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Making Good Decisions About Instructional Strategies

Expert teachers generally are comfortable with a wide range of instructional strategies, and they vary them skillfully with the nature of the learning task and learners' needs.

—Berliner, "In Pursuit of the Expert Pedagogue"

Tomlinson (1999) talks about a classroom where the needs of all students are met. She says that in that classroom, teachers use instructional practices "to create classrooms where students have the opportunity to work at a comfortable pace, at an individually challenging degree of difficulty, in a learning mode that is a good match for their learning profiles, and with applications that are personally intriguing."

Much is said about the alignment of curriculum to assessment, but little is written about the alignment of instructional strategies to curriculum and assessment. How can we make informed decisions about how to teach in the most effective way? Once we know the standards, the benchmarks for our subject/grade level, and our own objectives, how do we decide which instructional strategies will make the most difference in student learning? In the past, this has often been a hit-or-miss proposition, but we now have research to make better decisions about how to teach. Ask, "What is it that you want to accomplish with the instruction? Which skills and processes do students need to be able to carry out?" In my book, *What Every Teacher Should Know About Instructional Planning* (2004a), I talk about how to plan lessons around standards—both state standards and teacher standards—identified as objectives. In this book, I will talk about putting together a bag of strategies for teaching that ensures students learn and remember and that is directly aligned with the state and national standards.

Once the standards are identified, teachers develop declarative objectives that state the expectation in terms of what students will know as a result of the learning, and procedural objectives that identify what students will be able to do with the learning. For example, for a lesson in literature on O'Henry's short story, "After Twenty Years," my declarative objectives might look something like this:

Students will know (declarative objectives):

1. The vocabulary associated with the story.
2. The choices available to both characters.
3. The character traits of the two main characters that influenced their decisions.
4. The steps that we go through in making choices.
5. The concept of cause and effect.
6. Ways O'Henry uses suspense effectively.

All of these objectives are factual in nature and are stored in long-term memory in a different pathway than the procedural objectives. Thus, they are taught in a different way than procedural objectives. The procedural objectives for the same lesson might look like this:

Students will be able to (procedural objectives):

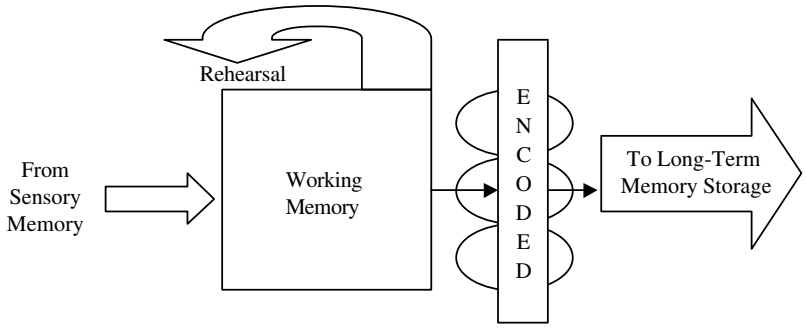
1. Develop a graphic model that shows cause and effect.
2. Use a graphic model to determine which choices they would make in the same situation as the main characters.
3. Write a character sketch about one of the characters.
4. Use logic and analysis to determine if the two characters are good friends.
5. Write a second ending to the story.

In the second set of objectives, students must actively do something with the declarative information. They are demonstrating understanding through processes, which are stored in a different pathway of the brain than factual information. Note that students need both types of objectives. Without the declarative objectives, the procedural objectives would be impossible to achieve, and without the procedural objectives, the declarative objectives would lead to shallow learning.

How Do We Implement the Objectives?

The "how" of teaching, then, relies on what the classroom teacher wants to accomplish with the learning. For example, if the purpose of the learning is to help students understand and be able to use vocabulary for a given unit of study, the declarative objectives would be written so that it is clear that students will not only be familiar with the vocabulary words and their meaning but will be able to use those vocabulary words in the context of the unit of study. Research shows that students are more likely to understand vocabulary words

Figure 1.1 Diagram of New Information From Sensory Data to Long-Term Memory



when these are taught using specific techniques. We will look at both the general categories of teaching and the specific teaching strategies that help us to reach learner goals.

Why the Way We Teach Is Important

In order to have a clearer understanding of the thinking systems—the self-system, the metacognitive system, and the cognitive system—it is necessary to look at the modalities that affect the way we teach and the way students learn.

