

## Hooked on thinking

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All of us work hard to motivate our students to think because they must become analytical and creative thinkers if they are going to meet the tremendous needs of the 21st-century workforce. According to *The Kiplinger Letter* ("Forecasts," 2003), "The first of seventy-eight million boomers can start retiring in five years. And far fewer younger workers have the know-how to replace the retirees. Also, 20 million jobs will be created by 2010, exacerbating the problem" (p. 2).

This revelation presents an awesome challenge for educators—we must teach all children to read and think. We cannot afford to leave any of them behind. To meet this challenge, we have created the Skyscraper—a graphic organizer based on Bloom's Taxonomy (see Figure 1) as a concrete model to help all students achieve higher order thinking. The skyscraper analogy relates to a quote from Oliver Wendell Holmes:

There are one-story intellects, two-story intellects, and three-story intellects with skylights. All fact collectors, who have no aim beyond their facts, are one-story men. Two-story men compare, reason, generalize, using the labors of the fact collectors as well as their own. Three-story men idealize, imagine, predict—their best illumination comes from above, through the skylight.

Several years ago, when we created the Skyscraper, we knew students were capable of more rigorous thinking and discussions of text than they were demonstrating in our classrooms. However, we had difficulty finding an instructional model that would enable us to help students develop thinking skills. As we struggled to find a solution, the analogy of a skyscraper came to mind

with its feature of ascending floors. The floors symbolize the effort needed to reach the next level. This graphic also conveys an enhanced view or broadened perspective from the top floor, making the Skyscraper the perfect visual to symbolize higher order thinking.

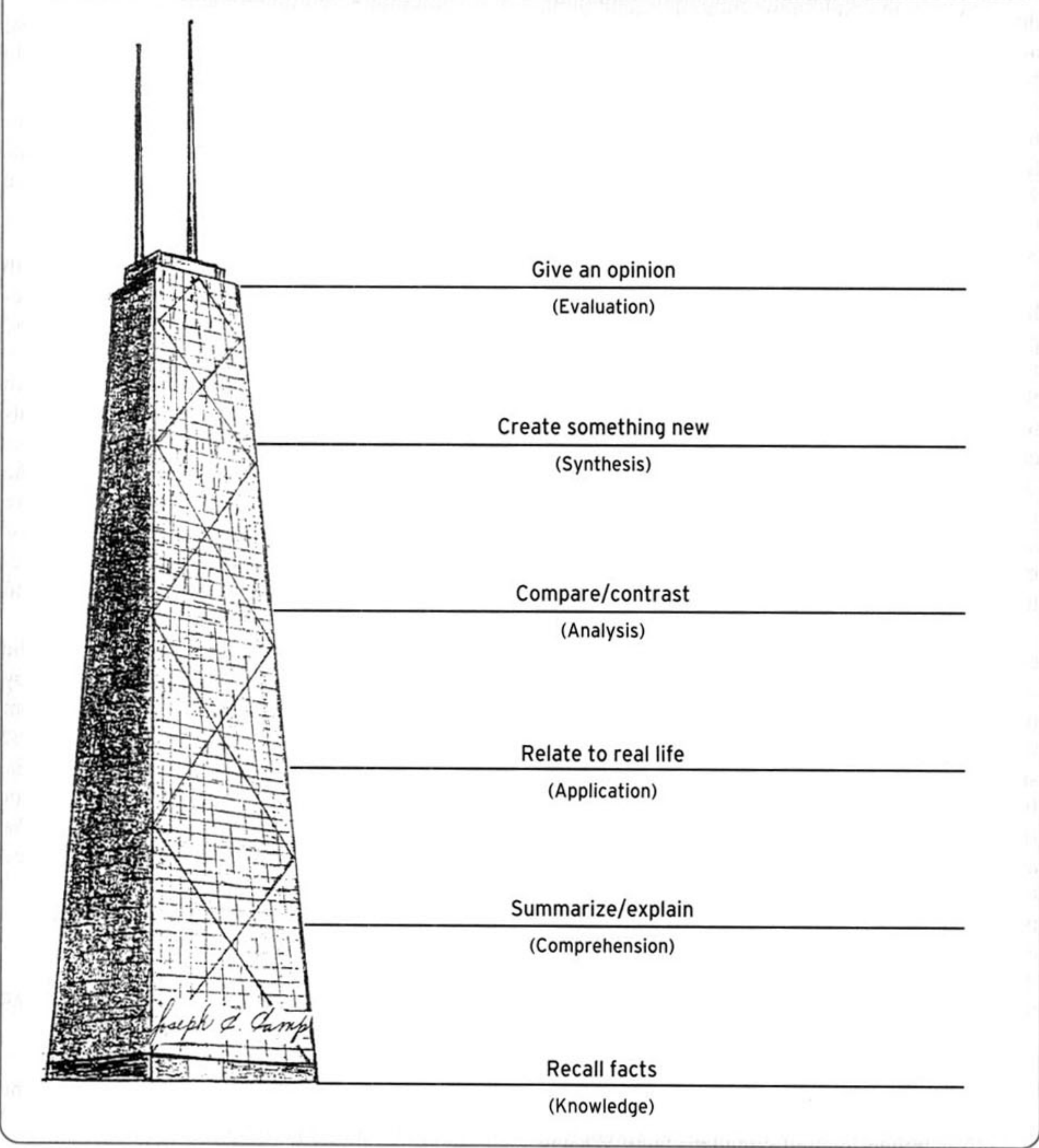
Research supports the use of graphics in the classroom. The National Reading Panel report indicated that graphic and semantic organizers and question-generation and question-answering strategies improve comprehension (National Institute of Child Health and Human Development, 2000). We believe that the Skyscraper graphic organizer helps students become cognizant of their thinking and provides them with a strategy for generating and answering higher level questions.

