

KWL In Action: Secondary Teachers Find Applications that Work

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“Knowledge that becomes ours is knowledge that we construct.” This quotation attributed to Henry David Thoreau expresses the theme of this paper. Both teachers and students need models and opportunities to construct meaning. As teachers we need to employ classroom instructional strategies that facilitate students’ construction of their own meanings. Research has made quite clear the importance of the active, constructive nature of reading and learning; good learners link their prior knowledge to new information, reorganize it and create their own meanings (Anderson, 1984; Steffenson, Joag-Dev, & Anderson, 1979; Taboada & Guthrie, 2006). The KWL strategy, described in this paper, is designed to help readers do just that. KWL provides a framework for learning that can be used across content areas to help students become active constructors of meaning.

Teachers also need opportunities to learn and use new strategies until they make them their own—adapting strategies to their own situations and teaching needs. Therefore, after explaining the KWL+ strategy, examples for a team of three high school teachers who have adapted the strategy illustrate how teachers, too, learn through an interactive process and construct personal meaning.

KWL + Strategy Explained

The letters in the name, KWL, stand for the process of making meaning that begins with what students KNOW, moves to the articulation of questions of what they WANT TO KNOW, and continues as students record what they LEARN. The strategy is designed to be used by a teacher and group of students working together. It is then easily transferred into a method for students’ independent study. In using the strategy the teacher first leads the group through an oral discussion of each of the components and then turns the process over to students to individually write their own ideas and questions on a personal worksheet. (For an example see Figure 6.1.) The intent of the strategy is to involve students actively, first by making real the connection between their prior knowledge and the information that will be presented in the texts, both by eliciting what they know about the specific information and the ways that information is likely to be structured. Then teachers guide the students to think of questions they need and want to have answered and, finally, students make notes and then organize the old and new information in graphic and elaborated written form.

K-W-L Strategy Sheet From Ogle (1996)		
NAME_____ SUBJECT_____		
1.		
K - What We Know	W - What we Want to Learn	L - What We Learned and Still Need to Learn
2.		
Categories of Information We Expect to Use		
A.	D.	G.
B.	E.	H.
C.	F.	I.

Figure 6.1.

As teachers initiate a new topic or prepare students to read an article or chapter, they explain the strategy that is being used. Teachers may say:

It is important to first find out what we think we know about this topic. Then we want to anticipate how an author is likely to present and organize the information. From this assessment we can generate good questions to focus our reading and study. Our level of knowledge will determine to some extent how we will study. Then as we read we will make notes of questions that get

answered and other new and important information we learn. During this process some new questions will probably occur to us; these we should also note so we can get clarification later.

After a brief explanation the teacher and students identify what they think they know about the topic; the teacher writes student-brainstormed ideas on the board or overhead transparency. All ideas should be recorded—it is not the teacher’s role at this time to clarify misconceptions, simply to let students first articulate the associations they have with the topic, right or wrong. As students engage in this brainstorming some questions should begin to emerge. Not everyone should have the same ideas; some disagreements and misconceptions begin to surface. The teacher notes these differences and helps students frame them into questions. These then become the beginning of the second column, what we want to know.

As the teacher facilitates the brainstorming of ideas and elicits questions that will guide the reading, she is modeling the writing of ideas and framing of questions for students who have a difficult time taking risks and composing their own questions. As soon as the teacher feels students are ready, she suggests that each now write on their own sheet what they individually think they know in the “know” column and the 2-3 questions that are of most interest to them in the second column. With less motivated students, selecting questions from those modeled by the teacher may provide a basic level of commitment to the learning. Some secondary students have learned that not engaging in class activities protects them; such students may need more structure and familiarity with the process before they will be willing to ask their own questions. At first these students may simply be allowed to select the 2-3 questions they think are most likely to be answered from those the teacher has modeled.

Another important component of the pre-reading preparation is anticipating the organization and structure of ideas that authors are most likely to use. This aspect of pre-reading taps a different kind of knowledge that is important for learning. The bottom of the first column on the worksheet provides space for students to list anticipated categories or topics.

