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Instructional Strategies for Student Success

JUST AS EACH LEARNER IS UNIQUE AND ONE SIZE DOESN'T FIT ALL, teachers realize that they need a wide repertoire of instructional strategies from which to pick and choose, adjust and modify. Taking a nip and tuck here and there in a garment is a beginning, but alterations are necessary if the garment is to fit comfortably and be wearable.

USING A VARIETY OF INSTRUCTIONAL STRATEGIES

Teachers need a vast amount of instructional strategies in order to teach information in a variety of ways. The key is to use the right strategy at the right time. Teachers are constantly gathering innovative ways to teach important information. Some favorite examples of these are visuals, graphic organizers, musical beats, mnemonics, processes, sequencing, seeking patterns, cubing, choice boards, and technology. Using stimulating hooks and intriguing closures with celebrations of successes are motivating strategies that entice learners.

After the information is taught, it is the student's time to be given an assignment to work with the material. Student engagement is the key! Vary the instructional strategies so that the learners never know what challenge they are going to encounter next. It takes personal ownership of the information for learning to happen. The instructional strategies and assignments must be timely, appropriate, and stimulating. Engagement is essential. One way to have success and motivate students is to give choices. The time is spent on an assignment that addresses the standard and is selected by the learner. Also, adjusting the assignment motivates a learner to complete a task because it is on a personal level of challenge and need.

BRAIN BASICS AND LEARNING

We know there are some things about the brain that are innate in all humans that impact how things operate in a classroom. Russian psychologist Lev Vygostky (1978) suggested a social development constructivist theory of learning on which many of the premises of differentiation are based.

1. Social interactions (teacher to student, student to student) foster learning.

2. To learn, one needs a more knowledgeable other (teacher, coach, or mentor).

3. Students will perform a task better and with more pleasure if the task is within reach and they have support from a more knowledgeable other. Understanding that every student is unique and has different "brain wiring" based on prior experience and background, the challenge must just exceed the skill level. This, Vygotsky suggests, is the *zone of proximal development*.

Pedagogy must be oriented not to the yesterday, but to the tomorrow of the child's development. Only then can it call to life in the process of education those processes of development which now lie in the zone of proximal development. (Vygotsky, 1993, pp. 251–252)

Although uniqueness is an issue, there are some things we know about how the brain works: It attends to new stimuli, processes information, and stores it in memory.

HOW THE BRAIN WORKS

Let us first examine the process so that we consider it as we think about differentiated instruction. One piece of vital information from brain research is that the brain continues to grow and thrive throughout life from external stimulation in the environment. Neural plasticity is the process of the brain growing and changing because of new learning opportunities. The brain actually grows dendrites (tree branch–like connections) between the neurons in response to environmental stimuli and multisensory enriched experiences (Diamond, 2001).

Brains change physically in classrooms where students are engaged in meaningful, stimulating experience and tasks. Information is taken into the brain by the senses; this usually is referred to as *sensory memory.* This is important for survival in the environment. It lasts for approximately three-fourths of a second.

Attention

The brain was put in our heads, not to go to school, but as a survival resource. Thus, the senses were the first line of defense to protect the species from extinction. Therefore all senses are on high alert for anything potentially dangerous or out of the ordinary.

Panksepp (1998) suggests all humans have a basic survival system. The brain hunts and searches for resources to exist. Exploring the environment is innate in all humans. The addictive behavior related to the Internet is an example of a 21st century *seeking system*. When we find what we seek, the medial forebrain bundle (the pleasure/reward center of the brain) is stimulated and triggers the dopaminergic

pathway, releasing dopamine to create a natural feeling of euphoria. Success and enjoyment of learning can cause the same dopamine to be released. The seeking system may be one of the main brain systems that generate and sustain curiosity, even for intellectual pursuits (see www.youtube.com/watch?v=5smTLCKkUA4).

Of the five senses, visual, tactile, and auditory are the most efficient in capturing attention. There are many environmental factors constantly bombarding our sensory fields to capture our attention. Novelty, color, humor, and hands-on activity all grab the attention of the learner. Emotion also plays a large role in increasing attention. Positive or negative emotions may be the hook that generates attention or engagement. Strong negative "baggage," such as a bully in the schoolyard or a problem from home, may actually block the attention needed to focus on learning. When we are overstressed or overchallenged, the neocortex of the brain moves to the fight-or-flight mode and no thinking takes place. On the other hand, fun, laughter, play, and a high-challenge/low-threat environment help focus and maintain attention and raise the pleasure neurotransmitters such as dopamine and norepinephrine in the brain.

FOCUS ACTIVITIES

If teachers are going to capture students' attention, they need strategies to do so. Focus activities will do the following:

- Help the learner focus and pay attention
- Eliminate distracters
- Open "mental files"
- Provide choices
- Encourage self-directed learning
- Capitalize on "prime time"
- Fill unallocated time—extend, enrich, or "sponge" up extra time

Using focus activities or bell-ringers at the beginning of class helps students block out distracters, concentrate on activating prior knowledge, and sustain attention. Post the directions for the focus activity in a designated area so the students know where to find it when entering the classroom.

Anchor or Sponge Activities

Throughout the day, there may be times when students finish work early. The teacher can offer other tasks to "sponge" up the extra time without wasting instructional time. Tasks may also be provided for students to use as sponge activities when extra time is available. These tasks are also useful when the teacher is working with one group and students in other groups finish what they were doing. These sponge activities help students become more self-directed learners. Sometimes, students will focus on a personal quest or project that they are pursuing or some standard or skill that they are trying to master. Broader or more general tasks may be offered, such as the following:

- Develop a crossword puzzle on the computer to review the topic.
- Use the computer to develop a word web on this concept or topic.

- Revise your agenda for the week.
- Work on your culminating task for the unit.
- Use a word web to organize the ideas in this unit.
- Examine the items in your portfolio, and make some decisions regarding the pieces you have included. Should some be deleted or replaced at this point?

These more generic tasks may be posted for the week for all students to refer to when they have some time to sponge up productively.

Engagement activities should all be related to the objectives in the learning process, not just fun. They may be fun, but they should be focused on the necessary content or skills students should be developing.

Focus activities can take many forms. One teacher in a math class asked students to do the following with a paper and pencil:

- Pick a number from 1 to 9.
- Multiply it by 9.
- Add the two digits.
- Take away 5.
- Locate the corresponding letter in the alphabet.
- Pick a country that begins with that letter.
- Pick an animal that begins with the last letter of the country.
- Pick a color that begins with the last letter of your animal.

Then the teacher asked the students if they had an orange kangaroo in Denmark.

"Wow," they exclaimed. "How did you know that?" "You figure it out," she challenged them. They eagerly worked in pairs and analyzed the process and discovered that when you multiply any number by 9, the resulting two digits add up to 9. Then when you subtract 5 you get 4. The number 4 leads you to D. Under pressure, most people choose Denmark as a country. The last letter is K and *kangaroo* usually comes to mind. The last letter of *kangaroo* being O leads to the color orange. Then the teacher continued by reviewing the multiplication table for 9. This teacher knew how to make learning fun, add novelty to the learning, and challenge the students to solve a problem. The brain loves to make sense and seek patterns in information or processes.

In another classroom, the teacher had students begin the class by writing down on a small card or paper:

- Three things I learned yesterday . . .
- Two ideas that connected for me . . .
- One question I still have . . .

Here are a few other examples of focus or bell-ringer activities.

- Go on a scavenger hunt in your book and find _____.
- Solve the _____ problem on page _____.
- Go over your homework with a partner.
- Answer today's Brain Puzzle. (Post the puzzle.)
- Get the materials ready for today's activity. (List the instructions needed.)

K-W-L

Often, teachers use a K-W-L chart (Ogle, 1986). The K stands for what students already know about the topic. The W stands for what the students want to know. The L is used at the end of the lesson or unit of study to enable students to reflect on their learning and identify the information and processes learned.

This strategy opens up mental files to see what students already know and creates anticipation and curiosity about the new learning to come. It also brings closure and satisfaction at the end of the unit of study as they reflect on and articulate their learnings.

Other Strategies for Focusing

Other focus activities can take many forms, including challenges, questions and problems, or journal entries. Tasks may be offered that require recall and application of previously learned information. For example, students who read a chapter for homework can be asked to sit with a buddy and find as many "feeling" words as they can in the chapter that help develop the reader's understanding of the character.

Sometimes, teachers offer choices to students in order to capitalize on their interests and give them options. These techniques are also forms of pre-assessment that help the teacher and students set goals and design and select learning tasks appropriate to individuals or groups of learners.

The following example is a set of focus tasks that a teacher offered to students to allow them to make a choice.

From the chapter that you read last night, choose one of the following tasks and work alone or with a partner to complete it:

- Draw a comic strip to show the events in the chapter.
- In your journal, chronicle the events in the chapter.
- Describe the setting and how it related to the events in the chapter.
- If you were a newscaster, what would your progress report be?
- Rewrite a passage of the chapter in your own words. Use synonyms to replace some of the author's words.

Memory

Sensory input is either dumped out or passed on to short-term or working memory if the individual's attention is captured. Once attention takes data from the sensory memory to the short-term or working memory, the data are said to be *conscious.* The data last in conscious short-term memory up to 20 seconds unless we process them in some way.

We know that at the mental age of 15 years, the short-term working memory has the capacity for seven bits of information plus or minus two (Miller, 1956; Pascal-Leon, 1980). Capacity develops over the years, starting at age 5 with two spaces and increasing one space every other year until age 15. One way to deal with more than seven bits is to chunk them into larger pieces that hold more bits.

Rehearsal

Processing in working memory is often called *rehearsal.* Rehearsal or practice allows us to organize, analyze, make sense of, and remember the information. Rehearsal may be in one of two forms, *rote* (repeating information in the same form) or *elaborative* (connecting information with known data or embedding it in context; see Figure 6.1).

Elaborative rehearsal facilitates organizing and associating information into networks that are then stored in long-term (unconscious) memory. Rote memory may work for some learning, like multiplication facts that are drilled and memorized and put into automatic memory, but for enduring understanding (Wiggins & McTighe, 1998) to occur, students need more than "drill and kill."

Rote learning does not always have a very long shelf life because it has few hooks in the long-term memory. The brain is a pattern-seeking device and enjoys making meaning and connections between new ideas and those previously learned. Thus elaborative rehearsal strategies have a greater chance of producing long-term memories.