### Using the Skyscraper

Teachers can help students develop their thinking skills by following a step-by-step procedure. First, the teacher helps students relate the various levels of thinking to the concrete model of a skyscraper. The following is an example of an author study unit in a fourth-grade classroom.

The fourth-grade class is studying Roald Dahl, and the teacher reads *The Witches* (Puffin, 2002) orally to the students. They discuss vocabulary, characters, and events to ensure basic comprehension before the teacher is ready to introduce the Skyscraper to her students. By presenting and referring to the Skyscraper model, as shown in Figure 1, the teacher helps students visualize how moving up the stairs of a skyscraper is similar to mov-

**FIGURE 1**  
**Bloom's Taxonomy adapted for use with literature**



ing up to higher levels of thinking. She begins by telling her students that walking into a skyscraper is easy and takes little effort. However, getting to the top floor is a more difficult task. Pointing to different locations on a poster of the Skyscraper, the

teacher says that climbing each new set of stairs to the next floor takes more effort than the one before. As you stop to look out the window on each ascending floor, you notice that your view begins to change. You're no longer focused on the details of

objects on the ground. Though the details are still present, they no longer restrict your view. You are now able to notice all that's around you. Finally, due to the increased altitude of the top floor, you acquire a greater understanding of where you are because you see the "big picture."

Next, the teacher connects the Skyscraper scenario to thinking. She explains to her students that the facts in a story or textbook are easy to find. They're right there in the print before your eyes. (Here the teacher points to the bottom of the Skyscraper.) However, discovering new findings, making judgments, and expressing opinions are higher levels of thinking that take more effort and processing by the student than identifying bare facts. (The teacher points to higher levels on the Skyscraper.) Just as your view changed as you went up the floors of the Skyscraper, your thinking changes as you move to higher levels. Though the details are still present in the text, they no longer restrict your thinking. You are now able to think about the "big idea" of the text. The big idea is the meaning, beyond the literal level, that you formulate for the text.

At this point, the students can visualize the connection between thinking levels. Thus, the teacher moves on to explain each of the six levels of Bloom's Taxonomy, pointing to its location on the Skyscraper. The teacher's objective is to help students understand that moving their thinking from the knowledge level to the evaluation level results in more meaningful or expanded thinking, just as moving from the bottom floor of the skyscraper to the top floor results in a more meaningful or expanded view. Following is the language that teachers in our school use to explain to their students the levels of Bloom's Taxonomy and the prompts related to each level.