Secondary students need to be able to identify descriptive organization, compare-contrast, cause-effect, sequence, and argumentation—basic organizing structures used in written and oral discourse in our society (see Roller, 1990, for further elaboration). An easy and very common structure is a simple descriptive frame with categories of information on a topic provided one by one. (For example, a chapter or book section on animal biology often adheres to a simple descriptive frame discussing animals, class by class, with information organized by categories—basic description, location, means of protection, and value in the natural cycle.) Other texts may compare and contrast animals or deal with functional systems and use animals for examples. These organizations require higher order thinking and yet assume knowledge of basic categories of information.

If students are not familiar with categorizing and structuring information, teachers can model this kind of thinking from the initial brainstorming students do by asking, “How do you think the author of a text or article on _____ is likely to organize the information? What categories or topics would you expect to find?” If no ideas are forthcoming the teacher can direct students’ attention to the list of information they

generated. This list can then be used to help students identify like ideas that could be chunked into a single category. For example, during a pre-reading discussion of coelenterates (corals and jellyfish) students may have suggested information like the following: live in salt water, have soft bodies, eat small creatures, wait for food to come to them, and are simple animals. The teacher can help students identify the more general categories represented by this information: habitat, physical characteristics, eating, and scientific classification. These categories should not be difficult for secondary students to generate once they are attuned to thinking of organization of knowledge. Yet, it is surprising how few students will use these organizers if not led to do so by teachers.

The time spent focusing students thinking about likely structure is important whether the KWL is used as a framework for reading a chapter or to initiate a broader unit of exploration and study. Too often content teachers assume students know how to use larger organizing structures for learning; asking students to anticipate most likely structures assures that we don't overlook gaps in students strategic thinking and provides us a naturally occurring occasion to teach these structures. These structures also have tremendous value when students come to study and write. Having organizing frames consciously available empowers students to chunk together discrete pieces of information in meaningful and, thus, memorable ways.

After students have accessed their ideas about content and structure and have identified key questions they then read and make notes in the third, learned, column of their worksheet. They will write answers to their questions and note new and interesting information. This note-making can occur as an ongoing reading-notemaking recursive activity. Other students may wait until they have read through a whole section of text before stopping to check what they have learned and make notes. Teachers can model making notes and then checking questions against the text information; this can provide a good opportunity to demonstrate the need for multiple sources of information if some basic questions are overlooked or not answered adequately.

Often students are confronted with a great deal of information they are expected to internalize in short periods of time. When it is important to retain the information the two post-reading components of the strategy, mapping and summarizing, are valuable. These were added after the original KWL was developed because teachers found that students still needed help rehearsing new information in ways that would make it memorable (Carr & Ogle, 1987). Once students have completed their reading and note-making, they go back and create a graphic map or diagram of the ideas. This map should include both what the student knew prior to reading and the important information that has been gained. Some teachers suggest students use two colors of pen or pencil to make even clearer the weaving together of new and old information. As students create a map of their ideas they should be using some of the basic structures or frames inherent to the content presentation. When the map is completed it is easy for students to write summaries; they simply use the category labels on their maps as main ideas and the subsumed information as details or illustrations. Research (Carr & Ogle, 1988) has demonstrated the value of the post-reading mapping and summarizing for long-term content retention.

Having each student involved in writing his/her own ideas before, during, and after reading is central to the KWL. It provides a means for students to retain the information they are learning. The writing also helps students to continually monitor their own

thinking and learning on the worksheet. Even if they do not contribute orally to the class discussions their writing provides a way for students and teacher to dialogue about their learning. This writing component is valuable to teachers, too, for several reasons. First, because so much content area instruction is conducted with whole classes, oral discussion often misses just those students who most need the time spent in focusing and calling up prior knowledge. The writing task provides a concrete way for all students to participate in the thinking about the topic even when not talking. Second, since they need to write out their ideas, there is a more personal commitment to the content. Third, written knowledge and questions provide teachers a window on students' thinking and interaction with the text information. Finally, those written sheets provide a good working copy of students knowledge-building that can serve teachers and students when they read and learn from multiple sources of information.

