiment is not necessarily an intellectually strong one.

Evaluation of the Article

The article is persuasive in showing that the scientific method can serve as an organizing framework and that science supports broad school-readiness goals. Its practical examples help teachers move from abstract endorsement of inquiry to classroom action. It also treats children as capable thinkers rather than empty recipients of facts. The framework is especially useful for teachers who need a clear entry point into science planning. Its limitations arise when a clean sequence risks being interpreted too rigidly or when "integration" is assumed to solve constraints that require institutional support. Teachers need preparation in science content, child development, inclusion, and assessment. They also need time, materials, manageable group sizes, and leadership that values inquiry. Current guidance improves the framework by emphasizing that scientific steps need not occur once or in order. The article should therefore be used as a flexible planning tool, not a script. In my future classroom, I would build several-week investigations from children's questions rather than schedule isolated demonstrations. If children become interested in puddles, we could observe where water collects, compare surfaces, mark changes over time, test absorption, and discuss evaporation. I would record predictions before testing and return to them afterward without rewarding only the "correct" guess. Books and expert sources would be introduced when they help answer a question, not used to close inquiry before children have observed. I would also plan for inclusion from the beginning. Materials would be reachable, instructions would be shown visually, home languages would be welcomed, and children could communicate through speech, drawing, objects, movement, or assistive systems. Family members could contribute relevant knowledge. My role would be to maintain safety and intellectual focus while resisting the urge to control every result. The success of the curriculum would be measured by children's growing ability to notice, wonder, test, explain, and continue asking questions.

Conclusion

Gerde, Schachter, and Wasik provide a valuable account of scientific inquiry as a foundation for integrated early childhood learning. Observation, questioning, prediction, investigation, analysis, communication, and new questions support science while strengthening language, mathematics, collaboration, and self-regulation. These processes should remain flexible and appropriate to young children rather than imitate a rigid laboratory report. Strong early science requires curious children, responsive teachers, accessible materials, sustained time, and a classroom culture in which changing one's mind is evidence of learning. The article offers a useful framework, but its implementation depends on teacher knowledge, equity, cultural responsiveness, and thoughtful assessment. Science education in preschool is not preparation for "real science" later. It is already scientific participation when children investigate the world with increasing care and share reasons for what they think.

References

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