Prairie Wetlands Learning Center

KWHL in the Outdoor Classroom

A KWHL chart (Know-Wonder-How-Learned) is type of graphic organizer that serves as matrix for planning and gathering information. It is an instruction activity developed by Donna Ogle (1986, National Louis University) which serves as a model for active thinking during reading. We adapt it for use in science. KWHL charts are excellent tools for identifying prior knowledge, developing a plan for investigation of a problem or topic, and summarizing newly acquired knowledge and skills. They are also an excellent tool to plan for field investigations in training students as scientists. A KWHL inquiry chart can include questions about predictions and/or implications. Additionally, these charts can be used as a basis to formulate a hypothesis, or research question, resulting in confirmation or denial as your research progresses.

The use of KWHL charts engages students in active thinking as they determine:

- **What do we already *Know*?** In this section students identify, share, and make connections to their existing knowledge. Misconceptions and disagreements may emerge that result in the formulation of questions for further investigation.

- **What do we *Wonder* or want to find out?** Students determine what they want to learn about the topic. These statements can be easily revised into questions to be investigated in the field. Instructors may need to guide students in eliminating less relevant or practical questions from the brainstormed list which cannot be answered by the parameters of field work. Students develop essential questions and may also identify areas of disagreement for further investigation.

- ***How* are we going to find out?** Students identify resources and develop a plan for gathering the information needed to answer their essential questions. Investigation processes, protocol, and tools can be included here. Primary and secondary methods can be identified. Primary resources could include ponds, prairie, observation, measurement, etc., while secondary resources may include field guides, Internet, encyclopedias, interviews, and other methods to be used after the investigation to extend the experience.

The bulk of the KWHL process takes place at this step as students also conduct their investigation outdoors and record data based upon their observations.

- What have we *Learned?* In this section students identify and summarize their newly acquired knowledge and skills. These statements can be adapted for answers to their questions. What they have learned often leads to the development of additional essential questions for future investigation and/or a consensus of opinion.

Additional columns may be added to fulfill the scientific process, such as Conclusions, New Questions for further investigation, and Recommendations. A column expressing *Why* the specified outdoor resource is important helps link their field work with the mission of the U.S. Fish and Wildlife Service (e.g. why is the prairie important?) With this framework, students can then write a scientific report or present a speech with all or many of the sections commonly used by scientists in communicating their results with other scientists and ultimately the public. The KWHL process naturally leads to further investigation, increasing validity of results and/or expanding research, and continuation of the science cycle.

Why Use KWHL?

- KWHL allows students to discover more for themselves without front-loading of information and direction by instructors.
- KWHL helps students find purpose in their learning. Students direct their learning and build on past knowledge, which seems to increase their loci of control, motivation for learning, and ownership in the investigation. Organizing information and making the process visible helps student tap into and possibly revise their organization of prior knowledge as they gain skills in thinking about thinking.
- KWHL promotes higher-order thinking for both students and instructors, allowing for a genuine two-way exchange of ideas and thinking between both. Instructors may be pleasantly surprised by the type of knowledge and by the critical thinking students demonstrate.
- KWHL parallels the scientific method and may directly support state and national academic standards for inquiry-based learning and use of the scientific method.
- Training students as scientists in their use of the scientific method through investigation of the outdoor classroom supports the mission of the National Wildlife Refuge System and the vision of the U.S. Fish and Wildlife Service.

Challenges to Using KWHL

- Instructors may experience fear and resistance because of inherent risk-taking involved in experimenting with a different and less familiar teaching approach.
- KWHL may involve more "seat time" for students if time is not carefully managed.
- Instructors need to be attentive to integrating the mission of the Refuge System where most appropriate. Consider adapting the chart with an additional column to ensure making this critical link.

Resources

- "The K-W-L: A Teaching Model that Develops Active Reading of Expository Text" by Donna Ogle. *The Reading Teacher* 39 (1986): 564-70.
- Thematic Unit—Owls, by Fran Van Vorst, Teacher Created Materials, 1999.
- Graphic Organizers, Enchanted Learning web site
- Inquiry 101, Thinking Like a Scientist, University of Minnesota web site
- KWHL Chart Maker, Worksheets web site
- Communication Comparisons lesson plan, North Central Regional Educational Laboratory, Education World web site
- Metacognition, an Overview, by Jennifer L. Livingston, ERIC web site
- What are the benefits of constructivism? WNET Concept to Classroom web site