Content Teachers Make KWL Their Own

The most extensive application of KWL as a framework for instruction at the secondary level with which I am familiar has occurred in the Kansas City, MO., Schools. The Comprehension and Cognitive Development Program, begun as part of a broader desegregation ruling from the federal courts, has as a major goal developing more interactive strategic teaching among its secondary (middle and high school) teachers. To achieve this goal they, in conjunction with the National Urban Alliance, have provided a rich staff development program to support teacher development from a discrete skills-oriented emphasis to more strategic and interactive instruction. This shift has not been easy since the students are challenging (95% are minority and achievement has been well below national averages) and pressures for better test scores are always felt. In this context the project becomes even more significant.

Teams of teachers from each building have been selected to become in-house leaders. The groups of teachers meet in their own buildings, take part in cross district seminars, and take evening courses at the University of Missouri, Kansas City. As a result of the project, they become staff development leaders and serve as resource people throughout the district.

During the three years the teachers learn, reflect, and develop a broader repertoire of teaching strategies. One of the strategies the teachers have selected for in-depth learning is KWL. Over a three-year period teachers have learned the theory behind this and other interactive strategies, have seen demonstrations of the strategy in use in their own classrooms, have learned to use the strategy in micro-teaching and video-taped situations, and have developed several adaptations of KWL to meet their needs. The remainder of this chapter presents examples provided by one leadership team from Central High School. These applications and adaptations have evolved as the teachers have studied and tried this and other strategies in their classrooms. Their comments and reflections have been drawn from journals and notes they have made as part of the staff development activities.

Katherine Walker, ninth grade science teacher, uses the KWL+ regularly with her students. She has noted that she likes the framework because it helps her find out what her students bring to their study of different topics and motivates some students to become involved in learning who would not normally do so. She has also found improved test scores, something that pleases her.

Katherine has provided an example of how the process works from a section she taught on tobacco that was in the textbook. Her objective for the section was to familiarize students with the effects of tobacco on the human body. “The lesson must build on the students’ knowledge of how a healthy body functions so that the information learned about the composition of tobacco and its physical effects and the diseases caused by and attributed to its use show how the body systems are impaired from normal function when tobacco is used” (from written reflections, March, 1990).

Katherine introduced the topic by asking students what they already knew about tobacco and its effects. As students volunteered information she also helped them frame questions like, “Why is it a legal substance?” and “How does it cause cancer?” As students got involved thinking about what section in a text could help them learn, she asked what topics or categories of information about tobacco they could anticipate finding in the textbook. Again, she guided their thinking as they suggested: harm, effects, types, uses, composition, odors, and growth. After all the students had written their own notes in the first 2 columns on worksheets or notebook paper divided into thirds, she gave them time in class to begin reading and filling in the third column, What We Learned. The text section and note-making were completed as homework. The next day the students discussed the information they had gained and checked to see if their questions had been answered. They then constructed semantic maps of their knowledge and, from these, each student wrote a summary. An example of one student’s work is included to illustrate the personal nature of the learning and construction of meaning (See Figure 6.2.)

In her written reflections Katherine explored the effectiveness of the strategy for this lesson. She wrote:

1. It allowed me to learn what students knew about tobacco.
2. It provided me with a means of getting more oral participation from non-talkative students when discussion occurs in my classroom.
3. It motivated some inactive students to become involved in both writing and talking.
4. It allowed my students to become cooperative in their learning while brainstorming.
5. It provided a means of additional research generated by student responses rather than teacher-mandated demands.
6. It provided a better test base for my students to comprehend information about tobacco. The students answered more questions correctly after having worked with the strategy than they usually do.

