Deeper Learning through Questioning

Asking good questions is central to learning and sometimes can be more important than getting the answers, particularly when the questions encourage students to think critically. *Skill in the art of questioning lies at the basis of all good teaching* (Betts, 1910, p. 55). Equally important is helping students use self questioning to monitor their learning. This fact sheet focuses on both teacher questioning and student self questioning.

About Questioning

Questioning as an instructional tool can be traced back to the fourth century BCE, when Socrates used questions and answers to challenge assumptions, expose contradictions, and lead to new knowledge and wisdom. Used in this way, questioning can be an undeniably powerful teaching approach. By his comment at his trial for heresy, *"An unexamined life is not worth living,"* Socrates made it clear that he also understood the importance of self-examination, or questioning oneself.

When teachers ask higher-order questions and give students opportunities to develop deep explanations, learning is enhanced across content areas. Higher-order questions often start with question stems such as *Why, What caused, How did it occur, What if, How does it compare,* or *What is the evidence.* When teachers ask higher-order questions and encourage explanations, they help their students develop important critical thinking skills. By modeling good questioning and encouraging students to ask questions of themselves, teachers can help students learn independently and improve their learning.

Teacher Questioning

A traditional teacher-led question-and-answer approach that is widely used is **recitation**, or the **Initiate-Response-Evaluat**e (I-R-E) model of questioning (Mehan, 1979). Although this model can be an effective way to check for factual knowledge or recall, it typically does not encourage higher-order thinking.

Most of the time, I-R-E questions expect one right answer. The I-R-E sequence consists of the teacher initiating a question, the student responding with an answer, and the teacher evaluating the student's response or giving feedback. Each round of interaction involves one student at a time, with the teacher asking, evaluating, and then moving on to question another student. With this model, teachers typically talk about two-thirds of the time (Cazden, 2001), spending an estimated 35–50 percent of their instructional time questioning students and asking one to three questions per minute.

A number of recent studies have begun to investigate the possibility of making classroom interaction more dialogic (e.g., Gibbons, 2002; Nystrand, 1997; Wells, 1999). Learning is likely to be more effective when students are actively involved in a dialogue in which they are co-constructors of meaning. Coming to know something requires learners to actively participate as they construct and progressively improve their understanding through the exploration of ideas (Bransford, Brown, & Cocking, 2000). Integral to this process is posing thought-provoking questions and inviting students to "*make predictions, summarize, link texts with one another and with background knowledge, generate and answer text-related questions, clarify understandings, muster relevant evidence to support an interpretation, and interrelate reading, writing, and discussion*" (Applebee, Langer, Nystrand, & Gamoran, 2003, p. 693).

Questions are typically classified by the level of cognitive demand required to answer them. The best known system for categorizing the cognitive level of questions is Bloom's taxonomy (1956), in which six levels of cognitive demand move from the lowest-order processes to the highest. Lower-order questions ask students to recall and comprehend material that was previously read or taught by the teacher. Higher-order questions ask students to use information previously learned to create or support an answer with logically reasoned evidence. Both higher- and lower-order questions are useful and have their place in the teaching-learning process, but they serve different purposes.

A recent revision of Bloom's taxonomy (Anderson & Krathwohl, 2001) expresses the levels as verbs instead of nouns. Both the 1956 and the revised 2001 taxonomies are shown in the figure below.

Bloom	Revised Bloom
Evaluation	Create
Synthesis	Evaluate
Analysis	Analyze
Application	Apply
Comprehension	Understand
Knowledge	Remember

A meta-analysis of studies of instructional methods (Redfield & Rousseau, 1981) found a positive relationship between the predominant use of higher-level questions during instruction and student gains on tests of both factual recall and application of thinking skills. Studies of classroom instruction (Gall, 1970; Hare & Pulliam, 1980) confirm that only 20 percent of questions posed by teachers require more than simple factual recall, clearly pointing to a need for more teachers to become familiar with and use higher-order questions to encourage deeper learning.

The following questions are examples of those that teachers can ask to encourage deeper student thinking and learning.