About 99% of all we learn comes to us through the senses. The brain takes about 15 seconds, or less, to decide what to pay attention to and what to discard. Approximately 98% of the information coming through the senses is discarded. That means that 98% of the information going to your students in the form of words, pictures, smells, tastes, and touch is lost. No wonder they don't remember! The illustration Figure 1.1 shows, in a simplistic format, information coming into the brain.

What happens to this incoming sensory information during those 15 seconds is critical to how the brain processes the information and whether it is sent to storage systems in long-term memory. How we introduce the information,

whether it is deemed to be important, and how we "rehearse" it are important indicators of whether the information will be stored and whether it can be easily accessed when needed. Rehearsal can be rote—that is, simply repeating it or doing it over and over so that it becomes automatic—or it can be active. Active rehearsal involves using the information in some way that is meaningful and useful. Some information and processes are learned better through rote rehearsal, and others are learned best through active rehearsal.

According to Marzano (1992) we should use rote rehearsal when the information will be used in the same format as the rehearsal, for example, multiplication facts. We use active rehearsal when it is important for students to be able to connect the information to other contexts. For example, when studying the Boston Tea Party, we want students to understand the reactions of people when they are not a part of the decision making process. We want them to understand this concept in many settings, not just as it applied to taxes placed on the colonists.

Prior to moving to long-term storage, the sensory information must be processed. There are three modalities responsible for processing the information and sending it to the appropriate storage pathway in long-term memory. This process is important because students may learn information but not be able to retrieve it easily, since it has not been encoded in a way that is appropriate for retrieval. For example, ELLs (English language learners) will have difficulty encoding information in the linguistic modality because they do not have sufficient vocabulary to encode the information into semantic memory, which is the memory pathway that stores words, facts, vocabulary, and so on. For these students the episodic pathway may be more appropriate because it includes context, pictures, and nonlinguistic methods of storage. How learning is processed or encoded determines where it will be stored. The three modalities actively involved in how information is stored are linguistic, nonlinguistic, and affective (Marzano, 1992).

The Linguistic Modality

Most of what is taught in school flows through the linguistic processor, which deals with speech and writing. The linguistic processor encodes this information into networks for storage in the brain. One of these networks is the declarative network, which contains information about events and the information that comes from the events. For example, students are taken on a field trip where a museum docent talks to them about the artifacts within the museum. The information is processed as linguistic, attached to the event of going to the museum.

The second network is the procedural network, which contains information needed to complete a process. For example, a math teacher provides students with the information needed to solve a problem and then gives them a problem to solve.

Think back to the information that was discussed about declarative and procedural objectives. Declarative objectives have to do with the "what" of learning. When those objectives are carried out in the linguistic modality, they are a part of the declarative network. The procedural objectives are carried out in the procedural network. Not all objectives are executed in the linguistic modality; two other examples of modalities follow.

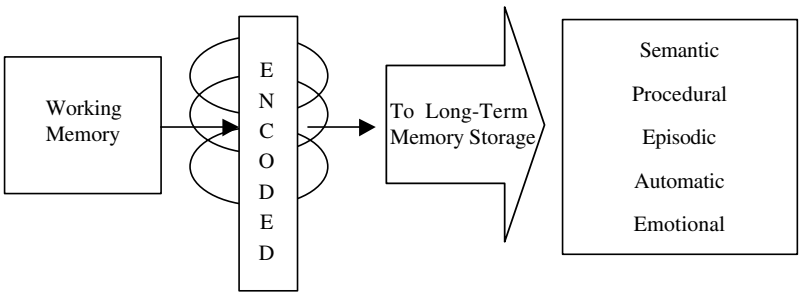
The Nonlinguistic Modality

This modality processes the experiences coming into the brain as "mental pictures, olfactory sensations (smell), kinesthetic sensations (touch), auditory sensations (sound), and taste sensations." Using graphic organizers is a powerful way that teachers help students encode information through this modality.

The Affective Modality

The affective modality encodes feelings and emotions. It has been said that emotion is the strongest influence on the brain.

Figure 1.2 The Memory Pathways



If a teacher adds strong emotion to any aspect of the teaching, students do seem to remember the information much longer. One of the reasons that most of us will remember forever where we were on September 11, 2001, is because of the strong emotional response we had to the event.

So far, we have discussed the sensory data coming into the brain, the fact that it must be rehearsed in some way, and, once rehearsed, how it is encoded for long-term storage. The model in Figure 1.2 shows graphically (in a nonlinguistic format) how the process works.