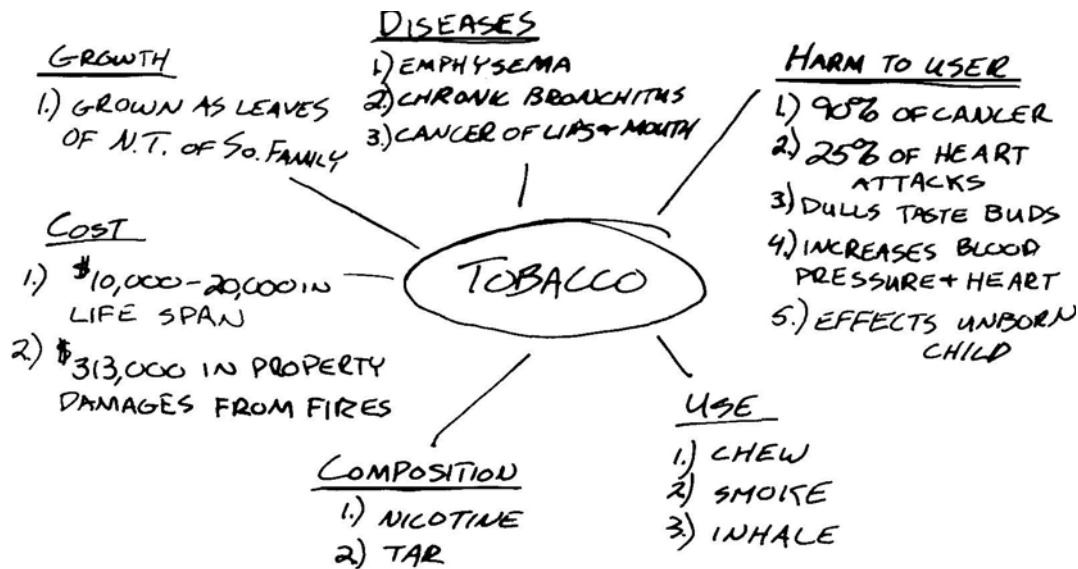
K-W-L Strategy Sheet

From Ogle (1996)

NAME _____ SUBJECT _____

1. <u>K - What We Know</u>	<u>W - What We Want to Learn</u>	<u>L - What We Learned and Still Need to Learn</u>
<p>A PLANT USED TO MAKE CIGARETTES CAN CAUSE CANCER TO LIPS, MOUTH, AND LUNGS CAUSES EMPHYSEMA ADDICTIVE SMOKELESS, CHEWING SURGEON GENERAL SAYS DONT USE</p>	<p>1.) WHERE IS TOBACCO GROWN 2.) HOW DOES IT CAUSE CANCER 3.) WHY IS IT A LEGAL SUBSTANCE 4.) IS TOBACCO USED FOR ANYTHING WORTH WHILE? 5.) IS THE TOBACCO YOU CHEW + THE KIND YOU SMOKE THE SAME? 6.) WHAT IS SMOKELESS TOBACCO?</p>	<p>1.) TOBACCO IS A DRUG 2.) 350,000 AMERICANS DIE FROM TOBACCO-RELATED DISEASES 3.) NICOTIANA-TOBACUM = NAME OF PLANT 4.) TOBACCO SMOKE IS INHALED NICOTINE IT IS ABSORBED THROUGH LINING OF MOUTH AND LUNGS INTO BLOOD STREAM. 5.) TRANSPORTED TO BRAIN IN 7.5 SECONDS 6.) 90% OF ALL LUNG CANCER FROM SMOKING. 7.) AVERAGE SMOKER SPENDS \$10,000-\$20,000 ON CIGARETTES IN A LIFE TIME.</p>
<p>2. Categories of Information We Expect to Use.</p>		
<p>A. HARMS/EFFECTS B. TYPES C. USES D. COMPOSITION</p>	<p>E. ODORS F. GROWTH G. H.</p>	

Figure 6.2



- TOBACCO IS AN ADDICTIVE DRUG THAT BOTHERS THE NORMAL FUNCTIONS OF THE BODY.
- TOBACCO COMES FROM THE PLANT NICOTIANA TABACUM.
- NICOTINE IS THE DRUG FOUND IN TOBACCO, IT IS A STIMULANT IT IS WHAT MAKES TOBACCO ADDICTIVE. TAR IS ALSO A PART OF TOBACCO.
- TOBACCO HAS MANY EFFECTS. IT CAUSES EMPHYSEMA, CHRONIC BRONCHITIS, YELLOW TEETH, BAD BREATH, AND OTHER KINDS OF CANCER.
- NEARLY 90% OF ALL LUNG CANCER DEATHS IS FROM SMOKING, 25% OF HEART ATTACKS ARE FROM THE USE OF TOBACCO.
- OTHER EFFECTS ARE RAPID HEART BEATS AND INCREASED BLOOD PRESSURE.