Questions that ask for more evidence: *How do you know that? What data is that claim based on?*
Questions that ask for clarification: *Can you put that another way? What do you mean by that?*
Linking or extension questions: *Is there any connection between what you've just said and __? How does your comment fit with ___ earlier comment?*
Hypothetical questions: *What might have happened if ___?*
Cause and effect questions: *What is likely to be the effect of___?*
Summary and synthesis questions: *What are the one or two most important ideas that emerged from this discussion? What remains unresolved or contentious about this topic?*

A different taxonomy (Gallagher & Aschner, 1963) categorizes four types of questions:

- **Memory** questions focus on identifying, naming, defining, designating, and responding with yes or no. Key words are *who*, *what*, *where*, *when*.
- **Convergent thinking** questions focus on explaining, stating relationships, comparing, and contrasting. Key words are *why*, *how*, *in what way*.
- **Divergent thinking** questions focus on predicting, hypothesizing, inferring, and reconstructing. Key words are *imagine*, *suppose*, *predict*, *if…then…*, *how might*, *can you create*, *what are some possible consequences*.
- **Evaluative thinking** questions focus on valuing, defending, judging, and justifying choices. Key words are *defend*, *judge*, *justify*, *what do you think*, *what is your opinion*.

The K-W-L Strategy

An example of teacher questioning that supports thinking and discussion is the K-W-L strategy, which helps students learn from expository text in any content area (Ogle, 1986). Using this strategy, the teacher models for students how to create a three-column chart, labeling the first column K, the middle column W, and the third column L. The teacher then introduces the topic of the expository text that students are to read and asks students to tell what they know about the topic of the text (e.g., World War II). The teacher asks students to brainstorm words, terms, or phrases from their background knowledge that they associate with the topic and to record these in the K column of the chart. Next, the teacher asks students what they want to learn about the topic or what they think they will learn about the topic. As students predict what they might learn about the topic, they record the predictions in the W column of the chart. This helps set the students' purpose for reading. Next, students read the text. After reading, students record in the L column the new knowledge they learned from reading the text. The teacher then leads a discussion of the information that is recorded in the L column.

The K-W-L strategy supports student learning before, during, and after reading. Initially the teacher leads students through the steps of K-W-L and then transfers control to students. As students use this procedure over time, they become more actively involved in their reading of expository text. Students can also use K-W-L when reading on the job (e.g., *I'm reading a manual about how to do X. What do I already know? What questions do I have?*).

Question the Author

Question the Author (QtA) is a reading comprehension strategy that actively engages students with a text by asking them to pose questions of the author *while* they are reading, rather than *after* they read. In forming their questions, students become engaged in the reading and solidify their understanding of the text. QtA teaches students to critique the author's writing, challenge the author, recognize the author's perspective, and understand why the author made choices. The teacher moves through six QtA steps:

1. Select a reading text.
2. Identify stopping points where students may need to obtain a deeper understanding.
3. Create questions to encourage higher-order thinking, such as *What is the author trying to say? Why do you think the author chose this wording in this particular spot? How does this connect to what the author said earlier? How does the author let you know that something has changed?*
4. Present the passage to students along with one or two questions the teacher has already created.
5. Use "think-alouds" to model for students how to think through the questions.
6. Ask students to read the passage and work through the questions that the teacher has prepared for them, using the questioning style that the teacher modeled for them.

The power of QtA is that students do all the interpretive work: *"They construct the meaning, wrestle with the ideas, and consider the ways information connects to construct meaning"* (Beck, McKeown, Hamilton, & Kugan, 1977, p. 33).

Appropriate teacher modeling of questioning and the use of think-alouds in both the K-W-L and the QtA strategies lead students to use self-questioning. Teachers should repeatedly model and provide guided practice with these strategies until students demonstrate that they can use them independently.

Student Self-Questioning

The mother of Isidore Rabi, a Nobel laureate in physics, asked him every day when he returned home from school, *"Did you ask a good question today?"* rather than *"Did you learn anything in school today?"* Rabi credits this difference—asking good questions—as the reason he became a scientist (Sheff, 1988).

