WHAT WE KNOW ABOUT IMPROVING SCIENCE TEACHING

Early childhood teachers may need support to feel comfortable teaching science, largely because of their own experiences learning about science. Training should focus on giving teachers the language and content knowledge to feel confident about teaching science and to have conversations with children about science topics.

Supporting teachers in using a research-based curriculum

Some science curricula for early childhood seem creative and effective, but many are not based on current research. For guidance on choosing an effective preschool curriculum that promotes school readiness, go to Choosing a Preschool Curriculum. Another resource is the Curriculum, Assessment and the Head Start Framework: An Alignment Review Tool, which programs can use to check whether curriculum and assessments align with Head Start domains.

To successfully use a high-quality science curriculum, teachers may need help to understand scientific concepts, developmentally appropriate science practices, and young children's science development. Teachers who receive ongoing training that focuses on scientific inquiry use effective strategies more frequently. Professional development should also address improving fidelity of implementation of the curriculum in use.

The National Research Council has recommended that curriculum be developed so that teachers without a lot of background information or experience can implement it successfully. One way to do this is to use curriculum with professional development support included within it. Such support could include suggestions about language to use, additional related activities to do throughout the school day, and ways to modify activities for all learners.

Other ways to improve science teaching

Professional development in the area of science should focus on helping teachers learn science skills and knowledge over an extended period so they can support children in scientific inquiry. This approach should include opportunities for teachers to pursue hands-on investigations and discuss strategies within the context of a learning community. Teachers also need strategies to help children communicate about science through conversations and models.

Trainers should view professional development as a joint problem-solving opportunity to help teachers build deeper understandings about effective science teaching. Teachers will improve practices when changes align with their personal concerns and if they receive enough support. Training should also focus on the potential impact that science learning can have on children's abilities and motivation.

Teachers should have many opportunities to use new information and practice skills in their classrooms. To master new practices, teachers need support from program administrators and colleagues in an environment that allows honest discussion, time for reflection, and opportunities to experiment.

Other effective professional development practices include opportunities for early childhood teachers to:

- Receive continued on-site support.
- Express their professional development needs in the area of science teaching.
- Review video clips of effective practices in science teaching.
- Collaborate on planning and assessment for science activities in their classrooms.
- Collect evidence of children's inquiry.
- Receive coaching.
- Record and review their teaching practices.
- Practice assessing children's science learning.

For more information on effective coaching practices, see the National Center on Quality Teaching and Learning (NCQTL) web page on Practice-Based Coaching.

KEY REFERENCES

Improving Science Teaching

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This chapter talks about the need to improve early childhood science teaching and gives recommendations about ways to do that.

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This article notes that despite the considerable interest in early childhood science education, there is little research about effective practices. One study shows that Head Start children end their preschool years with lower school readiness scores in science than in other domains. Another study identifies early childhood teachers' lack of confidence in their science and time management abilities as possible barriers to their success in teaching science.

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Professional Development to Improve Preschool Science

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Howes, C., Hamre, B. K., & Pianta, R. C. (2012). *Effective early childhood professional development: Improving teacher practice and child outcomes.* Baltimore, MD: Paul H. Brookes Publishing Co.

This book discusses current findings on effective professional development practices for early childhood teachers.

Education Development Center. (nd.) Teachers Learning in Science. *Foundations of Science Literacy.* Retrieved from http://foundationsofscienceliteracy.org/why-science-in-pre-k/teachers-learning-in-science/

This web page talks about ways to deliver professional development to early childhood teachers so they can provide engaging early childhood science experiences.

For more information, contact us at: **NCQTL@UW.EDU** or **877-731-0764**

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