Figure 6.2 – Continued

Beverly Shand, from the English department, used KWL in a somewhat different way while she was teaching a unit on Richard Wright, the author. Rather than begin with the strategy, she first had students read *Black Boy* by Wright. Then, before students read his biographical sketch and two additional short stories, she engaged the students in doing a KWL. The object of her lesson was to prepare students to respond to the two short stories by identifying Wright's strengths and to understand how his personal struggle affected his point-of-view and purpose for writing.

As she began the lesson she asked each class what they knew about Wright, what questions they had, and what they wanted to find out. By giving students the opportunity to read some of Wright's own writing she had insured some prior knowledge about his youth. Students were able to draw on their reading and make good inferences about his character and future as they worked in small groups using the worksheet as a guide. (See Figure 6.3.) They were motivated by reading *Black Boy* and wanted to know more about Wright. Because she knew the classes had some knowledge, she felt comfortable having them work in small groups to brainstorm and form questions to guide their reading.

In her written reflections Beverly added that:

1. Students are able to connect their prior knowledge, or schema to new information which they, themselves, identify as desired-to-know facts, and to use this new information in a synthesis which increases their level of critical thinking and ability to synthesize in the future.
2. The small group setting used in brainstorming provides a more secure, less-threatening environment for student interactions as effective brainstorming is done.
3. The making of graphic organizers, including the KWL sheet gives students valuable practice in an activity which lends them strength in organizing material into meaningful, easier to remember, chunks both now and in future lessons. For visual learners, as our students mostly are, this is an important tool for successful learning.
4. KWL+ allows students to address the idea of learning as a metacognitive process. If students know how they learn best they will be more successful learners (from written reflections, March, 1990).

K-W-L Strategy Sheet From Ogle (1996)		
NAME _____ SUBJECT _____		
Name <u>MICHELLE</u> Subject <u>ENGLISH</u> Date <u>1/30/91</u>		
<p>1. K - What We Know</p> <p>WRITER / AMERICAN BLACK / AUTHOR ^{BLACK} BOY INTELLIGENT BAD CHILD / KILLED CAT DRUNKARD AT 6 FATHER LEFT FAMILY MOTHER HAD SEVERE ^{BREAKDOWN} BROTHER LEG HIT BY WAGON</p>	<p>W - What We Want to Learn</p> <p>WHAT OTHER BOOKS DID HE WRITE? WHAT FAMILY LIFE WAS LIKE? IS HE ALIVE NOW? WHAT WAS HIS LIFE LIKE IN U.S.A.? HOW OLD WOULD HE BE? WAS HE MARRIED? HOW DID HE DIE? DID HE GET ANY AWARDS? WHY DID HE WRITE? WHAT WAS HIS GOAL?</p>	<p>L - What We Learned and Still Need to Learn</p> <p>THE BOOK <u>BLACK BOY</u> WOULD HAVE BEEN NAMED <u>AMERICAN HUNGER</u>. BORN NEAR NACHEZ, MISS. LIVED IN FRANCE FOR 13 YRS. GREAT WRITER WIFE ELLAN, 2 DAUGHTERS FATHER ILLITERATE SHARE-CROPPER MOM - SCHOOL TEACHER CALENDARIAN, MAY 1925 MARRIED WROTE POETRY & SHORT STORIES WON PRIZE WITH <u>UNCLE TOM'S CHILDREN</u> WROTE <u>NATIVE SON</u> BIGGER WAS VIOLENT THEN <u>BLACK BOY</u> - DIRECT WENT TO FRANCE - EXITED SELF WROTE 8 BOOKS THERE DIED YOUNG 1960</p>
<p>2. Categories of Information We Expect to Use:</p> <p>A. PROFESSION E. B. WORKS F. C. PERSONAL LIFE G. D. H.</p>		

Figure 6.3

Renee Gray has found an even different use of KWL+ in her mathematics classes. The textbooks she has available from the district have very little written, amplified text; they consist mostly of practice problems. The students come to each new topic with little background knowledge. As she participated in the leadership development program and experimented with ways to develop strategic teaching in math, she, too, discovered a way of using KWL+ as a teaching tool.

