Three-Dimensional Teaching and Learning

By Elizabeth Barrett-Zahn

At its foundational level, three-dimensional teaching and learning is the interweaving of the disciplinary core ideas (DCIs), science and engineering practices (SEPs), and crosscutting concepts (CCCs). But what does that mean for classroom planning and instruction? Some teachers view the formatted three-column listings as discreet categories. They don’t see the interconnectedness of the components or the value of intertwining the elements as they plan and implement lessons. One of the most important starting points when implementing three-dimensional teaching and learning is the placement of students within the learning environment. Are students the drivers of the learning, or are they passive recipients of a well-crafted lesson focusing on content and practice?

Recently on Twitter, I saw a post where a teacher shared frustration with a three-dimensional teaching focus. In essence, they stated that if we are hung up on the DCIs, SEPs, and CCCs alone, we may lose sight of the importance of allowing students to lead the learning. Instead, our emphasis should be on students creating meaning and developing understandings as they grow as learners. Creating learning situations to promote student agency and voice allows students space to puzzle through problems, look for alternatives, and evaluate processes and outcomes. Essentially students become scientists and engineers through sensemaking and student-led problem-solving.

Three-dimensional teaching is more than checking off a box in each color-coded column; it’s about guiding the learning pathways so that students can grapple with real-world issues, complex ideas, and multi-dimensional problems. This sets the stage for wonder, engagement, and empowerment, including social justice.

Incorporating three-dimensional learning into your classroom allows space for creativity, collaboration, and teamwork—these 21st-century skills are essential for our future workforce in solving global issues. It also promotes agency and voice, as students can investigate topics and problems that affect their world. When engaged in real-world issues, students have the opportunities to share divergent pathways, engage in meaningful discussions, and employ empathy to solutions.

Three-dimensional learning also seamlessly connects with the learning requirements of language arts and mathematics. With science and engineering as the focal point, teachers can embed appropriate language arts and mathematics standards in meaningful and memorable ways. When young learners are engaged in sensemaking, they have a reason to read, write, speak, listen, and employ mathematical reasoning and strategies.

In this issue of Science and Children, we focus on how teachers plan for and implement three-dimensional lessons for a wide variety of topics for all grades. Look for the common theme threaded through all the articles in providing opportunities for students to experience science and engineering “as” scientists and engineers through sensemaking and student-led inquiries.