FOR-PD's Reading Strategy of the Month

Cause and Effect

July/August 2010

(Developed by Zygouris-Coe, V., & Venturino, P., 2010)

RATIONALE

Students read different types of text across the content areas--from a book of short stories in an English class to a textbook heavy in equations and proofs in a mathematics class. Texts in each discipline carry their own unique structure. As a result, different types of reading skills are needed for each content area. For the purpose of this strategy we will use a science context.

Some students lack the necessary literacy skills to fully grasp certain concepts in science. An example of this is the concept of causality, which is often found in physics and chemistry courses. Many of these subject matters contain complex causality, where "the relationship between cause and effect is not easily identifiable" (Jasit, 2009). To compensate for students' lack of skills in this area, science teachers need to incorporate reading strategies in their lessons to teach them how to read and understand a science textbook. By combining both science and reading, "… instruction has the potential to improve science reading comprehension and science content learning, helping promote the development of science literacy" (Fang & Wei, 2010, p. 264). Discipline-specific graphic organizers can help students understand the relationship between cause and effect, a core concept in science. Research has shown that graphic organizers can "facilitate specific types of learning" (McCrudden, Schraw & Lenman, 2009, p. 68). These types of learning includes critical thinking, high order thinking skills, and active learning where students can collect information they find in various places in the text and then synthesize the information into another format.

HOW TO TEACH THIS SKILL

Students need to become familiar and comfortable with reading scientific text and identifying the cause and effect relationships. "Teaching students to use graphic organizers in science content is different than teaching students to use a graphic organizers of historical or literature content" (Shanahan, 2004, p. 88). Before instruction can take place, teacher knowledge and understanding of the strategy must be established.

Prior to instruction, teacher knowledge and understanding of the strategy must be established. The teacher needs to determine specific characteristics or criteria that will help students carefully examine the text for the purpose of identifying cause and effect relationships.

Once criteria are established, it is the responsibility of the teacher to scaffold instruction. Cause and effect is a cognitively-demanding and challenging task. Teachers will need to not only activate students' background knowledge but to also build and scaffold it, as well as provide constructive feedback. Students need many opportunities to practice identifying cause and effect relationships from text and presenting them through writing and illustrations (this can be especially challenging as some cause and effect relationships cannot be easily expressed via illustrations).

Modeling through a Think Aloud

We recommend beginning instruction on this critical reading skill by first presenting the purpose for finding cause and effect relationships in science. Once the purpose is established, the teacher should activate students' background knowledge on the topic at hand.

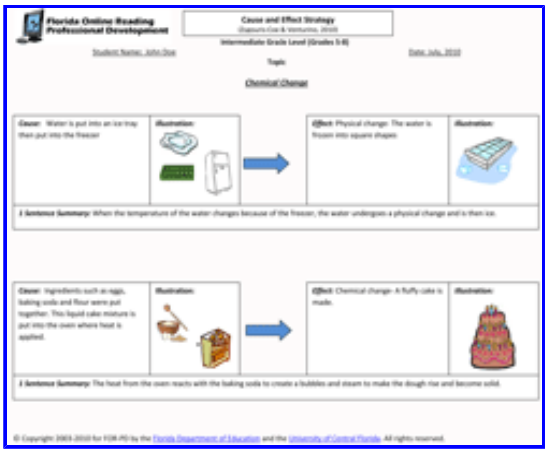
The next step in instruction is to model think alouds for finding cause and effect relationships within the science text(s). Think alouds can help students better understand how a teacher thinks through a task by making his or her thinking process and decision making visible to students. The think aloud process should encompass all areas of the strategy including the following: (a) determining the events in the cause and effect relationship within the text (by locating certain verbs such as because of, is due to, etc.); (b) stating the relationship between the events; and, (c) then recording this information along with writing a summary of the relationship.

Collaboration and Independent Practice

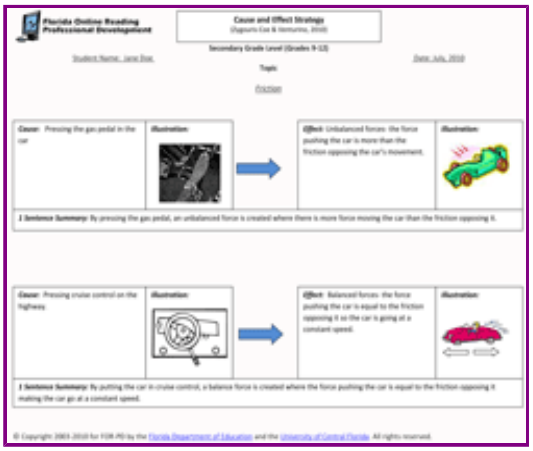
In order for students to feel comfortable with critical reading, they need ample opportunities with, and exposure to, cause and effect relationships found in the text(s). Student collaboration is useful during instruction because students can see other classmates' different perspectives of how they determined the cause and effect relationship. This is also the opportune time to provide scaffolding and feedback. Students can use the cause and effect graphic organizer we have developed in a variety of ways—i.e., independently or as part of collaborative group work.

Please see a cause and effect graphic organizer template and examples (for elementary and secondary grades).

Cause and Effect Template



Cause and Effect Intermediate Example



Sourcing Secondary Example

ASSESSMENT

Teachers can use informal observations, feedback from student discussions, teacher-student conferences, and the cause and effect graphic organizers for assessment of this strategy.

Informal observations can provide valuable information on how well students identify causes and effects from text, represent the relationship visually, and also how succinctly they can express the cause-relationship via a one-sentence summary. During independent, small group, or whole group discussions, teachers can probe, ask questions, and seek more feedback or evidence for cause-effect relationships; this will provide the teacher with valuable information about the students' thinking.

For assessment purposes, when using the cause and effect strategy, emphasis should be placed on all parts of the strategy, i.e., the written expression, the illustration, and on the quick summary of the relationship.

RESOURCES

Exercises in Science: Cause and Effect
http://www.fauxpress.com/kimball/w/9.html#Heading2
This website explains the reasons behind determining cause and effect relationship in science and the sentence patterns that can help find the cause and effect relationship in texts,

Using Cause and Effect to Write in Science
http://www.uen.org/Lessonplan/preview?LPid=11290
This is a lesson plan to help teach writing in science using cause and effect relationships.

Global Warming: A Cause and Effect Writing Lesson
http://iteslj.org/Lessons/Ogasawara-Warming.html
This lesson, aimed to college freshman, can be adapted and used for a high school science class to emphasize cause and effect writing.

REFERENCES

Fang, Z., & Wei, Y. (2010). Improving middle school students' science literacy through reading infusion. *The Journal of Educational Research*, *103*(4), 262-273.

Jasit, C. (2009). Teaching causality in science: The understandings of consequence project. Retrieved Friday, May 28th, 2010 from http://isites.harvard.edu/fs/docs/icb.topic558014.files/Jasti-Analysis-Teaching%20Causality%20in%20Science.doc.

McCrudden, M. T., Schraw, G., & Lenman, S. (2009). The use of adjunct displays to facilitate comprehension of causal relationships in expository text. *Instructional Science*, 37, 65-86.

Shanahan, C. (2004). Teaching science through literacy. In Jetton, T. L., & Dole, J. A., (Ed.). (2004) *Adolescent literacy research and practice* (pp. 75- 91). New York: Guilford Press.

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