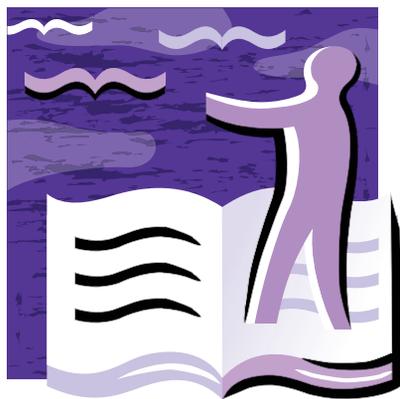


Representing Knowledge Nonlinguistically

Students have plenty of opportunities to process information linguistically: They listen to teachers explain content, and they read and write about content. They have fewer opportunities in school, however, to process information nonlinguistically, even though educators have known for some time that the human mind processes incoming information in these two primary modes (Paivio, 1990). Because the linguistic mode does not necessarily involve formal rules of language, this kind of processing is technically referred to as *semantic*.



The second mode of processing involves constructing images of incoming information. Images can refer not only to mental pictures but also to smells, tastes, and kinesthetic sensations, such as how

hot or cold something feels. Because this mode of processing goes beyond visual imagery, we refer to it more broadly as *nonlinguistic*.

Nonlinguistic strategies require students to generate a representation of new information that does not rely on language. In the hundreds of action research projects that we have conducted with teachers throughout the years, this approach is one of the most commonly studied. Specifically, across 129 studies in which teachers used nonlinguistic strategies—such as graphic organizers, sketches, and pictographs—with one class but not with another class studying the same content, the average effect was a 17 percentile point gain in student achievement (Haystead & Marzano, 2009).

Five Points to Keep in Mind

As with all strategies, the overall effect on student achievement does not tell the whole

story. We have identified five important characteristics of nonlinguistic representations that teachers should consider.

1. Nonlinguistic representations come in many forms. There are many ways to represent information nonlinguistically. These include graphic organizers, sketches, pictographs (stick figures

Creating nonlinguistic representations requires students to think about the content in new ways.

and symbols), concept maps, dramatizations, flowcharts, and computerized simulations, to name a few. The type of representation selected is a function of the type of content addressed and the amount of time available.

For example, a teacher might decide that it makes more sense for students to design a flowchart to describe the process of balancing an equation than to make a graphic organizer of the process or physically act the process out. On the other hand, a graphic organizer probably makes more sense for a concept with several defining characteristics. For example, to represent the term *anarchy*, a student might draw a circle containing the term *anarchy* and add spokes emanating from this hub that he or she labels with different defining characteristics.

2. Nonlinguistic representations must identify crucial information. Nonlinguistic representations that fail to focus on crucial information

can have little or no positive effect on student learning. For example, to highlight important information in a story the class is reading, an elementary teacher might ask students to draw a pictograph that illustrates the action. However, if a student draws a pictograph that represents the main characters—but not the central actions that occurred among those characters—the representation will not add much to that student's understanding of the plot.

A social studies teacher might ask students to dramatize significant events of Pickett's Charge at the Battle of Gettysburg. However, if students' dramatizations don't include important information—such as the fact that this encounter was a turning point in the U.S. Civil War—the representation will not have advanced their learning.

3. Students should explain their non-linguistic representations. Creating a nonlinguistic representation helps students deepen their understanding because it requires them to think about the content in new ways. Asking students to explain their representations promotes even greater understanding.

For example, the teacher might ask students in a middle school science class to create a nonlinguistic representation of their current understanding of the concept of percolation—the movement and filtering of fluids through porous material. One student might draw a picture, another might create a pictograph, and a third might generate a flowchart. Each of these representations will add to their creator's understanding.

The teacher would then ask students

to display their nonlinguistic representations and explain them to the class. Students would need to clarify any symbols or images they included. For example, if a student uses the symbol of a skeleton in a pictographic representation of Napoleon's advance on Russia in 1812, the student would need to explain that the skeleton represents the fact that many French soldiers died of malnutrition along the Russian front because they could not get supplies quickly enough.

Interactions like these sometimes help disclose errors or missing elements in students' understanding. When the student explains the lack of supplies across the Russian front, for instance, it might become clear that he or she is unaware of how harsh the Russian winter was—probably the most

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important factor in the demise of Napoleon's troops.

4. Nonlinguistic representations can take a lot of time. One of the biggest drawbacks to nonlinguistic representations is that they commonly require a great deal of time to construct and even more time to explain and defend. Consequently, when teachers plan for students to use nonlinguistic representations, they should allow for enough time to get the full effect. Because these representations are time-consuming, teachers should limit their use to crucial content.

5. Students should revise their representations when necessary. Nonlinguistic representations are a form of note taking in that they represent a

student's understanding of content at a specific point in time. If students have archived these representations in their notebooks or posted them on the bulletin board, they should review them for accuracy at a later date and alter them if needed.

For example, the science teacher focusing on percolation might post students' nonlinguistic representations. A few days later, the teacher might ask the students to revise their representations by correcting errors or adding or deleting information.

A Fresh Approach

Nonlinguistic representations are one of many powerful techniques available to classroom teachers. When used well, they can have a positive effect on student achievement and provide

diversity in the way that students process new information. 

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Robert J. Marzano is Cofounder and CEO of Marzano Research Laboratory in Denver, Colorado. He is the author of *The Art and Science of Teaching* (ASCD, 2007) and coauthor, with Mark W. Haystead, of *Making Standards Useful in the Classroom* (ASCD, 2008). To contact Marzano or participate in a study regarding a specific instructional strategy, visit www.marzanoresearch.com.

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