Figure 6.1   Rote and Elaborative Rehearsal

Rote rehearsal	*Elaborative rehearsal*
• Practice • Recitation • Drill • Repetition	• Mnemonics • Graphic organizers • Role-plays/simulations • Rhymes/raps/songs • Centers and projects • Multiple intelligences • Problems/inquiry • Performances • Exhibitions

Context

Context is an important contributor to memory and learning. A field trip to a farm or science center creates strong emotional hooks as well as enriched sensory stimulation. All these aspects will help solidify these experiences and concepts in the mind. *Episodic memory* is a term used to describe contextual or locale learning (O'Keefe & Nadel, 1978). It is processed through the hippocampus, as is *declarative memory,* which is concerned with the facts (who, what, where, when, and how).

Students often recall information better in the room in which they learned it. The context of the learning brings back vivid experiences of the learning that took place there. Students seem to do better on tests that are taken in the room in which they learned or studied. They also may do better on tests if the teacher who taught them is present in the room.

Emotions

Emotions play a large part not only in garnering attention but also in memory and learning. The amygdala, the brain's emotional sentinel (Goleman, 1995), imprints memory when experiences evoke strong emotions (LeDoux, 1996). Many key events

in life and in schools are punctuated by and charged with emotions. For example, we all remember where we were when we heard about the 2011 demise of Osama bin Laden. The combination of context and emotion creates vivid memories.

Associating Concepts

One way to help students deal with massive amounts of content is to organize information around concepts. For example, students can organize networks of association under concept headings such as Change, Relationships, Persuasion, and Community. These mental concept files can be accessed, and a flood of information will be released as they are opened.

Concepts also help students see the bigger picture, organize the information, and deepen their understanding. Information is organized in networks of association throughout the neocortex and is unconscious until retrieved back to working memory.

When a "file of birthdays" is opened, for example, all the facts, thoughts, images, memories, and emotions dealing with birthdays come into conscious awareness. The neural network is searched and asked to recall all it remembers. One idea triggers another. This is why the process of brainstorming is a useful tool for activating prior knowledge. The brain scans the files, and one idea brings about another as the connections are revisited.

Recall and Rehearsal

Three things can occur after data have spent time in short-term memory. They may be dumped out (because they have no meaning for the learner or the learner wasn't given any practice to ensure that the connections between the brain cells grew enough dendrites), they may be practiced further, or they may be transferred to long-term memory. Once in long-term memory, the data can last forever, but if not used, they will become hard to retrieve over time (Pinker, 1998). "Use it or lose it" is true in this case.
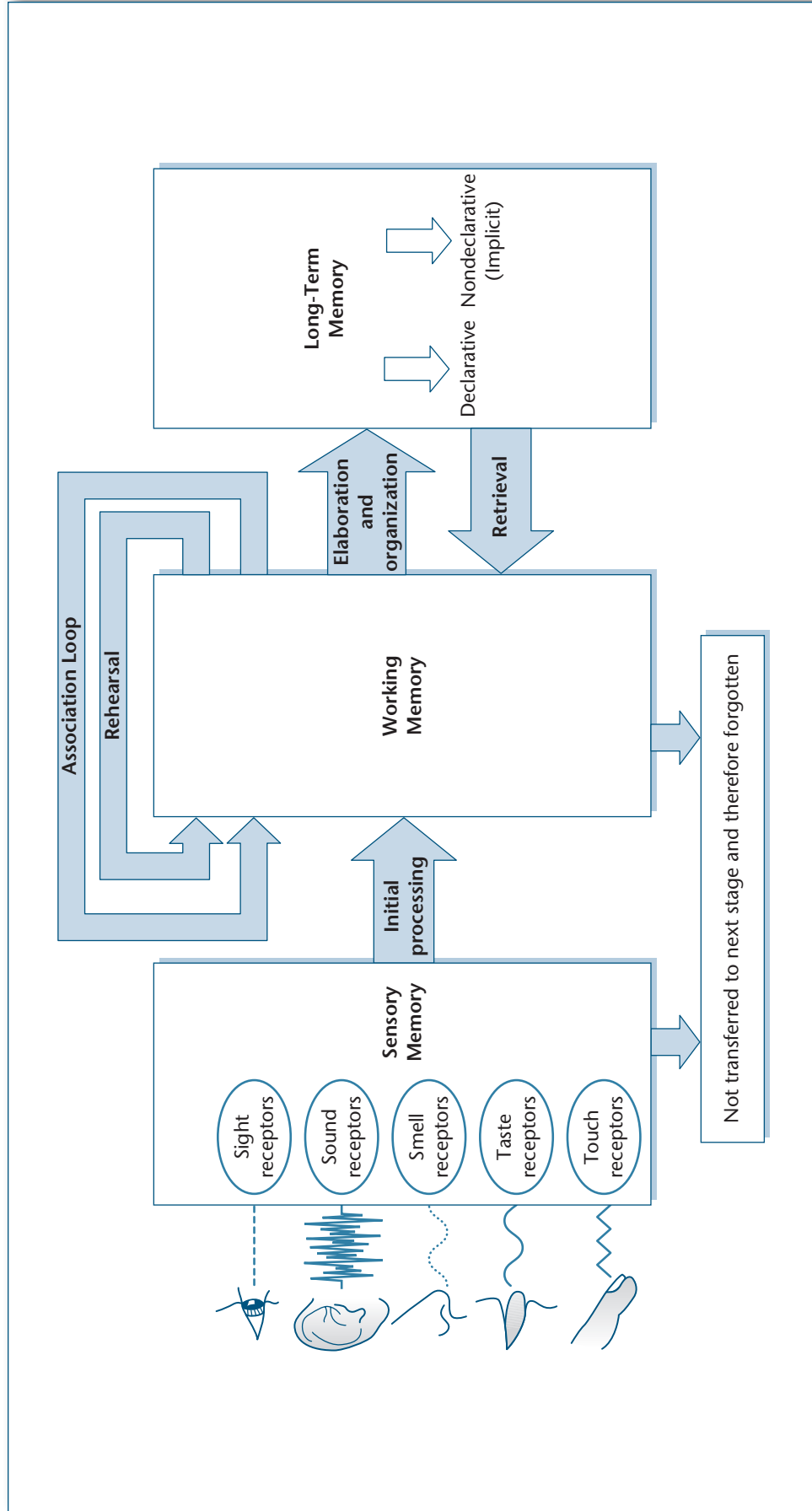
Students often need many opportunities to recall and rehearse, many times and in many ways, in order to deepen their understanding. Doyle and Strauss (1976, p. 25) suggest that we give people too much gum to chew (content) and not enough time to chew it (process). Maybe what we need to retain valuable information is "less gum, more chewing," as suggested in workshops by Bob Garnstom, a well-known educator and organizational change consultant.

Retrieving information from long-term memory usually takes 3–5 seconds, depending on its quantity and complexity. This is why wait time (Rowe, 1988) is so important when asking questions. Because information is stored all over the neocortex in networks of association, it takes time to search those neural networks and bring long-term unconscious memory back to short-term conscious memory. Figure 6.2 shows progression of attention to short term and long term memory.

New information that captures sensory attention (sight, smell, touch, etc.) can be transferred to short-term conscious memory.

1. In short-term memory it can trigger the retrieval of other data.

2. When it is already stored in long-term conscious memory, in effect it opens closed files with previous information that was stored throughout the neocortex.

Figure 6.2 Learning and Remembering New Information: A Complex Process

3. By examining and relating the new data to previously learned data, the newer information can be transferred to long-term memory.

4. That is, it can be learned and remembered.

Long-term memory is really of two types: declarative and procedural.

Declarative	Procedural

The Facts
   • Who?
   • What?
   • Where?
   • Why?
   • When?
	"Autopilot" (things one does without thinking)
	   • Playing the piano
	   • Riding a bicycle
	   • Doing up buttons
	   • Using the computer

Declarative memory is more conscious, whereas *procedural memory* is unconscious. Procedural memory starts as declarative. For example, when one learns to use a computer, each step is conscious and deliberate. Each step is in declarative memory: turn on switch, wait for screen, insert disk, double-click on icon. After many repetitions, the process becomes automatic and can be done unconsciously. These procedures are stored in the cerebellum (little brain). Students require lots of practice to send information and procedures to long-term memory. Practice may occur in numerous ways using a variety of multiple intelligences and as many modalities as possible to involve opportunities for visual, auditory, and tactile/kinesthetic learners to develop understanding.

PLANNING INSTRUCTIONAL STRATEGIES

Information about the process of memory is useful for teachers as they plan programs for a diverse group of students so that the students can realize their potential. Teachers may want to ask themselves the following questions as they plan:

- What do I want students to know or be able to do as a result of this learning experience?
- How will we judge success?
- What do they already know, and what are they able to do?
- How can attention be captured and sustained?
- What will the emotional hook be for the learners?
- How will new information and skills be acquired?
- How will students practice or rehearse to make meaning and understanding?
- How will they receive ongoing feedback during and after the learning?

REHEARSAL STRATEGIES

If teachers are to give students opportunities to rehearse in multiple ways they should pay attention to research based strategies for increasing student achievement (Dean, Hubbell, Pitler, & Stone, 2012).

Nine well-researched strategies hold promise for student success and interesting ways to interact with content and skills. They are divided into three groupings:

Creating the environment for learning

1. Setting objectives and providing feedback

2. Reinforcing effort and providing recognition

3. Cooperative learning

Helping students develop understanding

4. Questions, cues, and advance organizers

5. Nonlinguistic representations

6. Summarizing and note-taking

7. Assigning homework and providing practice

Helping students extend and apply knowledge

8. Identifying similarities and differences

9. Generating and testing hypotheses

Figure 6.3 shows the nine strategies with an explanation and information on what we know about the brain and how that knowledge supports the success of the strategies.

COOPERATIVE GROUP LEARNING

Cooperative group learning is one of the most researched instructional strategies in education today. We have gained valuable insight over the years from revered educators such as Aronson (1978); Bellanca and Fogarty (1991); Bennett, Rolheiser-Bennett, and Stevahn (1991); Cantelon (1991a, 1991b); Clarke, Wideman, and Eadie (1990); Dean et al. (2012); Johnson, Johnson, and Holubec (1998); and Kagan (1992). Working in cooperative groups, students learn valuable social skills, use higher-order thinking, and rehearse and practice new concepts, processes, and information. Cooperative group learning does not happen successfully unless it is well orchestrated and certain considerations prevail. These considerations increase the chances that the groups will work well together and achieve targeted standards (Johnson et al., 1998).

The acronym **TASK** (Robbins, Gregory, & Herndon, 2000) can be used to remember these aspects of cooperative group learning:

T Thinking is built into the process.

A Accountability is essential. Goal achievement: both individual and group.

S Social skills lead to team success.

K Keep everyone on TASK: roles, tasks, resources, novelty, simulations, and clear expectations.

