

## **Intellectual Engagement**

Research on learning suggests that effective lessons include meaningful experiences that engage students intellectually with important science content. The mode of learning may vary, as long as students have opportunities to engage with appropriate phenomena, investigate meaningful questions, and explicitly consider new experiences and knowledge in light of their prior conceptions. The important consideration is that lessons engage students in doing the intellectual work. It is not enough simply to provide students with an interesting hands-on experience that does not connect to learning goals, such as building and flying paper airplanes with no discussion of the forces involved in flight. Although such an activity may be successful at piquing students' interest in science, it is unlikely to teach important ideas if it does not focus on a meaningful question. Classroom activities must be explicitly linked to learning goals so that students understand the purpose of the instruction and feel motivated to engage with the ideas, not just the materials (White and Gunstone, 1992).

Banilower, E., Cohen, K., Pasley, J. & Weiss, I. (2008). *Effective science instruction: What does research tell us?* Portsmouth, NH: RMC Research Corporation, Center on Instruction.

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