To become critical thinkers and independent learners, students need to ask themselves questions. Good readers ask themselves questions as they read. For example, when reading fiction, they ask themselves why characters do what they do; when reading editorials, they ask themselves critical questions about truthfulness and bias; and when reading complex text, they ask themselves whether they understand.

The National Reading Panel (2000) examined 203 studies of reading comprehension instruction and found the strongest scientifically-based evidence was for asking readers to generate questions while reading. Self-questioning was the most effective strategy—asking readers to generate questions while reading improves reading comprehension. To generate questions, students need to search the text and combine information, which helps them comprehend what they read. Question generation is both a cognitive strategy and a metacognitive strategy because the process of asking questions enhances comprehension through a focus on main ideas (content) and also checks understanding to determine whether the content is learned (Rosenshine, Meister, & Chapman, 1996).

Not all students automatically know how to generate good questions, but through modeling and coaching, a teacher can help students learn to self-question. For learners to generalize and apply the strategy when faced with a new task, they must be explicitly taught self-questioning. For example, a teacher can introduce students to the idea of asking questions as they read. The teacher can model the process by reading aloud and developing his or her own questions about the text. The teacher can then give students a short segment of text to read as he or she models questions about the text and gives students time to answer the questions. The teacher continues with the next segment of the text, but this time, students ask the questions. The teacher and students continue through the text, taking turns asking questions and making sure to model questions that go beyond the literal level.

Effective self-questioning can improve students' awareness and control of their thinking, which in turn can improve their learning. It can improve long-term retention of knowledge and skills, as well as the ability of students to apply and transfer the knowledge and skills they learn. It can engage and motivate students by making them active participants in the learning process. Two proven strategies for encouraging student self-questioning follow.

Guided Reciprocal Peer Questioning

Guided reciprocal peer questioning (King, 1990, 1991) is a strategy in which students question one another about the content they are learning, using higher-order, open-ended question stems that then become the focus of a structured, small-group discussion. Following a mini-lecture or an assigned reading, the teacher provides a set of generic questions stems and asks students to use the stems to generate questions about the content of the lecture or the reading. The following are examples of possible question stems:

What is the main idea of _____?
What if _____?
How does _____ affect _____?
What is a new example of _____?
Explain why _____ .
What conclusions can I draw about _____?
What is the difference between _____ and _____?
How would I use _____ to _____?
What are the strengths and weaknesses of _____?
What is the best _____ and why?

Students work individually to generate their own questions, using as many of these stems as possible. Then, working in a small group, each student offers a question, with sufficient time allotted for a meaningful discussion of the question.

By providing explicit instruction in self-questioning, modeling its use, allowing students time for practice with feedback, incorporating self-questioning strategies while teaching, and structuring activities that use peer questioning, a teacher can help students use self-questioning to enhance their learning.

Reciprocal Teaching

Reciprocal teaching (Palincsar & Brown, 1984) is an interactive teaching strategy that supports students in improving reading comprehension. It uses four strategies that the teacher needs to model over a number of sessions and that demonstrate how an expert reader uses comprehension strategies to understand a text:

- **Predicting** what the reading is about
- **Clarifying** words and phrases that were not understood during reading
- **Generating questions** about the text
- **Summarizing** what was read

Working in a small teacher-led group, students and the teacher read a passage of expository text paragraph by paragraph. The teacher explicitly models the four strategies by making a prediction, clarifying, asking questions, and summarizing the main idea of the paragraph, followed by a structured dialogue about the selected text. Students then practice the strategies on subsequent sections of text, with each student assuming the role of teacher (hence, the name "reciprocal teaching"). Summarizing helps students learn the content better. In addition, in attempting to summarize, students become aware of what they do not understand in the text, which helps improve comprehension (Palincsar & Brown, 1984).

During guided practice, there is a gradual shift from the teacher assuming responsibility for modeling the performance of a task to the teacher incrementally giving students more of the responsibility until they can perform the task independently. The goal is to have students in small groups discuss texts using the four comprehension strategies—predicting, clarifying, asking questions, and summarizing—and engage in reciprocal teaching.