Figure 6.3   Best Practice, Brain Research

Researched Best Practices	Brain Bits
1. Setting objectives and providing feedback • Clear instructional goals help students focus when the goals are stated in general terms and personalized by individual learners. Continuous feedback from the student, teachers, and peers is important.	The brain responds to high challenge and continues to strive based on feedback.
2. Reinforcing effort and providing recognition • The ability to relate effort and hard work to success • Growth mindset	The brain responds to challenge and not to threat. Emotions enhance learning.
3. Cooperative learning • One of the most effective and well-documented instructional strategies is the formation of heterogeneous groups to accomplish academic tasks. This strategy uses higher-order thinking skills and focuses on the development of social skills.	The brain is social. Collaboration facilitates understanding and higher-order thinking.
4. Questions, cues, and advance organizers • These help students open "mental files" to access prior knowledge before new learning takes place. This helps in pre-assessing the knowledge and skills (related to standards) that a student possesses and gives a context for the learning experience to come.	The brain responds to wholes and parts. All learners need to open "mental files" into which new learning can be hooked.
5. Nonlinguistic representations • A variety of methods, such as graphics, models, mental pictures, drawing, and movement, should be used to elaborate and rehearse new learning.	The brain is a parallel processor. Visual stimuli are recalled with 90% accuracy. The more areas of the brain that are involved, the better.
6. Summarizing and note-taking • The ability to summarize, delete, distill, and analyze information in order to be able to select what is important or relevant for learning.	The brain pays attention to meaningful information and deletes what is not relevant.
7. Assigning homework and providing practice • The ability to provide additional learning experiences that will help students further rehearse concepts and skills. Not necessarily more of the same.	The brain pays attention to meaningful information and deletes what is not relevant.
8. Identifying similarities and differences • The ability to classify in groups based on like attributes or the same theme or patterns can be explicitly demonstrated, supported, and encouraged. Compare and contrast.	The brain seeks patterns, connections, and relationships between and among prior and new learning.
9. Generating and testing hypotheses • This can be done through the inductive or deductive process. Students should be able to articulate their hypothesis and evaluate their accuracy.	The brain is curious and has an innate need to make meaning through patterns.

Thinking Is Built Into the Process

Cooperative group learning is ideal for embedding a variety of other instructional strategies that make a difference in student learning. Graphic organizers, thinking skills, and metaphors are easily used in cooperative group work to facilitate rehearsal and practice. Groups can be given tasks that are differentiated and adjusted to levels of the thinking taxonomy, a topic that we will discuss in detail later in this chapter. This will challenge groups at a variety of levels. Cubing, another topic we will discuss later in this chapter, also works well in cooperative group situations. Opportunities to explore content by using some or all of the multiple intelligences are possible. Students see many sides of a topic when using multiple intelligences as a lens.

Accountability Is Essential

Students who work together in cooperative groups generally produce a group product or project that is graded. Each student needs to be accountable for his or her personal contributions to the group and also for personal acquisition of knowledge and skills as a result of the group process. Teachers often use checklists or journal entries to collect data on the contributions and learning of individuals in the group. If teachers need to know what students know and have learned in the group session, individual tests, quizzes, demonstrations, exhibitions, and conferences will help clarify the understanding and competencies of each student. Cooperative group learning is a powerful strategy for learning, but we can't assume that everyone will know and understand the content and develop the skills just by being in a group.

Assessment may be multifaceted and include the following elements:

- An individual grade for the piece of work completed or the part of the presentation given
- A group grade for the final product or presentation
- A test or quiz on the content
- A mark for group participation

Consider the cooperative learning activity a learning experience. It is another way to blend individual needs with the learning, discussion, process, and investigation of the information. Then give an individual assessment to see what each learner knows about the information. This way, the work and the individual's grade are not dependent on the other group members. Group grades often cause problems and may create "social loafers."

Social Skills Lead to Team Success

Even though teachers work to build a positive climate and trust in the classroom, they may also need to teach social skills. Cooperative group learning not only helps students learn content and competencies but also helps them develop their emotional intelligence in the five domains (Goleman, 1995, 2006):

- Self-awareness: through reflection
- Self-motivation: developing persistence and a positive work ethic
- Managing emotions: learning strategies for conflict resolution and consensus building

- Empathy: listening, reflecting feelings, and behaving in a supportive manner
- Social skills: opportunities to identify practice and reflect on social skills

Students have different needs in these areas, and teachers will observe where those needs are as they monitor groups and recognize the strengths and weaknesses of their students.

Basic social skills that students need include these:

- Using appropriate language
- Speaking politely and quietly
- Encouraging others
- Listening to others
- Asking for help

Here are some social skills that students need to function well in a group:

- Disagreeing in an agreeable way
- Accepting different opinions
- Following procedures
- Checking for accuracy and understanding
- Dealing with conflict

Students need to know what a social skill "looks like, sounds like, and feels like" (Hill & Hancock, 1993) through conscious identification of the skill, modeling, practice, and feedback.

Teachers often post charts for reference that describe acceptable behavior in the classroom. Students need to contribute to the charts using their own language and terms. This increases clarity and ownership of the behavior and the probability that it will be practiced. Figure 6.4 is an example of a chart that describes listening to others. It was developed by a teacher and students during a conversation about the importance of listening to other people in a group.

Students then need to practice this skill with their groups and reflect on its use.

Individuals learn differently as a result of their experience and need a chance to contemplate their learning and their participation. Because students sometimes don't have the ability to reflect without guidelines, an organizer may be provided. Figure 6.5 is an example of student reflection after a group effort.

Figure 6.4   Social Skill: Listening to Others

Looks like	Sounds like	Feels like
Looking at the person	Tell me more . . .	I've been heard
Nodding and smiling	Mmm...	My ideas are valued

Figure 6.5 Reflection on Group Work

Date: _____

Name: _____

In my math class today we were involved in a cooperative learning activity.
This is a summary of what my group did.

My role was . . .

_____

_____

My behavior in that role was . . .

_____

_____

I helped achieve the group goal by . . .

_____

_____

I could have . . .

_____

_____

One thing I need to work on is . . .

_____

_____

Keeping Everyone on Task

Students in cooperative groups usually are assigned roles that increase the chances that they will work interdependently (Johnson et al., 1998; Johnson & Johnson, 2009). Roles such as encourager, clarifier, summarizer, or questioner can be assigned to keep the group functioning well. Other roles may include those that facilitate the task, such as recorder, reader, researcher, drawer, materials manager, or reporter. This encourages students to take responsibility and ownership for the task by assuming a particular role.

Some teachers may want to set up a scenario more like the real world and assign some of the following roles to students in a cooperative group (based on a workshop strategy by Kathy and Rob Bocchino, Heart of Change Consultants).

Production Manager. The production manager is responsible for the project. You will oversee and ensure that the other managers are working appropriately. You will manage the process, keep track of progress, and be the only person in the group who communicates with the CEO (teacher) when the group needs clarification or direction.

Information Manager. Your job is to ensure the accuracy and quality of the product. Your listening skills are valuable assets and help you make sure you clarify what the client is asking for. You will make sure all group members understand the client's/ CEO's expectations. You must adhere to any written directions.
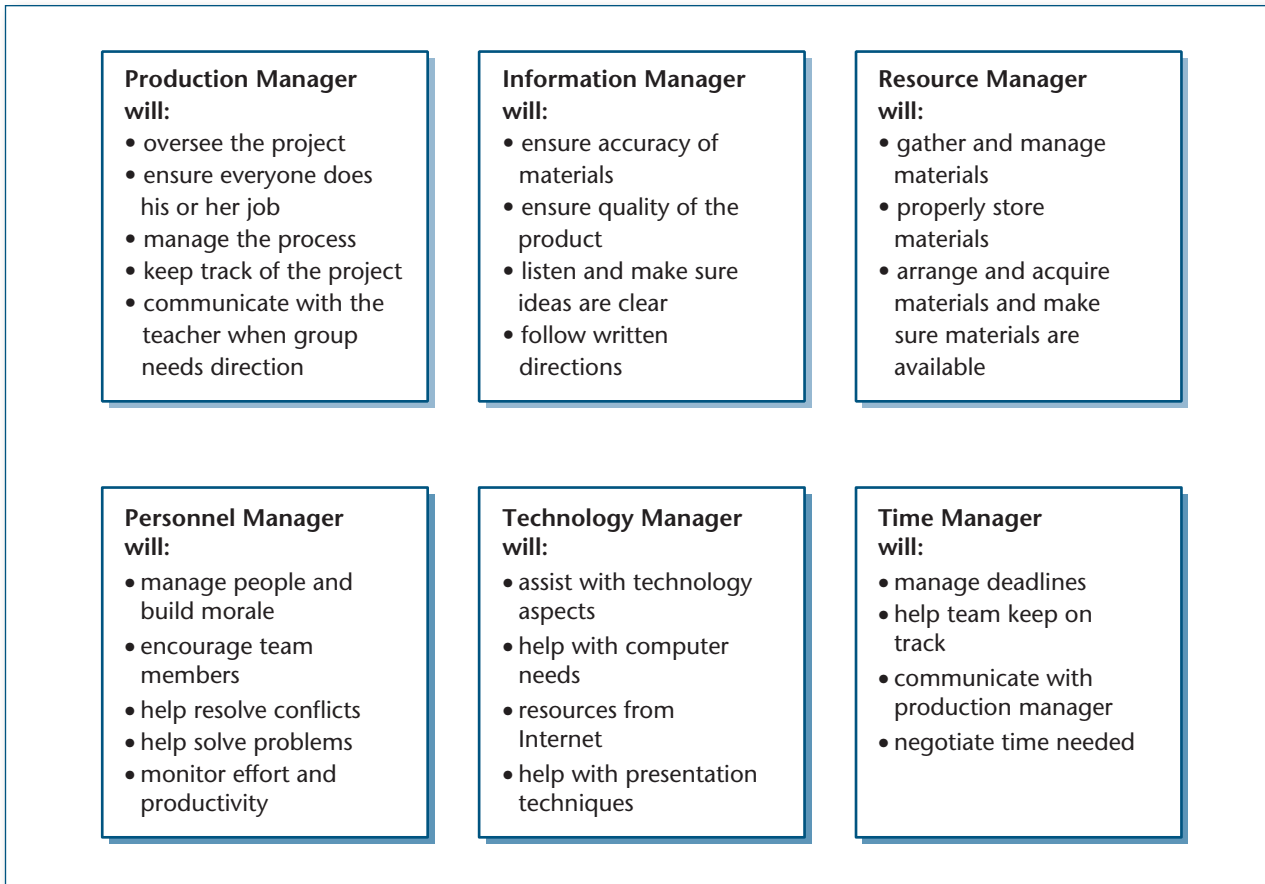
Resource Manager. Your job is to gather and manage the materials necessary to complete the group project. Make sure all group papers and materials are properly stored away at the end of the period. If other objects, props, or materials are necessary, arrange to acquire them and make sure they are available when needed.