- Knowledge/get the facts: What is \_\_\_\_\_? Can you recall \_\_\_\_\_? How would you explain \_\_\_\_\_?
- Comprehension/understand the facts: What is the main idea of \_\_\_\_\_? How would you summarize \_\_\_\_\_? What facts or ideas show \_\_\_\_\_?
- Application/make a connection: What examples can you find to \_\_\_\_\_? How would you show your understanding of \_\_\_\_\_?

- Analysis/take apart: How would you classify \_\_\_\_\_? What conclusions can you draw? Why do you think \_\_\_\_\_?
- Synthesis/create something new: What would happen if \_\_\_\_\_? Suppose you could \_\_\_\_\_. What would you do?
- Evaluation/give an opinion: What is your opinion of \_\_\_\_\_? Why was it better than \_\_\_\_\_? What judgment would you make about \_\_\_\_\_?

The teacher in the earlier example noted that with practice her students can identify a low-, middle- and high-level question because they understand the meaning of each level and can identify its location on the Skyscraper. This activity is much more than an exercise in memorization. If students identify a question at the knowledge level, they become aware that they are at the bottom of the Skyscraper and must move up to create a more meaningful question. As the students' thinking ascends the Skyscraper, they begin to make connections with life experiences, draw conclusions, and formulate opinions.

While reading orally to the students, the teacher models the different levels of questions by thinking aloud. We crafted the following classroom scenario, including dialogue between teacher and students, to demonstrate how to use this approach.

The teacher positions herself near the poster of the Skyscraper while reading the book *The Witches* to her students, pausing at designated points in the story to ask questions.

- Teacher: How was the boy changed in the story?  
 Mari: He was turned into a mouse.  
 Teacher: How do you know that the boy turned into a mouse?  
 Mari: Because it tells us in the book.  
 Teacher: Can you find the page that tells us that the boy changed?  
 Mari: Yes, it tells us on page 32 that the little boy turned into a mouse.  
 Teacher: Is that a knowledge question or an evaluation question? Is that question at the bottom of the Skyscraper or the top?  
 Jacob: That's a bottom-floor question.  
 Teacher: Why is it a bottom-floor/knowledge question?

Jacob: Because you can find the answer in the book on page 32.

Teacher: That's right! Facts are written in the book. You can easily find the facts in a story. Why are facts important?

Mari: Facts tell you what's going on in the story.

Teacher: Excellent! We need to keep thinking about the facts in the story and stringing them along in our minds.

The teacher now takes a strip of paper and writes the question "How was the boy changed?" She asks Mari to write the answer under the question and adhere the strip of paper to the first floor of the Skyscraper. The teacher continues this model of reading and questioning while interspersing higher order questions as well.

Teacher: Who can tell us how to take a fact, like the boy turned into a mouse, and ascend the Skyscraper to create high-order questions?

Tim: If my answer to a question is in the book, I know I'm thinking at the bottom of the Skyscraper. So, I have to go up the Skyscraper to ask a question that can't be answered by just looking in the book, like trying to make a connection with my own life.

Teacher: Tim, can you think of a question at a higher level on the Skyscraper?

Tim: What if you were turned into a mouse? How would you feel?

Greta: I'd feel scared because no one would know me.

Teacher: Can Greta's answer be found in the book?

Jacob: No, she had to use the facts from the book and think about her own feelings.

Teacher: Let's think about another question. What is Roald Dahl's message? What is he trying to tell the boys and girls who read his book?

Tim: I think he's telling us to make the best of your life.

Teacher: Did you find your answer in the book?

Tim: No.

Teacher: How did you decide that this was the author's message?

Tim: I thought about the little boy who was turned into a mouse and how he handled the change in his life. He really wasn't upset. He was a mouse person and had fun.

Teacher: Where does Tim's answer belong on the Skyscraper?

Greta: It belongs on the top floor.

Teacher: Why?

Greta: Because he's giving us his (informed) opinion. You can't find Tim's answer in the book.

Teacher: That's right. Tim had to think about all the events and facts in the story before he could decide what the author's message was.

The teacher asks Tim to write his question and the answer on a strip of paper. She asks Tim to place it on the top floor of the skyscraper.

Teacher: Why is Skyscraper thinking important?

Marc: Because it makes you think.

Teacher: How does it make you think?

Marc: Because you have to think about all the facts that happened in the story.

Teacher: What do you do with the facts after you think about them?