An effective way to teach and have students practice the four comprehension strategies used in reciprocal teaching is to have them form groups of four and then give each group member a card identifying one of the roles–predictor, clarifier, questioner, summarizer. Students read a section of text and, on the basis of their assigned roles, prepare for their parts in the discussion of the text. The roles in the group then switch, and students read the next section of the text. This process is then repeated with students in new roles each time until they have read the entire text.

As defined by the National Research Council (2012), deeper learning is the process through which a person becomes capable of taking what was learned in one situation and applying it to new situations, learning transferable knowledge and skills. To encourage deeper student learning and facilitate thinking at the highest cognitive levels, teachers can ensure that they incorporate into their lesson planning the use of effective questions, particularly at the higher cognitive levels, and that they provide explicit instruction using think-alouds to model for students the use of self-questioning.

References

Anderson, L. & Krathwohl, D. (Eds.). (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's Taxonomy of Educational Objectives.* New York: Addison Wesley Longman.

Applebee, A., Langer, J., Nystrand, M., & Gamoran, A. (2003). Discussion-based approaches to developing understanding: Classroom instruction and student performance in middle and high school English. *American Educational Research Journal*, *40*, 685–730.

Beck, I., McKeown, M., Hamilton, R., & Kugan, L. (1997). *Questioning the author: An approach for enhancing student engagement with text.* Newark, DE: International Reading Association.

Betts, G. H. (1910). *The recitation.* Boston: Houghton-Mifflin.

Bloom, B. S. (1987). *Taxonomy of educational objectives. Book 1: Cognitive domain.* New York: Longman.

Bransford, J., Brown, A., & Cocking, R. (Eds.). (2000). *How people learn: Brain, mind, experience and school.* Washington, DC: National Academy Press.

Cazden, C. B. (2001). *Classroom discourse: The language of teaching and learning* (2nd ed.). Portsmouth, NH: Heinemann.

Gall, M. D. (1970). The use of questions in teaching. *Review of Educational Research*, *40*, 707–721.

Gallagher, J. J., & Aschner, M. J. (1963). A preliminary report on analyses of classroom instruction. *Merrill-Palmer Quarterly*, *9*, 183–194.

Gibbons, P. (2002). *Scaffolding language, scaffolding learning.* Portsmouth, NH: Heinemann.

Hare, V., & Pulliam, C. (1980). *College students' metacognitive awareness of reading behaviors: Yearbook of the National Reading Conference.* Washington, DC: National Reading Conference.

King, A. (1990). Reciprocal peer questioning: A strategy for teaching students how to learn through lectures. *The Clearinghouse*, *64*, 131–135.

King, A. (1991). Enhancing peer interaction and learning in the classroom through reciprocal questioning. *American Educational Research Journal*, *27*, 664–687.

King, A. (1993). From sage on the stage to guide on the side. *College Teaching*, *41*(1), 30–35.

Mehan, H. (1979). *Learning lessons.* Cambridge, Mass.: Harvard University Press.

National Reading Panel. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction.* Washington, DC: National Institute of Child Health and Human Development.

National Research Council. (2012). *Education for life and work: Developing transferable knowledge and skills in the 21st century.* Washington, DC: The National Academies Press.

Nystrand, M. (1997). *Opening dialogue: Understanding the dynamics of language and learning in the English classroom.* New York: Teachers College Press.

Ogle, D. M. (1986). K-W-L: A teaching model that develops active reading of expository text. *The Reading Teacher*, *39*, 564–571.

Palincsar, A. S., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and comprehension monitoring activities. *Cognition and Instruction*, *1*(2), 117–175.

Redfield, D., & Rousseau, E. (1981) A meta-analysis of experimental research on teacher questioning behavior. *Review of Educational Research, 51*(2), 237–245.

Rosenshine, B., Meister, C., & Chapman, S. (1996). Teaching students to generate questions: A review of the intervention studies. *Review of Educational Research*, *66*(2), 181–221.

Sheff, D. (1988, January 19). Izzy, did you ask a good question today? [Letter to the Editor]. *New York Times,* p. A26.

Wells, G. (1999). *Dialogic inquiry: Towards a sociocultural practice and theory of education.* Cambridge, England: Cambridge University Press.