Personnel Manager. Your job is to manage the people on the team and build morale throughout the production. Encourage other team members, manage conflicts, and facilitate problem solving when necessary. Monitor for effort and productivity. Communicate any concerns to the production manager.

Technology Manager. Your job is to assist group members with all technical aspects of the production. You will help members with their computer skills when using the Internet for research, with spreadsheets and databases, word processing, presentation techniques, and troubleshooting.

Time Manager. Your job is to know when all deadlines are and remind others in the production team of those deadlines. You will keep a log of the steps and the progress. Communicate with the production manager concerning timelines and concerns. Communicate with the production manager concerning a particular team member who is not meeting time requirements. If more time is needed, ask the production manager to negotiate for more time.

The bookmarks in Figure 6.6 can be given to team members to help them keep focused on their duties for team success. Teachers may enlarge, photocopy, and laminate individual bookmarks for students' use.

Figure 6.6   Keeping Students on Task Bookmarks

Production Manager will:
- oversee the project
- ensure everyone does his or her job
- manage the process
- keep track of the project
- communicate with the teacher when group needs direction

Information Manager will:
- ensure accuracy of materials
- ensure quality of the product
- listen and make sure ideas are clear
- follow written directions

Resource Manager will:
- gather and manage materials
- properly store materials
- arrange and acquire materials and make sure materials are available

Personnel Manager will:
- manage people and build morale
- encourage team members
- help resolve conflicts
- help solve problems
- monitor effort and productivity

Technology Manager will:
- assist with technology aspects
- help with computer needs
- resources from Internet
- help with presentation techniques

Time Manager will:
- manage deadlines
- help team keep on track
- communicate with production manager
- negotiate time needed

Creating Interdependence and Building Alliances Within Groups

Teachers also can increase the interdependence in the groups by taking the following steps:

- Create a sequence to the process. Each group member has a role and a particular step to perform in the task.
- Provide limited resources (tools, texts, materials) that must be shared to complete the activity.
- Provide novelty and engaging scenarios or simulations in which students take on personas, such as investigator, researcher, or land developer. This creates a role that would be found in the real world and often adds authenticity to the activity.

There are many times when students work in cooperative groups of two, three, or four. In fact, working in pairs is a great way for students to build alliances in the classroom, by getting to work with many students to get to know them. It is also hard to get left out of a pair (Johnson et al., 1998). Partner work gives students a chance to practice

social skills in a controlled environment with only one other personality at a time. It also builds community as students get to know one another one on one.

Whenever cooperative group learning is used as a vehicle for student learning, teachers need to ask the following questions to clarify the intention and process of the learning:

- What is it that students need to accomplish, and how will I communicate that? (Written task cards or charted directions should be clearly outlined for students so that expectations are clear and visible to all.)
- What will the size of the group be, considering the task?
- How will I group students, and why? (randomly, by ability, by background knowledge, heterogeneous but structured; see Figure 5.15, "Stick Picks," and Figure 5.16, "Wagon Wheel Teaming," in Chapter 5)
- What social skill will they practice and reflect on? (The social skill should be relevant to the task.)
- How will they learn about the social skill?
- How will they monitor its use?
- What are the timelines and guidelines for the task?
- What assessment will be used for the academic task? (presentation, product, report, performance, exhibition, test, quiz, etc.)
- What roles or tasks will group members be assigned to ensure interdependence and active participation?
- Are the groups functional?
- Do the groups get along socially?

Jigsaw

Another way to increase interdependence is by using a *jigsaw method*. Jigsaw (Aronson, 1978; Slavin, 1994; see Figure 6.7) is a very effective strategy, but not one that should be used with students until they have the social skills to deal with several members in a group as well as the skills to work independently. It is a powerful strategy for covering more material in less time. It enhances learning and increases retention. Students begin in a base group of three or four and are given letters, numbers, or names that will help them form expert groups. In the expert group, students are to access information or learn new material or skills that they will in turn teach to their base group. When they return to the base group, they teach their group members what they have learned.

Individual accountability is built into the process by having each member hand in a report, test, or quiz on the material learned or by calling on students randomly to report for their group.

The jigsaw method facilitates the sharing of responsibility for learning. It helps focus energy in a task and provides structure and process for the learning. It has inter- and intrapersonal components that also allow students to process information and move and interact with a variety of class members to gain a greater perspective on the knowledge or skills that are targeted for learning. It offers many chances for elaborative rehearsal and use of higher-order thinking through dialogue.

Jigsaws can be differentiated for students by giving them different materials and content to match different levels of readiness. Products, projects, or other authentic tasks and assessment that are expected from the group, based on their preferences and multiple intelligences, offer another way to differentiate.

The following example demonstrates how to build all the aspects of TASK into a jigsaw activity.

Figure 6.7   Jigsaw Strategy: Used to Enhance Interdependence With More Advanced
Learners
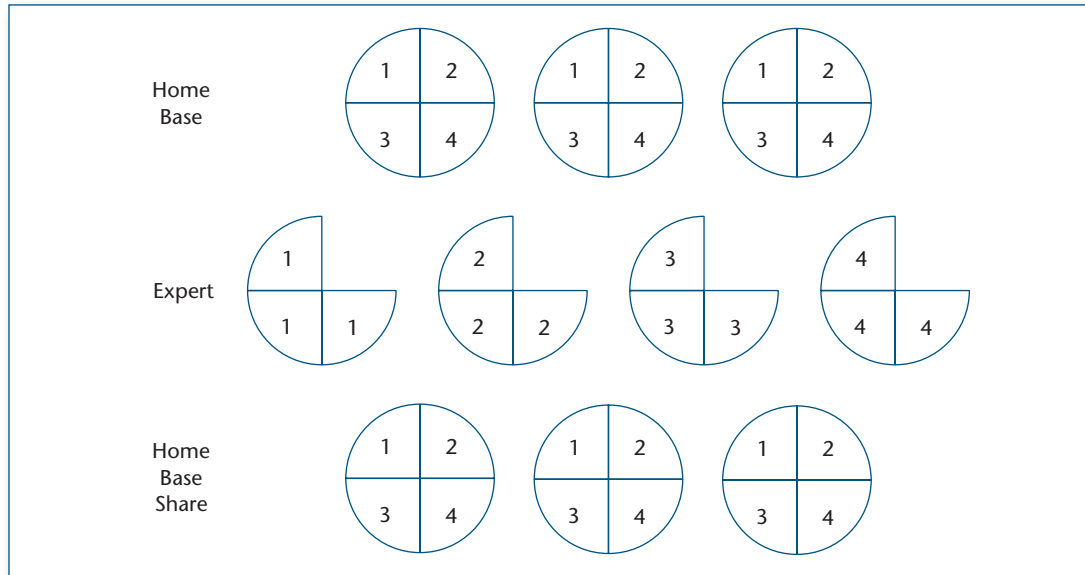
The Character Sketch (see Figure 6.8) is an organizer that can be used by a cooperative group of four people when reading a story or novel. Groups A and B focus on the same character (perhaps the main character), Groups C and D identify a different character, and so on. The base group (Persons 1, 2, 3, and 4) cuts the organizer on the broken line and distributes the four sections. Each person in Group A meets with the same-number partner from Group B (i.e., 1 with 1, 2 with 2, 3 with 3, and 4 with 4). They discuss an aspect of the character depending on the section of the organizer that they have. For example, two students may have the quadrant that says, "Looks like." They would find evidence in the story of what the character looks like and then write their conclusions in that segment of the quadrant. As they work together, the social skill they use would be to clarify information and listen to others' ideas. Each group of partners meets to complete their sections of the organizer: "Looks like," "Seems like," "Does," and "Sounds like." Then the base groups reconstitute and review all the evidence and conclusions that they made. From this information, the group writes a complete character sketch based on all the attributes collected.

The organizer can be reproduced on large chart paper to increase the space for collected information and to allow all participants to see the information. Each group member has an organizer to collect data personally from other expert team members.

There is interdependence built into this activity through shared resources and tasks. The students practice social skills as they work. They access information and use evidence to support their thinking, both worthy standards in any classroom.

This organizer can also be modified and used to divide tasks in other subject areas in a jigsaw process. Students could begin in a base group and examine four aspects of a country, such as food, peoples, geography, and origins (or in biology, they could focus on body systems, such as respiratory, digestive, nervous, and circulatory), in their expert groups and bring that information back to their base groups.

Jigsaw Variations

Table Jigsaw: Each group is responsible for a different topic or aspect and presents their findings to the rest of the class.

Simple Jigsaw: Each person in a small group (three or four students) is responsible for a piece of the assignment and resources the team.

Full Jigsaw: As described above, beginning with a base group, breaking out to expert groups, and then back to the base group to share.

Questions Often Asked About Cooperative Group Learning

What Is the Best Way to Group Students?

If a group of students get along socially, they usually get the job done. Occasionally let students choose partners or small groups. Group work is not always a social decision. Students also need to develop skills to work with a variety of personalities and perspectives. Alternate with random grouping and self-selected and teacher-constructed groups.

What Do You Do With the Student Who Does Not Want to Work in a Group?

