A tree at bedtime investigation: Connecting mathematics, science, and literature

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Main content

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When children experience mathematics and science in ways that relate to their own day-to-day lives, meaningful learning takes place. From simple concept books to more elaborate informational books, many books present mathematics and science concepts that children see in their own world. Children can build new knowledge or expand their existing understanding; they can refine and reorganize what they already know; and they can make connections among the concepts as they learn more about them (Columba, Kim, & Moe, 2005).

Seymour Papert (1980), who created the computer language Logo, said, "Children learn by doing and by thinking about what they do." Children are actively engaged when classroom learning focuses on discovering patterns and relationships, solving problems, connecting to real-life situations and authentic problems, and reasoning skills (Pang & Good, 2000).

Activities that promote "active thinking" help children learn mathematics and science by allowing them to work at forming relationships, making connections, and integrating concepts and procedures. Dynamic and exciting children's books invite and motivate children to learn mathematics and science by responding to stories, characters, and their experiences.

According to the National Research Council (NRC, 1996), inquiry is the "shifting (of) emphasis from teachers presenting information ... to students learning science through active involvement." This type of learning requires imagination as students figure out the inner workings of our world and its myriad connections. Quality children's literature is the ingredient that nurtures children's imaginations and fosters its growth (Columba et al., 2005).

Standards and Expectations

An investigation using Hush-a-bye Babies (Slingsby, 2001) directly connects to the National Science Education Standards (NRC, 1996) for Life Science, PreK-2. The primary focus is on understanding the meaning of environment and habitat--more specifically, how habitat and environment differ for different living things. The overall goal is to encourage the use of higher level thinking skills (synthesis, analysis, and evaluation). The students will be creating homes for different animals in a tree environment and discussing animals that are active during the day and those that are active at night. In their Investigation Record (Appendix B), the students will record how a tree can be a home for animals. The National Council of Teachers of Mathematics (NCTM) Standards (2000) for Measurement (specifically, for telling time) also align with this investigation. The students will record in the Investigation Record (Appendix B) what time they go to bed and draw the hands on the clock. Teachers can adapt the activities to better match their students’ strengths and the local curriculum.

Materials

An illustration of a tree or Tree...

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Using literature as a springboard for mathematical investigation is a useful tool that teachers can use to introduce problem solving situations that could have “messy” results. Such connections help students develop an understanding of the academic vocabulary required to “do mathematics” and connect the language of mathematical ideas with numerical representations. Sharing mathematical ideas. It is essential that students have the opportunity to discuss mathematics with one another, refining and critiquing each other’s ideas and understandings. Scientists might use a variety of strategies to calculate p-values for hypotheses at different levels to maximize power, or they might rely on the p-values for the ner-scale hypotheses and obtain the remainder with combination rules. The latter situation, for example, is In our theory and simulations, aiming at a general purpose rule, we emphasize the case where each parent hypothesis is the intersection of all its children, and the p-values for the Level − 1 hypotheses are derived using Simes method [26] on the p-values of the family of hypotheses they index at Level , starting from the available valid Level-L p-values. There were at that time several computer science texts containing a chapter or two on strings, usually devoted to a rigorous treatment of Knuth-Morris-Pratt and a cursory treatment of Boyer-Moore, and possibly an elementary discussion of matching with errors. There were also some good survey papers that had a somewhat wider scope but didn’t treat their topics in much depth. I connect theoretical results from computer science on sublinear-time algorithms with widely used methods for biological database search. ular Biology, and The DIMACS Center for Discrete Mathematics and Computer Science special year on computational biology, for support of my work and the work of my students and postdoctoral researchers.