# Strategy Makeover

## From "Know," "Want," "Learned" to "Think," "How," "Conclude," a popular reading strategy gets a science makeover.

By David T. Crowther and John Cannon

For the past few decades the integration of literacy instruction has influenced the teaching of science in the elementary classroom—whether through traditional learning or as part of inquiry and hands-on methods. One reason: the ubiquitous K-W-L strategy. This popular literacy strategy is essentially a framework to guide students through a learning experience by answering the questions "What do I **K**now about the topic?" and "What do I **W**ant to learn about the topic?" *before* a study begins and then, following the learning experiences, answering the question, "What did I **L**earn about the topic?"

Originally developed for use as preparation for expository reading assignments, the K-W-L strategy has migrated and evolved—quite successfully—to the science classroom. Typically, when applied in elementary science lessons, the K-W-L strategy is used to introduce a topic and provide an opportunity for students to write about what was learned upon completion of the learning experiences.

The strategy works well as a preassessment tool because it reveals what students know and want to learn about a topic before instruction and as a postassessment tool because it fosters reflection after the experiences, requiring students to commit to and express their thoughts. Teachers can use students' writings to inform their teaching as well as to assess student levels of understanding.

While we recognize the value of the K-W-L framework, we've modified it to enhance the scientific learning environment. Our strategy—T-H-C—expands on K-W-L and its previous modifications (see sidebar, Variations on a Theme) by uniting several elements essential to science inquiry—questioning, methodology, and evaluation—through the questions:

- What do you **T**hink?
- **H**ow can we find out? and
- What do we **C**onclude?

We believe these questions offer a framework that prepares children to think scientifically, relates to the nature of science, and integrates more purposeful communication by children—all without diminishing the strategy's usefulness as a tool to help children think and hypothesize about a science topic.

## What Do You Think?

What do you Think about...? Questioning is the first stage of a science project. Borrowed from Akerson's (2001) modification of K-W-L, the "Think" phase of our strategy is especially useful in encouraging students to freely share their ideas.

This phase also relates to the National Science Education Standard of understanding the nature of science (NRC 1996). In science we really don't truly "know" much, but we continue to build hypotheses and theories until they become consistent over time and can stand as a grand theory in science. The laws of science are known, but can still be proven wrong as our technology and knowledge of the world develops and improves.

Additionally, when a child is asked to write "what you Know" the child is often put on the defensive and will write very little out of fear of "being wrong." So, to begin a lesson with what you *think* helps children understand that it is okay to not "know" something, but to take a risk and list what they think.

To illustrate this, we piloted the T-H-C in a first-grade classroom of 36 students of diverse learning styles and abilities. In this classroom, the teamed teachers had used the K-W-L strategy consistently over the course of the year. When we asked them to change the "K" to "T," they immediately noticed that children wrote more. In fact, by the end of the year, students were averaging three sentences in the "T" phase as compared to the average of one sentence used with the "K."

## How Can We Find Out?

Once the ideas (what we Think) are on paper, it's only natural to proceed to "How can we find this out?," the "H" phase of the strategy. At this point, although teachers have a plan of what students will discover, it is important to allow students a chance to write their ideas on "how" they could find out if their thoughts were correct. These ideas may lead to a hands-on investigation, text reading, or an inquiry (guided or open-ended) learning situation.

To illustrate this, let's return to the first-grade classroom where the T-H-C idea was piloted. In learning about how much water and land cover the surface of the Earth, the students first wrote what they thought and then were asked "how" they could figure it out.

Many of the responses were to ask the teacher or look it up in a book or on the Internet, all of which were appropriate responses. Then the teacher held up an inflatable ball of the Earth and asked the children to write a few more ideas that might relate to using the Earth ball to find out.

Some kids were very creative and came up with ideas of counting and comparing. When pushed for ideas, the students came up with cutting the land pieces out of the ball and putting them over the water pieces to compare which was larger.