An independent learner, who usually does not like group work, works better with a partner than a larger group. Remember, this student is learning important social skills when working with others. He or she does need some independent work time to process the cognitive learning.
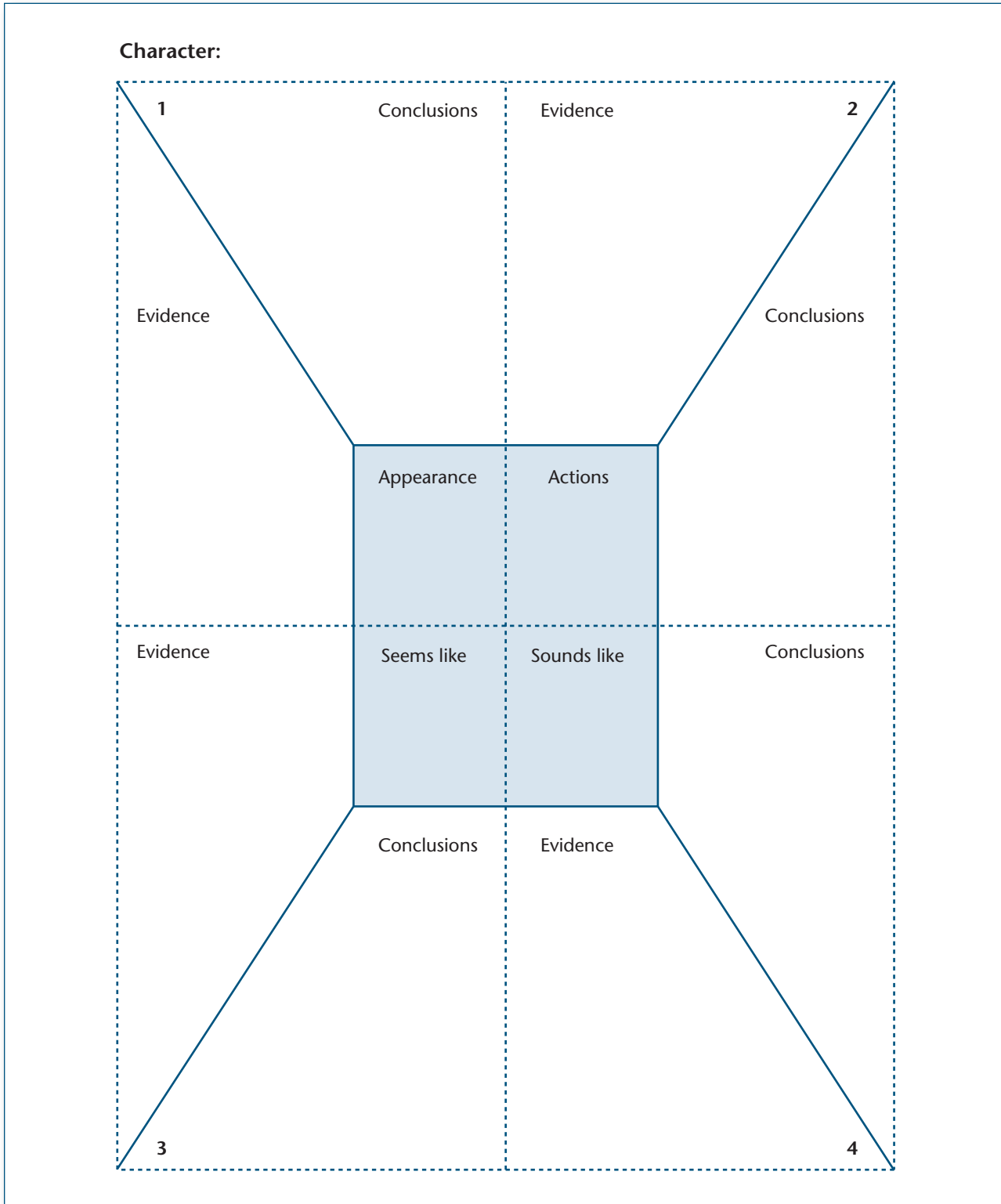
What Is the Best-Sized Group?

Students working in groups of twos, threes, or fours are the most successful. When needing consensus, use groups of three to break the tie. Remember that the size of the group is also decided by the task to be completed. If the task is complex, more students may be needed. However, when students are developing skills for group work, smaller groups are better. It is hard to get left out of a pair. There is less social conflict and plenty to do. There is more "airtime" for each partner, and generally students stay on task.

NONLINGUISTIC REPRESENTATIONS: GRAPHIC ORGANIZERS

What Are They?

Graphic organizers are useful thinking tools that allow students to organize information and to see their thinking. They are visual/spatial, logical/mathematical tools that appeal to many learners for managing and organizing information. Graphic organizers give visual representations of facts/concepts and show the relationships between and among new facts and previous information. They are also used to plot

Figure 6.8 Character Sketch: Used as an Organizer by Four Students When Reading a Story or Novel

Character:

	Conclusions	Evidence	
1			**2**
Evidence			Conclusions
	Appearance	Actions	
Evidence	Seems like	Sounds like	Conclusions
	Conclusions	Evidence	
3			**4**

processes and procedures, and can be used at many points in the lesson. They may also be completed or designed online using sites such as Kidspiration.

WHY DO WE USE THEM?

The difference between good and poor learners is not the sheer quantity of what the good learner learns, but rather the good learner's ability to organize and use information (Smith, 1986). It takes time to process and pull random thoughts together. Sometimes a graphic organizer can be the answer to a difficult task. After learning the way to use the organizer, students are able to jot down their information their way.

Graphic organizers can be used in various ways:

- For brainstorming at the beginning of a lesson or unit to find out what students already know
- With reading assignments or when watching a video so that students can organize and capture information (The teacher may provide one, or students can design their own using the criteria given by the teacher, such as Who? What? Where? and Why?)
- To help chronicle a sequence of events or a process
- To relate new information to previously learned information
- To check for understanding
- For note-taking and summarizing
- For the culminating assessment

How Do We Use Them?

As with any tool, students need to be taught how to use the organizer and be given opportunities for practice with a full range of content and situations. Teachers model how the organizer can be used with content that is not too complicated. That way, students learn the process of using the organizer and can then use it with any content. Over time, students become familiar with the process of using a variety of graphic organizers. They will become adept at choosing appropriate organizers to fit the situation. Many students begin to design and create their own organizers to fit their needs. Using visual representations often appeals to the intrapersonal learner, who appreciates opportunities for processing and reflecting on new information independently. Organizers can be used independently, with a partner, or in a small group.

Effective Graphic Organizers for Comparing and Contrasting

Comparing, contrasting, classifying, and using metaphors are instructional strategies that increase student achievement (Dean et al., 2012; Marzano, Pickering, & Pollack, 2001). Students who spend time looking at the similarities and differences between two topics and perhaps plot these on a graphic organizer deepen their understanding and ability to use the knowledge.

Venn Diagram

The often-used Venn diagram (see Figure 6.9) identifies what is similar and what is different between two topics. A quick way to teach students to use the Venn is to

have them compare themselves with a classmate in terms of personal characteristics, likes and dislikes, hobbies or sports, pets, and so on. They can brainstorm these characteristics individually and then plot them on the Venn with their partners, placing similarities in the overlapping center and differences on each side.

Comparison Matrix

A *comparison matrix* (see Figure 6.10) is another way to compare several items based on identified criteria. For example, when comparing states, the following could be listed in the left column: New York, Arizona, California, and Louisiana. Across the top, the following criteria could be considered: climate, population, geography, and size. This information, once plotted, can be transferred to a Venn diagram to identify the similarities and differences between two of the states.

Figure 6.9   Venn Diagram: Used to Identify an Area of Overlap Between Two Topics
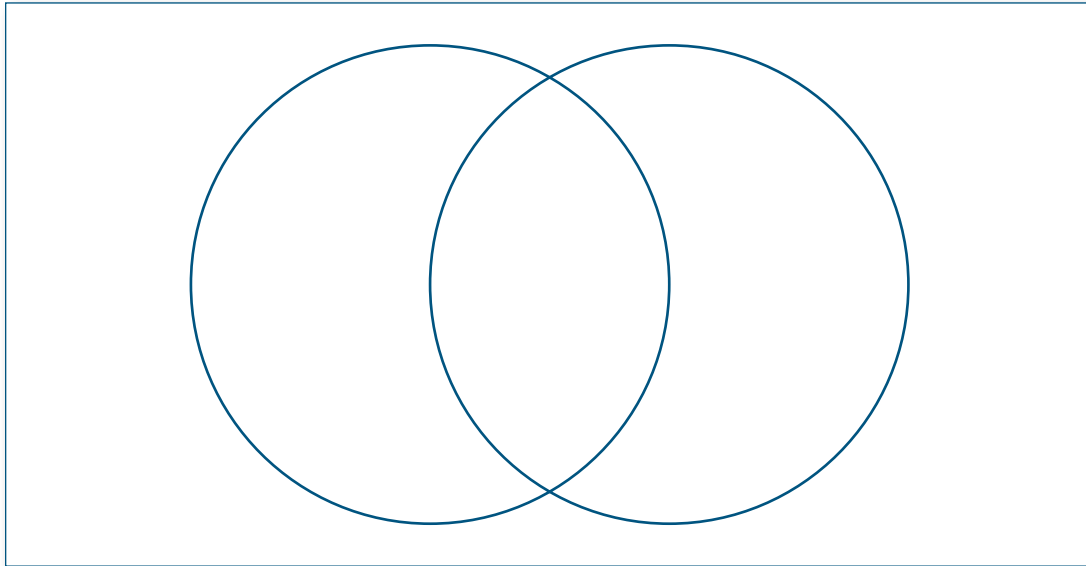
Comparing Two Things

Other forms of comparing and contrasting can be used. In Figure 6.11, any two things, ideas, concepts, or procedures may be scrutinized. At the top, in the first two frames, the two things being analyzed are put in place. In the two large boxes underneath, all their attributes are listed. Then all their similarities are selected and placed in the large frame underneath the Similarities heading. Finally, the ways in which the concepts differ are placed in the appropriate frames. Use the numbers so that the items in each box that differ correspond to one another. Students can compare forms of art, continents, scientific procedures, politicians, historical events, or any two pieces of content in any subject area.

Word Webs

The *word web* is an organizer that can be used for organizing and classifying. It enables students to focus on a concept, theme, or topic; identify the secondary categories related to the big idea; and then add all the significant dimensions related

Figure 6.10 Cross-Classification Compare and Contrast Matrix

Criteria

Compare these

to those secondary categories. In Figure 6.12, for example, the big idea is World War II, and the secondary categories are the Axis, the Allies, Causes, Differences, Theaters of War, the Blitzkrieg, and Pivotal Events.

METAPHORICAL AND ANALOGOUS THINKING

Using metaphors and analogies is another way to show similarities and differences and to connect new information to more familiar objects or concepts. In Chapter 3, "Knowing the Learner," we used the objects beach ball, microscope, clipboard, and puppy to help clarify and understand the characteristics of the four styles of learning. By thinking of these four objects, students can easily recall the attributes of each one and in turn relate those characteristics to the four learning styles in order to understand them better.

Students can also relate new information by connecting it to something with which they are familiar. They may be able to understand the Renaissance if we ask them to explain how the Renaissance is like a video game, or understand the government if we ask them how the government is like an orchestra. When using two seemingly unrelated ideas or topics, we are causing students to examine comparisons and look at the similarities and differences between the two.

Having students stretch their thinking through metaphorical connections increases the likelihood of broadening their understanding of a concept or topic and remembering it in the future.

The quality of thinking, classifying, and deep understanding that it takes to create an intricate word web is a form of elaborative thinking and processing, as shown in Figure 6.13.

Figure 6.11 Comparing 2 Things Flow Chart

Comparing 2 Things

2 Items to Compare

Attributes/ Characteristics

Similarities

Differences

1.

2.

