# Science + Movement = Increased Learning

"I believe all students benefit from movement during science lessons because it promotes full participation, active engagement, and retention of new ideas. I notice an improvement in building connections between concepts and recall when students are moving," maintains Ann Kennedy, fourth-grade teacher at Robert Crown School in Wauconda, Illinois. "Throughout all of our science topics, I find ways to get students moving and thinking on their feet!"

Kennedy says she regularly incorporates movement into her science lessons "to engage students with disciplinary core ideas." Her students "often act out concepts (such as particle movement in a solid, liquid, or gas). We use physical cues or gestures to build connections with academic vocabulary," she explains, adding, "I frequently have students use movement to act out academic vocabulary. This activates memory about the meaning of a new term or concept."

When she added movement to a lesson about positive and negative charges, for example, she says she "noticed that students had a better understanding. We used hand-claps to show how opposite charges attract and like charges repel. By saying 'negative, negative' or 'positive, positive,' students would separate their hands, and with 'positive, negative,' students clapped their hands. The repetition of this activity reinforced the concept while generating enthusiasm. In fact, students requested that we review this particular topic because they were excited to show what they learned using the movement activity!"

In lessons about the Periodic Table, Kennedy uses movement "to help students identify and understand the organization of the elements. Each student will be assigned an element and will record the symbol, name, and atomic number from the Periodic Table on an index card. The student will then 'represent' that element as I guide the class through a movement activity," she relates.

"For instance, students with an element that is a non-metal may be asked


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*Students in Trudi Spencer's physical education lab at Sonora Middle School in Springdale, Arkansas, read and study while using fitness equipment.*

to stand. All of the elements in the second period may be asked to march in place, and so on. Through this lesson, students actively participate in using the Periodic Table to locate elements while developing an understanding of how the elements are classified," she contends.

"Since we all learn differently, I feel that movement is another tool to support a variety of learning needs," she observes. "Along with using visuals, language arts connections, and technology, movement adds another dimension, to the benefit of all. Some students, such as English Language Learners, may especially benefit."

Though Kennedy allows that "adding movement can be a challenge when time is limited," she believes "using even three minutes of movement during a lesson can provide the stimulus for a deeper understanding." She also encourages science teachers to work with their students' physical education (PE) teacher: "I think many crosscutting concepts could be modeled in large spaces by using the gym or playground. Coordinating with the students' [PE] teacher could provide a great extension to a lesson to further reinforce core ideas."

## Action Based Learning

Trudi Spencer, PE/Health Department Head at Sonora Middle School in Springdale, Arkansas, would agree with Kennedy. "I work with our science teachers, and we review content that they are learning in class," she reports. "I check with the math and science teachers to see what the students need."

Spencer has received training in Action Based Learning (ABL), a program of kinesthetic teaching strategies for teaching specific academic concepts (see *http://abllab.com*). She points out that "85% of people are kinesthetic learners. It's hard [for them] to just sit and listen to the teacher." And with many of Sonora's students living in poverty and "far behind in their classes, I wanted to make [learning] more creative and fun for [them] and improve their knowledge and health," she asserts. Data showing ABL's success convinced her school's teachers and instructional facilitators that it was worth a try, she observes.

In her lab, Spencer has 22 stations with treadmills, elliptical machines, recumbent bicycles, and other fitness equipment that has been modified to hold books and other written materials. The equipment, developed by Kidsfit (*www.youthfit.com*) for use with ABL, allows students to read and study "a small passage of text, science or social studies vocabulary words and articles, math problems," and other content, she explains, adding that classroom teachers often give her the vocabulary words at the beginning of a unit so students can become familiar with them in advance.

Having movement "brain breaks" before learning new material "makes the brain ready to learn," she contends, and "the movement helps them remember it." As students use the equipment, "I help them review what they've been learning" by asking them to reflect on what they have learned and discuss the projects they're working on, she explains.

In one of her success stories, three weeks after starting ABL, a student known for misbehaving and having trouble keeping up with his peers has now "caught up in class and has no discipline problems. He can do what he is assigned to do," she reports.

"ABL isn't really new. Sometimes we forget about what worked before. Running and playing is how they become better students," she maintains.

## Gaming and STEM

Sandy Slade—creator of Skillastics®, a fitness and learning program—says the demand for PE teachers to integrate academics and physical activity is increasing. She developed STEM Skillastics (*https://goo.gl/NQlzoV*) for grades 3–6 because "it's important to get students interested in [science, technology, engineering, and math]. STEM takes time [to teach and learn], so integrating STEM and movement can spark kids' interest" early on, she contends.

In STEM Skillastics, student teams do physical activities such as toe-taps, leg swings, and heelwalking that coordinate with cards featuring general STEM knowledge questions for them to answer. Questions include What is the largest planet in our solar system? (science); Which state-of-the-art computer technology trains pilots? (technology); What type of bridge is San Francisco's Golden Gate Bridge? (engineering); and Which of the following figures doesn't have four sides? (math).

Slade says she researched the questions and had experts—including teachers around the country—review them. "I looked at the *Next Generation Science Standards* and tried to complement them," she explains. The game aligns with national PE standards and after-school Healthy Eating and Physical Activity Guidelines.

She emphasizes that "in a positive, non-competitive environment, students of all abilities can enjoy STEM Skillastics, not just the athletic students." On the student teams, "every child has the opportunity to be the team leader, and the teams work independently of one another." Because of this, the game has become "very popular with 21st-century learning organizations," she contends.

STEM teachers are using the game as "a brain-break in class," and it is used widely in after-school programs, Slade reports. It can be played in "a variety of environments," including outdoors, she notes.

Slade observes that "being an athlete, I was more interested in going outside and playing. This type of learning would have been much more interesting to me. My motivation is to spark that interest in STEM in athletic kids who may also have a STEM skill." ●