All information is not stored in the same place in the brain. Current research has revealed five pathways in which all we know is stored. There are probably more, but, to date, five have been identified.

Semantic Memory

This memory pathway holds facts, words, and lists. This is the memory pathway used most often in classrooms. It is also the least effective of all of the memory pathways, which is just one more reason why our students have so much difficulty recalling facts and pieces of information. The way this information is rehearsed is critical to storage and retrieval. The information must either be rehearsed repeatedly, or it must be stimulated by associations, by comparisons, or by similarities

(Sprenger, 1999). In order for the information to be processed and stored in this pathway, it must have a connector. The brain asks, "What do I already know that I can connect to the new learning?" This is why it is imperative that teachers introducing a new unit find a way to connect the new learning to something that the students already know. For example, an elementary teacher is introducing a unit on the explorers. Now, elementary students have not been on an expedition searching for new land, nor were they alive during time in which these groups of explorers were living. How, then, can the teacher connect the new learning to prior experiences or learning? She might take the students around the school on a scavenger hunt, looking for specific things or pieces of information. She might discuss this experience in light of what explorers do. She might ask students if they have been on a vacation or trip with their parents to a place they had not been before and discuss the new experiences. There are wonderful books available, such as *If You Had Been on the Mayflower,* that simulate the experience for students. These books could also offer a good beginning activity to build connectors for the brain. The Public Broadcasting System (PBS) Website provides wonderful pictures that can be downloaded to help students "see the learning."

Episodic Memory

This powerful memory system is sometimes called contextual or spatial memory. Just as these names imply, this memory system relies on context or where you learned the information. This is the memory system that allows us to remember events years after they take place—especially if there is a strong emotional response connected to the experience. A course that contains a great deal of semantic information, such as vocabulary, facts, dates, people, and the like, is strengthened by a teacher who uses context to help the learners embed the information in the episodic memory system rather than the semantic. For example, a teacher who teaches

a class in which students must learn a great deal of vocabulary can strengthen the memory just by color-coding the vocabulary sheets by topic or chapter. The color-coding gives the vocabulary a context. Building a story around the vocabulary is another way to help students remember the vocabulary. The story gives it context. Students who come to us from poverty, and especially the urban poor, learn best when the information is given a context. Like ELL students, the urban poor often lack the formal speech of the classroom and thus do not have the acquisition skills necessary to store information in a verbal format. A teacher in California who teaches anatomy shared with me how he helps his students build a context for the parts of the body and what they do by wrapping a story around the information. He tells his students a story about a man who gets caught in a snowdrift. He gets out of his car and tries to push it, but it won't budge. The man goes around to the front of the car and tries to pull it. Now, it is more difficult to pull a car than to push it; he is like the pulmonary artery. And so the story goes. He says that since he started using this technique, his students' ability to recall the information has greatly improved. This teacher has taken factual information that is usually stored in the semantic memory system (which is not very efficient at remembering) and given it a context (for procedural memory system, which is much more efficient at recall). Some other strategies to help students remember include:

- Put information up in the room so that it is visible to the learners. More than 80% of the learners in any given classroom are visual learners. Just having the information visible in the classroom helps these learners to remember.
- Give the learning a context through stories, color codes, pictures, music, and symbols. For example, I often use cardboard frames that say "Frames of Reference" when I want students to discuss or review information from different viewpoints. To teach a lesson on environment,

I might place students in groups so that each group has a frame. One frame might say politician, another might say new parent, and so on. Each group would be responsible for looking at environmental issues from the viewpoint of the person or persons they were assigned. The purpose of the frames is to give the information a context. On those days when a student cannot remember the answer to a question, just saying, "Remember it was on the frame for the factory owner" will usually provide the cue to the memory system for accurate recall.

Procedural Memory

Just as the name implies, this memory system deals with procedures or processes that the brain stores in the cerebellum once they become routine**.** Some examples of procedural memory include driving a car and shooting a basket. Once these processes are learned to the point of routine, we do not need to stop and go through the process in our mind before executing them. This memory deals with things the body does as physical activity.

Automatic Memory

Sometimes called "conditioned response" memory, this memory system is located in the cerebellum. According to Sprenger (1999), this memory system contains decoding skills and multiplication skills but not comprehension skills. It stores the skills that come automatically through repetition and use.