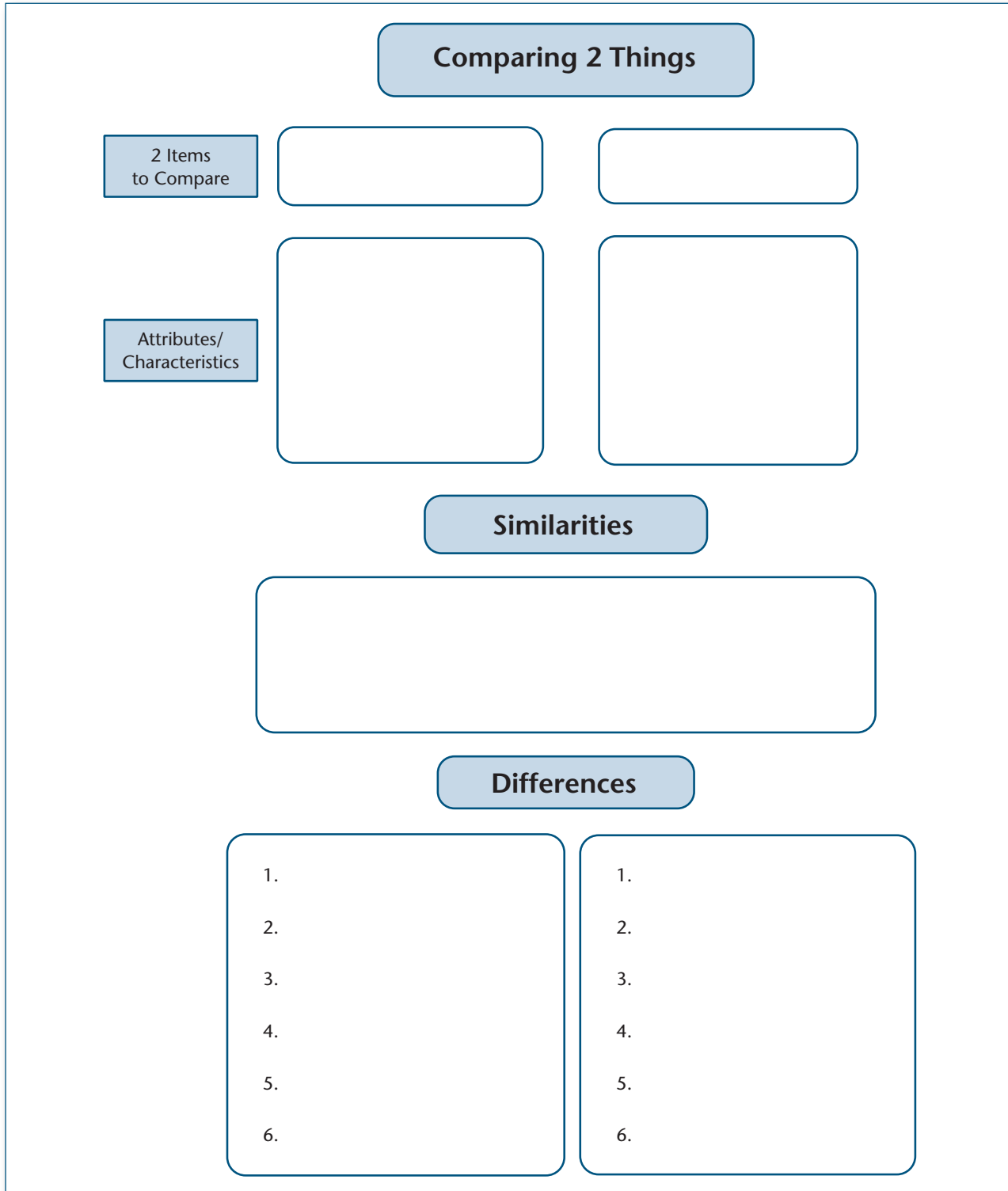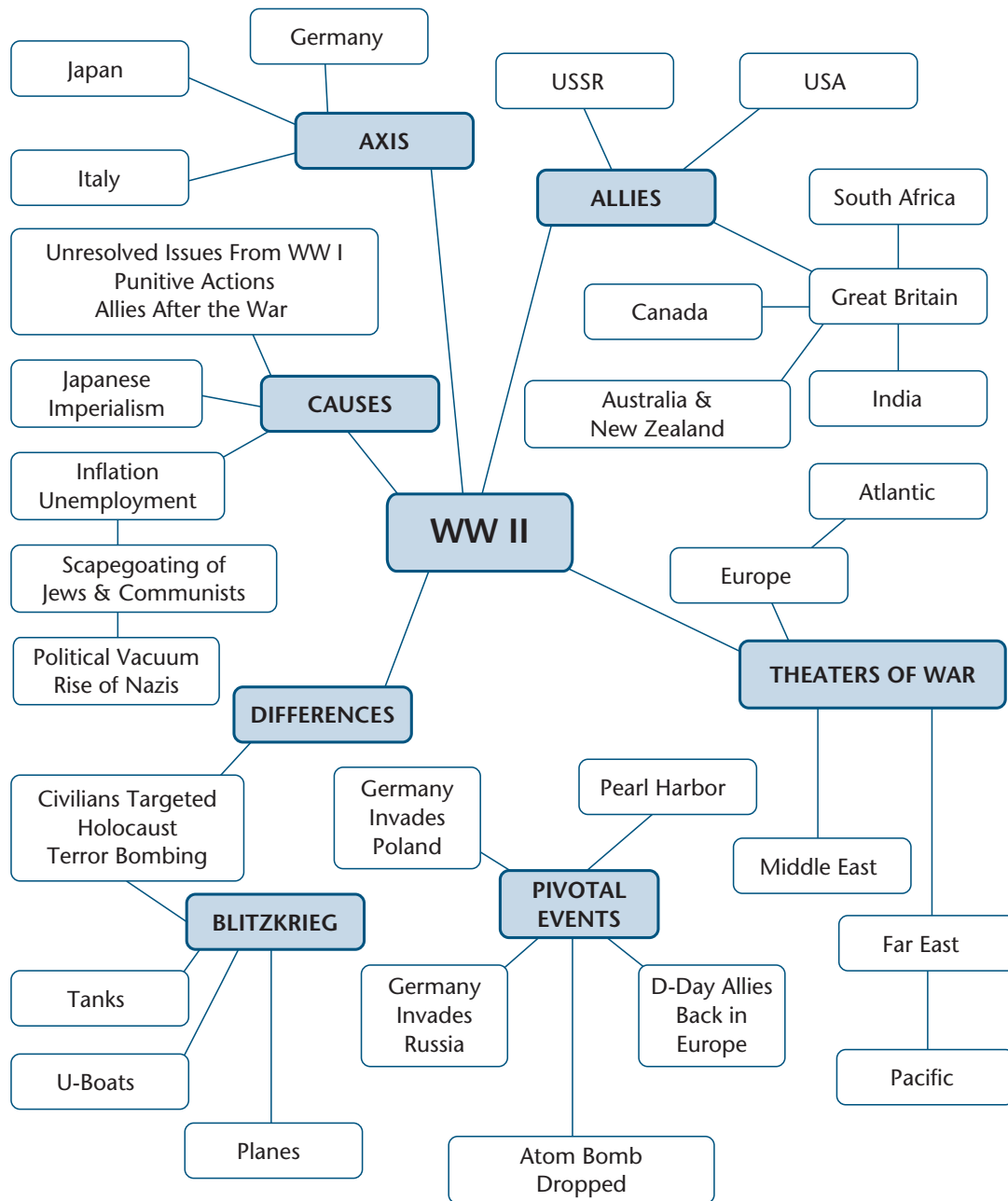3.

4.

5.

6.

1.

2.

3.

4.

5.

6.

Figure 6.12   Example of a Word Web Used to Organize and Classify Primary and Secondary Concepts Related to World War II

A word web can be used to assess how well students have organized data. It also indicates that they have grasped the major concepts and made connections between them. It is also a useful tool to organize thinking in the prewriting stage.

Source: Used with permission from Terence Parry.

Figure 6.13 Graphic Organizer Framework
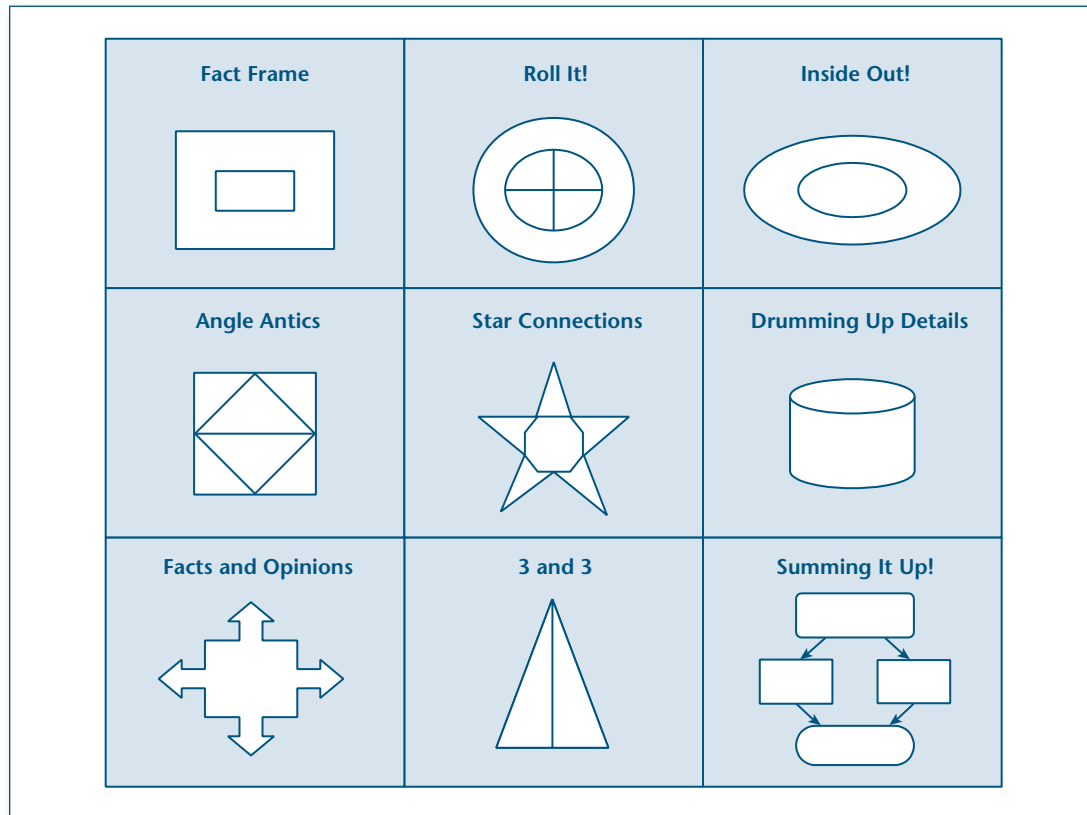
1. **Fact Frame:** Write fact in center box. Write supporting details in outer box.