That led to the teacher's suggestion of the activity of tossing the Earth ball and counting how many times the ball was caught with the right index finger landing on water or land. The resulting data showed that over several sets of throwing the ball, the finger landed on water more often than land.

Moving from the exploration (activity) phase to the explanation phase (communicating knowledge learned), the teacher then guided the students, using the data they collected, to the discovery that the ratio was about three-fourths water to one-fourth land.

## Variations on a Theme

Modifications of the K-W-L have been developed before. Following its conception in 1986, Donna Ogle developed the K-W-L Plus in 1987, which added concept mapping and summarizing what was learned to the strategy. In 2001, Valerie Akerson modified the K-W-L as the "T"-W-L, in which the "T" replaces "what you want to Know" with "what you Think about a topic," thus making the strategy a more appropriate tool for use in the science classroom. Akerson's "T" signaled an opening of the door for inquiry and investigation. Children could state problems, discuss what they think about that problem, or even work something into a hypothesis. This was followed up with "W," "What else I Want to know," which allows for questions or a line of inquiry to follow.

In both modifications, the strategy enabled students to go further with thoughts and thinking in writing as they begin a science activity or unit of study. The T-H-C strategy expands on these previous strategies by uniting several elements essential to science inquiry—questioning, methodology, and evaluation.

## "C" Is for Conclusions

Finally, when the explorations and explanations are complete, students should be able to make conclusions about what was learned—the "C" phase of the strategy. Students can write (or illustrate) their conclusions

## Connecting to the Standards

This article relates to the following *National Science Education Standards* (NRC 1996):

### Teaching Standards

**Standard C:**

Teachers of science engage in ongoing assessment of their teaching and of student learning.

**Standard E:**

Teachers enable students to have a significant voice in decisions about the content and context of their work and give students significant responsibility for the learning of all members of the community.

### Assessment Standards

**Standard A:**

Assessments must be consistent with the decisions they are designed to inform.

based upon the results of the activity, investigation, or experiment they conducted. This can be done in several ways, for nonwriters, pictures can be drawn and then communicated orally to the teacher. For beginning writers, illustrations can be drawn and then labeled from a word wall created during the lesson. Developing writers can write their conclusions and add illustrations to substantiate them.

The teacher can ask the students questions based on their "H" experiences to guide them to conclusions. Additionally, the teacher can use students' conclusions to evaluate student progress using both formal and informal assessment strategies. Teachers can analyze what students concluded (via drawings and writings) based upon their data or experience to determine the students' level of content understanding and to show that learning took place.

In the first-grade lesson investigating the amount of water and land on Earth, the students conducted an assessment activity in which they were asked to cover a paper plate with clay to show understanding of the ratio of approximately three-fourths water and one-fourth land on the Earth's surface. All but three students correctly covered three-fourths of the plate in blue clay and one-fourth of the plate in brown clay. The other three did show more water than land, but did not fully understand the three-fourths ratio.

Following that experience, the students were asked to write their conclusions in their journals. The sentences they wrote not only showed an understanding of what was accomplished but also showed their thinking process. One advanced student wrote, "I put blue clay over three parts and brown clay over one part. I did this because there is more water on Earth than land."

## Just Learning

T-H-C helps teachers more purposefully integrate language arts into science instruction and also provides quality assessment information. It draws on a popular strategy already used in many classrooms to integrate language arts into other subjects, making it comfortable for teachers to incorporate in their science instruction.

The integration of language arts into all subjects, especially science, is what many of us would simply call "good teaching." Good teaching happens when the teacher plans units of study in such a way that subjects blend themselves into what children perceive as a project or learning experience. The children are not aware that they are reading, writing, doing mathematics, or doing science—they are just learning.

Purposeful communication is what learning is all about, and if we can provide more experiences where children are motivated to write, not because they have to, but because they are interested and want to share their ideas, as the T-H-C strategy enables students to do, this will likely result in better learning in both science and literacy in the elementary classroom.

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## Resources

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