Emotional Memory

Emotional memory is the strongest of the brain's memory systems. Emotion has the power to make the memory stronger

or to shut down the other systems. This memory system is in the amygdala, which looks through all incoming information to determine if there is emotion. Margulies and Sylwester (1998) list the following as basic emotions: joy, fear, surprise, sadness, disgust, acceptance, anticipation, and anger. By adding emotion to the learning, the teacher helps to make the memory stronger.

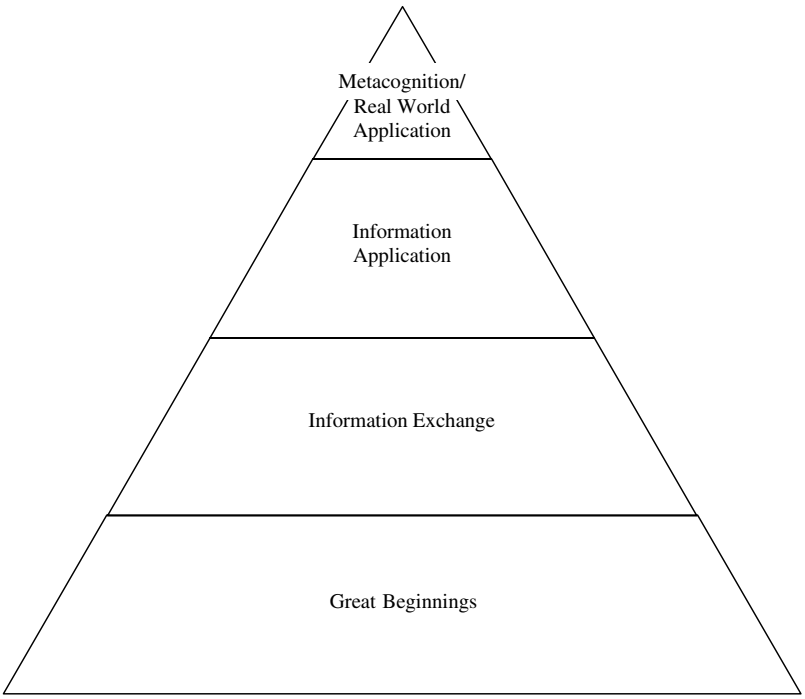
Throughout this book we will examine strategies that help the classroom teacher communicate learning objectives to students. For the purposes of this book, teaching strategies are "best practices" that provide the means and the way to link the systems of thinking to teaching. A teaching strategy might be a graphic organizer, a procedure (such as explicit instruction), or a method (such as cooperative learning).

Good teachers have a variety of teaching strategies at their disposal so they can monitor and adjust the teaching as needed and can reach all students. Using the brain research reported by Sprenger (2002), Tileston (2000), Jensen (1997), and Marzano (1998), teachers can make clearer decisions about how to teach the information before them. Figure 1.3 shows a plan for teaching that follows the way the brain learns and remembers. In the chapters to follow, we will look at each of the components of this plan in terms of implementation.

The base for the learning, called Great Beginnings, includes the establishment of a productive and positive learning climate, the structures in place at the beginning of class, and how the teacher introduces the lesson. This part of the lesson is especially critical because it is at this time that students make important decisions about their attitudes toward the learning. The self-system of the brain decides if the student will become actively involved in the learning and whether the student will have the motivation to begin new tasks. There are specific tactics that we can employ at this time to help activate the brain's natural intrinsic motivation.

The second level of the pyramid involves the declarative information needed in order to process and store the learning. Since factual information is the most difficult for students to

Figure 1.3 Learning Pyramid



retrieve from long-term storage, it is important to teach this information in a format that will help the brain to store and retrieve it more efficiently.

The third level of the pyramid takes place after the factual information (declarative objectives) has been presented. This level of the pyramid deals with the procedural objectives that enhance the ability of the student to use the information in context. The self-system and the metacognitive system of the brain are involved in helping students set personal goals for

the learning and in carrying out those goals even in the face of difficulty. The classroom teacher can use specific tactics at this time that will help facilitate this process.

The last level of the pyramid has to do with metacognition or processing and evaluating the learning. This is one of the most important steps of the learning process, yet it is often omitted in our hurried classrooms where we are trying to transmit so much information in a short period of time. By providing metacognition time for our students, we help them to identify what they know, how they know it, and what they can do with the information in a real-world context.

In the chapters that follow we will examine each of the levels of the pyramid and specific teaching strategies or tactics that can be employed to help students be successful from the beginning.