2. **Roll It!** Write topic in the tire section. Write four key points in the spokes.

3. **Inside Out!** Write an important event, object, character, or place in the center. Write its attributes in the outer oval.

4. **Angle Antics:** Put a cause in each big triangle. Write the effects on each side of the cause.

5. **Star Connections:** Place the topic in the middle. Add a key fact in each star point.

6. **Drumming Up Details:** Write a prediction on the top of the drum. State the outcomes or learned facts on the side of the drum.

7. **Facts and Opinions:** Write the fact in the center. List an opinion by each arrow.

8. **3 and 3:** Write an important topic vocabulary noun in each of the large triangles. Write the meaning, a sentence, and draw a picture on the sidelines.

9. **Summing It Up!** In the top rectangle, write the fact. In the next two boxes, write two supporting details. Then write the summary or conclusion in the bottom figure.

ROLE-PLAYING

What Is It?

Role-playing is when a student takes on the role of a character, perhaps from a story, play, or novel; a historical or political figure; or someone depicting a particular scenario that deals with a concern or issue such as conflict resolution.

Why Do We Do It?

Role-playing allows students to process knowledge and demonstrate skills in an emotionally laden context. It is a form of elaborative rehearsal that causes students to interact with content and concepts and, ideally, create an episodic memory. It affords students the opportunity to examine and organize information, deal with issues, and create or re-create situations that have meaning. The roles students take on allow them to become immersed in situations. They become that person or character and take on that persona. As they play that role, their emotions are involved, and the emotional brain punctuates the moment. Role-playing allows students to be involved at their levels. Many students have strong verbal and interpersonal skills, and this technique allows them to use those skills. It also gives those bodily/kinesthetic students a chance for movement and expression.

How Do We Do It?

Allow students the opportunity to be involved when they are comfortable. Encourage students to choose the type of role-playing they would like to do. Try using a "choice board" similar to the one shown in Figure 6.14. Teachers find that they must work within the comfort zones of students; those who are more intrapersonal do not always embrace this technique because they may not be as gregarious as other students. Initially, teachers may have students engage in improvisation. As teachers begin to introduce this technique to students, they may want to use mime initially or provide a script. After several tries at role-playing, students may begin to write scripts for themselves. Props and scenery may be included if needed or available.

All students will need to identify appropriate audience interaction and behavior and monitor that behavior in role-playing situations. Feedback to participants should be positive and constructive. Reflection and emotional reactions should be processed after each attempt at role-playing. Role-playing places information and key concepts in a contextual learning situation and increases the chances for understanding and retention.

INDEPENDENT WORK ASSIGNMENTS

In every classroom, independent work is given daily. In a differentiated classroom, independent work time can be a time to meet individual gaps in the learning or challenge the students who know the information. Students are not always doing the same assignments. Some examples follow of activities that can be used as independent work assignments are listed on page 141.

Figure 6.14   Choice Board for Role-Playing

Format	Scenes	Props
Narrative actors	Transparencies	Artifacts
Interviews	Stage	Television frames
Mimes	Mural	Costumes

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DIFFERENTIATING LEVELS OF THINKING AND QUESTIONING

Undue stress can occur during teacher-student question-and-answer sessions, and with excessive anxiety students can't access information filed in the neocortex. Fear of ridicule and inability to retrieve and recall occur when students are challenged by questions that are beyond their levels of understanding or comprehension. Wait time (Rowe, 1988) gives students time to access information stored in long-term memory. We know this takes at least 3 to 5 seconds. The quality or quantity of the answer is often increased by the amount of time given to access the information and formulate an answer. Generally, the longer the think time, the better the answer.

Think, Pair, Share (Lyman & McTighe, 1988) is a great technique to facilitate wait time. Asking students to think by themselves, pair with other students, and share their ideas naturally gives them time to think, access information, and formulate better answers. This also decreases the chances of overstressing students and increases the chances of them actually thinking about and attending to the question that has been posed. It encourages all students to share thinking, not just the person called on to answer. Studies show that greater retention and student achievement (up to 60% greater) will result when students are given more wait time for thinking (Black, Harrison, Lee, Marshall, & Wiliam, 2004). As the teacher comes to know the learners better and to recognize their levels of readiness, questions can be differentiated by level of complexity. This challenges learners at or just beyond their levels of comprehension or experience.

The following are samples of assignment activities for follow-ups after learning information by reading a passage or a teacher lecturette. Use these ideas to develop differentiated assignments, such as agendas, homework, centers, or projects, for the students to demonstrate what has been learned. These assignments also intensify the learners' knowledge about a standard, concept, or unit.

Record findings.	Discuss with a partner.
Hold a small group text talk.	Develop questions.
Write a song.	Create a rap.
Develop a cinquain.	Write a limerick.
Write a poem.	Write an advertisement.
Develop a collage.	Role-play.
Find the background music.	Portray a reenactment.
Develop a caricature.	Draw a picture.
Develop an editorial cartoon.	Make a diorama.
Write a cartoon strip with speech bubbles.	Color code.
Illustrate the _____.	Write the attributes.
Write adjectives or phrases to describe.	Create a timeline.
Develop a mural.	Design a new game.
Play *Who Wants to Be a Millionaire*.	Play *Jeopardy*.
Design a puppet.	Draw the setting.
Find the missing piece(s).	Draw a map.
Write an editorial with your point of view.	Use a manipulative.
Make a bar graph and interpret the data.	Design a brochure.
Create a pie chart and explain the results.	Scavenge for information.
Develop a key.	Prepare a point of view.
Act out the vocabulary words.	Name the causes.
Create a vocabulary game.	List the reasons.
List the synonyms or antonyms.	Write the main idea.
Write a summary.	Write the directions.
Develop a critique.	Draw a conclusion.
Write your opinion.	Write the fact(s).
Discover how it works.	Name examples.
Develop the sequence.	Debate the issue.
Invent a new way.	Identify the sounds.
Conduct an interview.	Write an ad.

Bloom's Revised Thinking Taxonomy

For years teachers have used Bloom's taxonomy of thinking skills to foster higher-order thinking skills in students. The revised taxonomy (Anderson & Krathwohl, 2001) broadens the opportunities for critical and creative thinking and includes the following skills:

1. **Remember:** Accessing long-term memory

2. **Understand:** Comprehending through words, pictures, and symbols

3. **Apply:** Ways to use

4. **Analyze:** Parts to whole

5. **Evaluate:** Make judgments using criteria

6. **Create:** Take beyond, rearrange, and innovate

Figure 6.15   Process Verbs for Thinking Skills

Thinking Skills	Process Verbs
Remember	List, remember, define, tell, state, label
Understand	Summarize, describe, discuss, locate, calculate, explain
Apply	Illustrate, demonstrate, dramatize, solve, apply, operate
Analyze	Compare, analyze, contrast, classify, question, experiment
Evaluate	Select, judge, evaluate, support, advocate, defend
Create	Invent, create, construct, design, develop, synthesize

Bloom's levels (see Figure 6.15) can also be used to layer the curriculum. In our lesson-planning template (see Figure 1.3 in Chapter 1), the levels of working with the content and skills include acquiring the knowledge or skills, applying and adjusting them in other situations, and assessing and evaluating their use.

Teachers may differentiate questions or layer curriculum based on students' readiness and levels of comprehension. Figures 6.16 and 6.17 offer samples of thinking level, definition, directing verbs, and question starters that may be used to align lessons and learning tasks with the different levels of the taxonomy.

We plan opportunities so that students interact with new knowledge and skills and develop an understanding and ability to retain and retrieve information in long-term memory. This is the learning process. By using verbs from Bloom's taxonomy, we can deepen understanding and learning using multiple rehearsals that "drill down" into the knowledge and skills. For example, related to a concept or skill, the Potential Activities column in Figure 6.17 can guide us to work through the "Acquire, Apply and Adjust, and Assess" process.

CUBING

What Is It?

Cubing is another technique that can help students think at different levels of the taxonomy (Cowan & Cowan, 1980). Cubing is a technique for considering a subject from six points of view (Cowan & Cowan, 1980; Tomlinson, 2001). It works well when we are locked into a particular way of thinking.

One side of the cube may say: Remember it.

Another side: Understand it.

The third side: Apply it.

The fourth side: Analyze it.

The fifth side: Evaluate it.

And the sixth side says: Create it.

Figure 6.16   Aligning Lesson Plans With the Six Levels of Bloom's Taxonomy

Lesson-Planning Steps	Thinking Level	Definition	Directing Verbs
Acquire	**Remember** Knowledge Learn information	Recall the facts and remember previously learned information.	Describe, list, identify, locate, label
Apply	**Understand** Comprehension information	Understand the meaning of and the how and why of events.	Explain, give examples, paraphrase, summarize
Adjust	**Apply** Use information	Transfer the skill or knowledge to another situation or setting. It tests knowledge and comprehension.	Infer, predict, deduce, adapt, modify, solve problems
Adjust	**Analysis** Examine parts	Break down information to specific parts so that the whole can be understood. Understanding structure can help with comparisons.	Discriminate, classify, categorize, subdivide, delineate
Adjust	**Evaluate** Judge the information	Combine elements to create new and different ideas or models.	Judge, compare, criticize, contrast, justify, conclude
Assess	**Create** Use differently	Rank or rate the value of information using a set of criteria.	Induce, create, compose, generalize, combine, rearrange, design, plan

Cubes may vary with tasks or commands that are appropriate to the level of readiness of the group. Cubes may also be constructed with tasks in a particular area of multiple intelligences, such as verbal/linguistic, bodily/kinesthetic, or intrapersonal intelligence.

Why Do We Use It?

Cubing, with its many sides, allows students to look at an issue or topic from a variety of angles and to develop a multidimensional perspective rather than a single one.

Figure 6.17 Question Starters and Classroom Activities Differentiated According to Bloom's Taxonomy

QUESTION STARTERS

POTENTIAL ACTIVITIES

Level I: REMEMBER (recall)

1. What is the definition for . . . ?
2. What happened after . . . ?
3. Recall the facts.
4. What were the characteristics of . . . ?
5. Which is true or false?
6. How many . . . ?
7. Who was the . . . ?
8. Tell in your own words.

1. Describe the . . .
2. Make a time line of events.
3. Make a facts chart.
4. Write a list of . . . steps in . . . facts about . . .
5. List all the people in the story.
6. Make a chart showing . . .
7. Make an acrostic.
8. Recite a poem.

Level II: UNDERSTAND

1. Why are these ideas similar?
2. In your own words retell the story of . . .
3. What do you think could happen?
4. How are these ideas different?
5. Explain what happened after.
6. What are some examples?
7. Can you provide a definition of . . . ?
8. Who was the key character?

