Math and Science in Preschool: Policies and Practice

by Kimberly Brenneman, Judi Stevenson-Boyd and Ellen C. Frede

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Connections Among Literacy, Mathematics, and Science

As researchers continue to explore the importance of specific science and math experiences and skills for school readiness and later achievement, we already know that early math and science experiences matter because they can support language and literacy development, independent of any effect on later math and science achievement.

Science and math interactions support vocabulary development by exposing children to a variety of new words in meaningful contexts. The practices of math and science are described using verbs such as observe, predict, estimate, sort, experiment, and so on. As children engage in these practices, they learn new nouns to label what they are observing—chrysalis, roots, seed pods, parallelogram—and use adjectives to describe attributes— sticky, dirty, roundish, pointy, more than, and less than. Research suggests that exposure to uncommon vocabulary words predicts vocabulary development, which predicts reading achievement, [26] and that participation in sustained science experiences results in vocabulary gains for preschoolers. [27]

Conversations about objects that are not present or events in the past or future support the development of abstract reasoning and are related to literacy skills. [28] Such conversations often occur in the context of a science activity when children make predictions and plan explorations. [29] Children who are asked, "What should we do to find out?" must use language to describe a plan for the future. When they are asked, "What will happen if…?" or "Why do you think seeds need water to sprout?," they are required to reason and talk about objects, events, and changes that they have not yet experienced. [30] Similarly, explaining results and their causes supports the use of complex grammatical structures such as embedded clauses and prepositional phrases. Children's growing science content knowledge and their developing language skills mutually reinforce each other. [31] Encouraging children to talk about their observations, thoughts, and reasoning as part of mathematical and scientific play helps them develop not just their facility with the language of mathematics, but also more general communication skills and their awareness of their own thinking. [32]

Math and science explorations can be used to support literacy development. The content of fiction and nonfiction books can be scientific or mathematical and can serve as the basis for extended conversations between children and adults around key science and math content and ideas. [33] When teachers create science charts to record children's observations, predictions, and explanations of results, they illustrate the links between spoken and written language and support growing print concepts. Producing simple graphs, recording numerical data on charts, and documenting how math problems were solved encourages children to use numerals or other symbols that represent number. Science journals can also be successfully incorporated into preschool activities as tools for supporting the growth of both science and literacy skills. A rich language interaction occurs as children watch their ideas and words translated into print as a teacher transcribes what children have to say about their entry. Recording in journals also provides opportunities for children to practice their own growing printing and spelling skills. [34]

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