Research Based Strategies for the Classroom

Part # 6 - Nonlinguistic Representation

Introduction

All the senses come into play in learning. In most classrooms, however, reading and lectures dominate instruction, engaging students through the linguistic mode. Learners also acquire and retain knowledge nonlinguistically, through visual imagery, kinesthetic or whole-body modes, auditory experiences, and so forth. Teachers who wish to take advantage of all modes of learning will encourage students to make nonlinguistic representations of their thinking.

These can take many forms. When students make concept maps, idea webs, dramatizations, and other types of nonlinguistic representation, they are actively creating a model of their thinking. Computer simulations also encourage exploration and experimentation by allowing learners to manipulate their learning experience and visualize results. When students then explain their models, they are putting their thinking into words. This may lead to new questions and discussions, which will in turn promote deeper thinking and better understanding.

Key Research Findings

- Learners acquire and store knowledge in two primary ways: linguistic (by reading or hearing lectures), and nonlinguistic (through visual imagery, kinesthetic or whole-body modes, and so forth). The more students use both systems of representing knowledge, the better they are able to think about and recall what they have learned (Marzano, Pickering, & Pollock, 2001).
- Visual representations help students recognize how related topics connect (NCTM, 2000).
- Finding patterns helps students organize their ideas so that they can later recall and apply what they have learned. Research has shown an increase in understanding of geometry when students learn to represent and visualize three-dimensional forms (Bransford et al., 1999; Lehrer & Chazen, 1998).
- After brainstorming to generate ideas, students can improve their reading, writing, and thinking skills by using thinking maps to help them organize key concepts in a visual way (Hyerle, 1996).
- Using visual representation software in a science classroom helps students express their developing understanding of core chemistry concepts in the form of visual representations that are readily created and shared. These representations help students generate explanations of the phenomena they are investigating. (Michalchik, V., Rosenquist, A., Kozma, R., Kreikemeier, P., Schank, P., & Coppola, B., in press)

Implementation

Helping students understand and represent knowledge nonlinguistically is the most under-used instructional strategy (Marzano et al., 2001). Taking advantage of this teaching tool requires focusing on current classroom practice and looking for opportunities to engage students in multiple modes. Research suggests best practices for instruction:

1. Model use of new tools. Activities that involve nonlinguistic representation may be new to students who are accustomed to learning through lectures and readings. Scaffold student learning as you introduce activities such as concept maps, idea webs, and computer simulations by modeling how to use tools that help them represent their thinking nonverbally. Gradually remove the scaffolds so students eventually work independently with the new tool or technology.

2. Use nonlinguistic modes in the content areas. Math and science classrooms offer ideal settings for incorporating nonlinguistic learning experiences. Language arts classrooms provide natural connections from classifying words to modeling plotlines. Models, graphs, imagery, and other tools enable students to engage in actively constructing representations of their understanding.

3. Foster cooperative learning. Encourage students to work in small teams when they are constructing nonlinguistic representations. Students' questions and discussions will help them communicate and refine their thinking.

4. Teach interpretation of nonlinguistic forms also. Finding patterns helps students organize their ideas so that they can later recall and apply what they have learned. Teach students to represent and interpret information in graphs, charts, maps, and other formats that will help them see patterns and make connections.

5. Simulations offer new modes for learning. Use simulation software or online simulations to let students practice making predictions and testing outcomes. Combine nonlinguistic experimentation with verbal discussion, which prompt students to think through their understanding and raise new questions.

6. Stimulate body-mind connections. Kinesthetic learning is not just for primary grades. Older students continue to learn through physical activities. Incorporate dramatizations, dance, music, simulations, and other active learning experiences.

7. Integrate nonlinguistic forms into note-taking. Encourage students to take notes that are meaningful to them. Model use of sketches, graphs, and symbols.

Additional Resources

The ***Council for Exceptional Children*** provides a bibliography and resources about graphic organizers. http://www.ericec.org/minibibs/eb21.html

Carleton College publishes a Web site about teaching with visualization. http://serc.carleton.edu/NAGTWorkshops/visualization/index.html

ESRI maintains a variety of Web resources to support the use of global information systems (GIS) in the K-12 classroom, including case studies about schools that have used mapping software to support student learning. http://www.esri.com/industries/k-12/