1. Cut out or draw pictures to show an event.
2. Illustrate what you think the main idea was.
3. Make a cartoon strip showing the sequence of . . .
4. Write and perform a play based on the . . .
5. Compare this _____ with _____
6. Construct a model of . . .
7. Write a news report.
8. Prepare a flow chart to show the sequence . . .

Level III: APPLICATION (applying without understanding is not effective)

1. What is another instance of . . . ?
2. Demonstrate the way to . . .
3. Which one is most like . . . ?
4. What questions would you ask?
5. Which factors would you change?
6. Could this have happened in . . . ? Why or why not?
7. How would you organize these ideas?

1. Construct a model to demonstrate using it.
2. Make a display to illustrate one event.
3. Make a collection about . . .
4. Design a relief map to include relevant information about an event.
5. Scan a collection of photographs to illustrate a particular aspect of the study.
6. Create a mural to depict . . .

Figure 6.17   (Continued)

QUESTION STARTERS	POTENTIAL ACTIVITIES
Level IV: ANALYSIS 1. What are the component parts of . . . ? 2. What steps are important in the process of . . . ? 3. If . . . then . . . 4. What other conclusions can you reach about . . . that have not been mentioned? 5. The difference between the fact and the hypothesis is . . . 6. The solution would be to . . . 7. What is the relationship between . . . and . . . ?	1. Design a questionnaire about . . . 2. Conduct an investigation to produce . . . 3. Make a flow chart to show . . . 4. Construct a graph to show . . . 5. Put on a play about . . . 6. Review . . . in terms of identified criteria. 7. Prepare a report about the area of study.
Level V: EVALUATE 1. In your opinion . . . 2. Appraise the chances for . . . 3. Grade or rank the . . . 4. What do you think should be the outcome? 5. What solution do you favor and why? 6. Which systems are best? Worst? 7. Rate the relative value of these ideas to . . . 8. Which is the better bargain?	1. Prepare a list of criteria you would use to judge a . . . Indicate priority ratings you would give. 2. Conduct a debate about an issue. 3. Prepare an annotated bibliography . . . 4. Form a discussion panel on the topic of . . . 5. Prepare a case to present your opinions about . . . 6. List some common assumptions about . . . Rationalize your reactions.
Level VI: CREATE 1. Can you design a . . . ? 2. Why not compose a song about . . . ? 3. Why don't you devise your own way to . . . ? 4. Can you create new and unusual uses for . . . ? 5. Can you develop a proposal for . . . ? 6. How would you deal with . . . ? 7. Invent a scheme that would . . .	1. Create a model that shows your new ideas. 2. Devise an original plan or experiment for . . . 3. Finish the incomplete . . . 4. Make a hypothesis about . . . 5. Change . . . so that it will . . . 6. Propose a method to . . . 7. Prescribe a way to . . . 8. Give the book a new title.

Cubes offer a chance to differentiate learning by readiness (familiarity with content or level of skill), student interest, and/or learning profile (multiple intelligences). Cubes may vary in color and tasks depending on the abilities and interests of the small group. They add an element of novelty and fun to the learning by providing uniqueness to the lesson. It is a great strategy for tactile/kinesthetic learners as they reinforce understanding and extend or demonstrate learning.

How Do We Use It?

1. Keep clear learning goals in mind when considering the use of cubing for different learners.

2. Provide extended opportunities, materials, and learning situations that are appropriate for a wide range of readiness, interests, and learning styles.

3. Make sure students understand the verbs and directions for the tasks.

4. Group students according to readiness, with different colored cubes giving tasks or questions appropriate to their levels of understanding and ability in that particular topic or skill. Students assist one another in their learning.

5. Ask students to share findings with the large group or to form base groups of experts to share their tasks.

Figure 6.18 suggests verbs that may be used on all six sides of a cube.

Cubing may also be differentiated using multiple intelligences. Cubes may be designed with a variety of multiple intelligences activities to give students a chance to use their varied strengths. As an alternative, teachers can also use a die with numbers 1 to 6 and provide students with activity cards at various levels of complexity related to the topic (see Figure 6.19).

If students are studying the planets, for example, they might have a variety of cubes in the different multiple intelligences to process information for musical/rhythmic, bodily/kinesthetic, visual/spatial, naturalist, logical/mathematical, interpersonal, or intrapersonal intelligences. Or in a class where students are reading *Charlotte's Web,* by E. B. White, cubes could be used to deal with visual/spatial intelligence, and students could be given the following statements on the sides of their cubes.

Green Cube

1. Draw Charlotte as you think she looks.

2. Use a Venn diagram to compare Charlotte and Fern.

3. Use a comic strip to tell what happened in this chapter.

4. Shut your eyes and describe the barn. Jot down your ideas.

5. In your opinion, why is Charlotte a good friend?

6. Predict what will happen in the next chapter. Use symbols.

Figure 6.18 Use of Different Verbs, Tasks, and Commands on Each Side of a Cube

Cubing . . . Levels of Thinking

1. Tell
    Describe
    Recall
    Name
    Locate
    List
	4. Review
	    Discuss
	    Prepare
	    Diagram
	    Cartoon

2. Compare
    Contrast
    Example
    Explain
    Define
    Write
	5. Propose
	    Suggest
	    Finish
	    Prescribe
	    Devise

3. Connect
    Make
    Design
    Produce
    Develop
	6. Debate
	    Formu late
	    Choose
	    Support
	    In your opinion . . .

Yellow Cube

1. Use a graphics program on the computer to create a character web for Wilbur.

2. Use symbols on a Venn diagram to compare Wilbur and Charlotte.

3. Use a storyboard to show the progress of the plot to this point.

4. Draw the farm and label the items, people, and buildings.

5. When you think of the title, do you agree or disagree that it is a good choice? Why or why not?

6. What is the message that you think the writer wants people to remember? Draw a symbol that illustrates your idea.

Both cubes are tapping into using visual/spatial intelligence; the green cube is working at a more basic level, with key aspects of the story, and the yellow cube is stretching student thinking more in the abstraction, extending ideas and making connections.

Figure 6.19 Cubes Vary in Color and Tasks Depending on the Prior Knowledge and Interests of the Learners

Green Cube	Blue Cube
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.
Yellow Cube	**Red Cube**
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.

Teachers who use a variety of instructional strategies add novelty, choice, and individuality to the learning. These strategies allow diverse learners to find a size that fits and suits and to engage in practice and rehearsal to deepen understanding through as many learning styles and multiple intelligences as they can.

USING TECHNOLOGY IN
THE DIFFERENTIATED CLASSROOM

Technology is a must in classrooms today. We are dealing with *digital natives* after all. Students understand it as part of their world and are motivated to readily use technological tools. Most classrooms have document readers, an interactive board, and a teacher's computer to use with the board. For many years computer labs have been common in schools. Today many schools supply computers for students to use in a station to share or tablets or laptops for each class member. This is an expensive endeavor but is proving to be well worth the investment. Other schools have mobile computer carts with enough tablets for each student. This means that the lab is rolled into the classroom and can be shared by classes at different times of the day.

Successful use of technology in the classroom depends on the knowledge of the teacher. There must be professional development training for teachers so that as the equipment is made available they know how to use it and make the equipment a working instructional strategy.

The positive aspects of using gadgets outweigh the negative, but there are some problems that can occur without careful monitoring and planning. Time on task and using time to teach and learn are important. The following are some of the problems related to using technology:

- Interruptions from unexpected glitches with the equipment
- A game becoming the focus instead of the learning of information
- Overuse that causes learners to get out of the habit of using other quality ways to think and solve problems
- Off-task behavior
- Misuse of the gadget

There are many opportunities for students to learn and practice on the computer so that they use higher-order thinking skills and problem solve. Instead of technology becoming the instructional tool or strategy, it needs to be one of many ways to teach. Memorable learning often happens when using technology to make personal links and connections to the topic. These can include a related video clip, music of the students' generation, or a web picture of something unfamiliar. Students can interact and exchange information with others from different parts of the world, other schools, and other classrooms.

Classroom response clickers get each student answering a question. Each member of the class, pair, or small group is assigned a clicker to respond to a posed question. The results are given so the teacher can assess opinions, misunderstandings, gaps in the learning, needs for interventions, or areas of mastery.

Technological gadgets are such popular items with students. The use has to be monitored and established rules enforced for successful use in the classroom. Clear expectations have to be established so as to avoid inappropriate use of gadgets.

More and more school districts are giving permission to use personal gadgets such as e-readers, cameras, tablets, and smartphones in the classroom. These gadgets are highly stimulating to the mind, and this concept is turning a recreational gadget into a useful learning tool. For example, smartphones are equipped to send text messages and emails, take and send photographs and videos, play games, and surf the

Internet. These are very useful and challenging during learning. Students often become bored with lectures and some assignments. They become excited and engaged if they are challenged to find answers and create unique ways of presenting information using their world of gadgets. The key is the teacher finding beneficial educational opportunities to use the gadgets at appropriate times. It requires constantly monitoring and enforcing the rules.

Less Paper and More Technology

More and more classroom teachers are planning lessons that use gadgets and computer programs for lessons, which requires less paper. For example, many projects are being done online. E-portfolios are being used as a way for students to digitally display their work, receive comments and feedback, self-assess their progress, and complete their goals. Classroom and homework assignments are being completed online as a way to communicate with peers as well as the teacher for feedback and assistance. Teachers are posting lesson plans, attendance, and having dialogue with other teachers, students, administrators, and parents online.

The success of this advancement means ongoing professional development for all school staff. They have to be trained in how to use the equipment and the programs. Also, it is vital to keep the equipment accessible, up to date, and working. Continually sharing new resources that are available provides the tools for successful classroom implementation.

Valuable Tools for Implementing Technology

Some of the web resources available are blogs, wikis, discussion boards, glossaries, RSS feeds, polls, surveys, social bookmarking, grading, lesson plans, and assignments (Chapman & Vagle, 2011). Continually search for websites to keep current with the most valuable tools for implementing technology in the classroom.

There are numerous instructional strategies, and we continue to learn and add to our expertise, like adding clothes to our wardrobes. However, as teachers build and increase their repertoires, they will see how they can adjust the learning for their group of learners and how different strategies appeal to different learners.

One size doesn't fit all, and, happily, one size doesn't have to.

Chapter 6 Reflections

In your professional learning communities, discuss the following:

1. Considering the Best Practice, Brain Research chart in Figure 6.3. Which strategies are you using on a routine basis?

2. Which instructional strategy will you incorporate into your repertoire in the next month?

3. How will you do that? With what content might you try it?

4. With whom could you work and plan for this implementation?

5. How will you monitor student improvement or reaction to the use of this strategy?

6. Brainstorm lists of focus activities and graphic organizers.

7. Design cubes for upcoming topics.