Marc: You can come up with your own ideas about the book.

Teacher: Why is it important to have your own ideas about a book?

Marc: Because it's about what you're thinking while you're reading the book (metacognition).

In the third step of this procedure, the students, individually and in groups, practice generating different levels of questions. After the teacher has modeled the procedure for using the Skyscraper, the students are ready to read books by Roald Dahl at their instructional reading level. *Charlie and the Chocolate Factory* (Puffin, 2002), *Minpins* (Puffin, 1994), *The Enormous Crocodile* (Puffin, 2001), and *The Twits* (Puffin, 2002) are chosen for reading. Literature circles are designed by the teacher, and all students have a copy of the Skyscraper with them while they read their books. Each day the teacher assigns a number of pages to read. She also asks students to create questions reflecting levels of the Skyscraper. After the readings are completed, students share their questions and answers in their literature circles. The students are instructed by the teacher to always justify their answers by telling the group why and how they respond to certain prompts and how that helps their thinking.

This classroom example illustrates one way a teacher used the Skyscraper. Here are ideas from other teachers in our school:

**FIGURE 2**  
Skyscraper for use as an assessment (planning tool for teachers)

Health unit on the heart

Evaluate a friend or relative's life style related to what you know about maintaining a healthy heart and make any recommendations for improvement.

(Evaluation)

Describe the journey of a blood cell through the arteries of an unhealthy heart.

(Synthesis)

Compare and contrast the life styles of a person with a healthy heart to a person with heart disease.

(Analysis)

Write a paragraph describing the things you do to keep your heart healthy

(Application)

Describe the functions of each part of the heart.

(Comprehension)

Joseph A. Camp Draw and label the parts of the human heart.

(Knowledge)

- Students refer to the Skyscraper posted in the classroom as they respond to questions from the teacher either orally or in writing.
- As a quick check of comprehension, the teacher gives students the Skyscraper with a question at each level of thinking after reading a story or piece of nonfiction text.
- Students are given a copy of the Skyscraper. As they read, they formulate questions or responses. They place them on the appropriate

levels of the skyscraper to help them monitor their thinking while reading. Later they use them for discussion.

- Teachers use the Skyscraper as a planning tool for instructional activities and assessments. On the ascending lines of the Skyscraper, teachers pose written questions that correspond to each of the six levels of thinking. Each question would be given a different weight (evaluation the highest; factual the lowest) when the teacher assessed or scored student responses. (See Figure 2.) Bloom found that over 95% of the test questions students encounter can be classified at the bottom level, the recall of information (see [www.officeport.com/edu/blooms.html](http://www.officeport.com/edu/blooms.html)).
- The Skyscraper can be an anchoring activity to differentiate instruction. During a fairy-tale unit, one of the teachers glues a picture of a small skyscraper with its accompanying levels to six file folders. Inside each folder is a menu consisting of two to three activities from which the students can choose. (For example, Knowledge folder: What did the wolf do to trick Little Red Riding Hood? Evaluation folder: Pretend you are the wolf in the story. Write a short paragraph defending your actions.) This folder activity allows the whole class to explore all levels of thinking. It also provides students with an opportunity to make choices, and it allows the teacher to monitor students' progress while they are developing their thinking skills.

## Helping students learn to think

In assessing the effectiveness of using the Skyscraper as an instructional model, we have gleaned a variety of empirical evidence to justify its continued employment. The implementation of this

concrete model by all staff members within all grade levels has created a sequential, cohesive, and universal approach in assisting students to develop and internalize their cognitive skills to a higher degree. The majority of students—not just the talented—can identify and generate questions that fall into the six cognitive levels.

This ability has been demonstrated when students are perusing written text, doing hands-on activities, or involved in discussions requiring interpolations or extrapolations. It's the consensus of the teachers that they have witnessed substantial improvement in their students' ability to process and dissect the facts and formulate solutions or conclusions as a result of their exposure to the Skyscraper and its accompanying activities.

The Skyscraper has enabled students to become teachers. When someone can generate questions from all six levels and either knows the answers to these queries or is cognizant of the process to follow in search of an answer, that person has acquired the traits and skills of an exemplary teacher. We need more people reaching and peering from the top floor of the Skyscraper.

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