Renee does not use the strategy to introduce lessons or units. Rather she uses it as a review framework to help students prepare for exams. As she explains, "The KWL+ strategy is great to use when reviewing with the students before a test. After all the material has been presented, I take an extra day just for review. Students participate readily, happy to share and discuss everything they know about a topic, under the K

column. The categories generated in math are usually Givens, Translate, and Solve. Categorizing the information helps students know approximately when the information is used in solving the problems.”

She continues in her reflections: “Students are not afraid or embarrassed to tell what they don’t know or what they want to know. Because wanting to know is a part of the strategy, it is expected that they want to know something, so even the low achievers or inactive students become involved and productive.”

“Everything the student has learned is listed in the L column, which is then used to generate a graphic organizer. We create the graphic organizer from what we learned in the reading and put the organizer in the L column. The students then use the organizer to prepare a summary or make up and solve problems of their own to demonstrate their command of the learned information” (from written reflections, March, 1990). Samples of students’ work are shown in Figures 6.4 and 6.5.

K-W-L Strategy Sheet		
From Ogle (1996)		
NAME _____		SUBJECT _____
1. K - What We Know	W - What We Want to Learn	L - What We Learned and Still Need to Learn
<p>1.) X IS 3 METERS</p> <p>2.) PERIMETER IS 3x-1 UNITS LONG</p> <p>THE RECTANGLES</p> <p>3.) LENGTH IS $x+9$</p> <p>4.) WIDTH IS $2x-3$</p> <p>TRANSLATE</p> <p>GIVEN</p> <p>SOLVE</p>	<p>1.) PERIMETER OF THE SQUARE & RECTANGLE</p> <p>2.) WANT TO KNOW WHICH IS GREATER</p> <p>3.) AND BY HOW MUCH</p> <p>4.) HOW TO SOLVE THE LENGTH OF REC. WHEN X IS ADDED TO 9</p> <p>HOW TO SET PROBLEM UP.</p>	<p>FINDING AND COMPARING PERIMETER OF POLYGONS</p> <p>1.) DRAW THE FIGURE</p> <p>2.) LABEL</p> <p>3.) FIND THE PERI. OF EACH FIGURE IN TERMS OF X</p> <p>4.) SUBSTITUTE THE GIVEN VALUE OF THE VARIABLE</p> <p>5.) COMPARE THE PERIMETER</p>
2. Categories of Information We Expect to Use:		
A.	E.	
B.	F.	
C.	G.	
D.	H.	

Figure 6.4.

Summary

I learned how to solve polynomials by adding like terms. Then apply the distributive postulate. But before adding or subtracting, arrange like terms in the same column.

A polynomial with two terms is called a *binomial* and a polynomial with three terms is called a *trinomial*. The length of each polygon is expressed as the sum of monomial

Figure 6.5

Conclusion

These examples illustrate how teachers have adapted a basic strategy framework to meet their needs and those of their students. Other teachers have used the KWL+ strategy to help students write reports without copying, to guide exploratory science activities, and to increase learning from multiple sources including films and video-tapes. In each instance the basic purposes and thinking activities have been retained. Students' ideas and knowledge about the content and structure are the beginning point. Teachers listen to what students think they know before presenting information. Teachers listen automatically since their role is to record what the students volunteer. This establishes a tone of respect for students' ideas and helps students take the risk of asking questions which then provides personal and corporate reasons for learning. The notetaking, mapping, and summarizing all work to help students add to their personal knowledge, refine it, and store it in memory.

When teachers encourage students' active involvement in learning, they find unexpected rewards. Many teachers like Katherine, Beverly, and Renee learn more about their students. They enjoy reading their personal reflections on the worksheets, semantic maps, and summaries. They find students become more involved as learners and achieve at higher levels.

Likewise, teachers' active involvement, exploring learning and teaching with new strategies, is empowering to both students and teachers. Teachers gain from observing and sharing and from opportunities to explore and create their own knowledge. Changes in students and teachers go hand in hand!

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