Science Classroom Observation Guide

I. Classroom Culture is Conducive to Learning Science

A. Ideas, questions, and contributions are exchanged respectfully.

- ☐ Students and teachers interact respectfully.
- ☐ Students interact collegially.
- ☐ Students and teachers jointly decide what science related idea will be discussed or investigated.
- ☐ Students listen actively and ask for clarification when they don't understand.

B. Discussions are based on scientific evidence.

- ☐ Students use supporting and refuting evidence to inform reflection and discourse.
- ☐ Students rely on their own thinking and logical arguments to evaluate ideas.
- ☐ Students explain, question, and debate their own understanding.
- ☐ Student use observation and evidence to challenge ideas and inferences.
- ☐ Students differentiate between personal and scientific ways of knowing.

C. Science content is made accessible to each student.

- ☐ Content and instruction is adjusted based on the background knowledge and skills of each student.
- ☐ Explanations and clarifications are clear, accurate, and accessible to each student.
- ☐ Spoken and unspoken messages communicate that each student is capable of learning science.
- ☐ Each student actively participates in thinking and learning.
- ☐ Each student experiences challenges that ultimately lead to new insights.
- ☐ Each student experiences scientifically productive disequilibrium.

II. Science Content is Intellectually Engaging

A. Science content is significant, accurate, and worthwhile.

- ☐ Science content is explicit and apparent to students.
- ☐ Science content is primarily focused on big ideas supported by relevant concepts, facts, and terms.
- ☐ Science content is within the bounds of an agreed upon body of knowledge.
- ☐ Science content is accurate.
- ☐ Science content is developmentally appropriate and scaffolded appropriately.
- ☐ Science is portrayed as a dynamic body of knowledge that changes based on the best available evidence.

B. Science content builds on students' prior ideas or experiences.

- ☐ Students reveal their preconceptions about the science content, the underlying related concepts, or the nature of science.
- ☐ Students reveal their underlying thinking and reasoning and the source of their preconceptions.
- ☐ Students recognize links between their preconceptions or previously learned science concepts and the activities or experiences in the science lesson.

C. Science content is intentionally connected to the classroom activities and experiences.

- ☐ Student actions and interactions focus on understanding important and relevant science content.
- ☐ Students generate and explore questions about the science in the lesson.
- ☐ Students can articulate the intended science content of a lesson, activity, or experience.

III. Instruction Fosters and Monitors Student Understanding

A. Instruction fosters students' emerging understanding of science content.

- ☐ Students are confronted with evidence that challenges their initial ideas as opportunities for productive disequilibrium.
- ☐ Questions enhance the development of students' understanding of key concepts connected to the lesson.
- ☐ Clear and accurate explanation/clarification are provided at appropriate points.
- ☐ Opportunities are provided for students to build on their present understanding as they develop new understandings.
- ☐ Student generated questions are pursued based on their relevance to the science content and their potential to deepen student understanding.

B. Instruction monitors students' emerging understanding of science content.

- ☐ Student ideas are recognized, even when they are vaguely articulated.
- ☐ Responses to student questions or comments address the scientific idea expressed in their thinking and relate it to the focus of the lesson.
- ☐ Learning experiences are modified or added to ensure students develop the necessary science content knowledge.

IV. Students Organize, Relate, and Apply Their Scientific Knowledge

A. Students make sense of the intended scientific ideas and concepts.

- ☐ Students work on answering scientific questions or problems and objectively communicate their findings.
- ☐ Students clarify their own ideas, observations, reasoning, models and explanations of core science concepts.
- ☐ Students self-monitor the accuracy of their understanding and revise their ideas based on scientific reasoning and evidence.
- ☐ Students recognize changes in their initial ideas and cite experiences and/or evidence that led to them.
- ☐ Students describe the difficulties they confronted in developing new and more accurate understanding.

B. Students reflect on their own understanding of the science content.

- ☐ Students engage in private think time to reflect on the content within the lesson.
- ☐ Students reflect critically on their own and each others' processes, reasoning, and explanations.
- ☐ Students discuss what they understand and don't understand about the intended content.

C. Students make connections between the science content in the current lesson and prior experiences in and out of school.

- ☐ Students articulate a purpose for the content beyond the immediate classroom lesson.
- ☐ Students make multiple connections to what they already know or to applications in real world contexts.
- ☐ Students apply what they learn beyond the context of the original problem.
- ☐ Students connect the science ideas to everyday life.

Supported by NSF under Grant No. EHR-0315060

The Science Classroom Observation Guide describes a research- based approach to important components, elements, and indicators of effective science teaching that can be used by administrators and teachers to develop a shared understanding of quality science classrooms and to collaboratively identify targets for growth.

Potential Uses of the Science Classroom Observation Guide

Building a Common Vision for Science: Careful study and analysis of the guide can be used to help build consensus among teachers and administrators within a school or across a district about effective science teaching and learning.

Deprivatizing Practice: The guide can support teacher collaboration around effective instruction. Professional Learning Communities can target specific components from within the guide. Subsequent dialogue among teachers can focus on evidence of student learning and effective instruction gathered through observation.

Supporting Lesson Study: The guide allows a lesson study group to easily identify important aspects of their classroom that they would like lesson study observers to provide feedback on. The components, elements and indicators allow a group to easily scale the observation feedback from detail to general details of instruction.

Case Study: The guide may be used in case study to highlight certain aspects of instructional practice related to the issues a particular case raises. Indicators in the guide may help case study participants consider different perspectives and/or potential solutions to the dilemmas presented in that case.

Developing a Reflective Practice: Following a science lesson, the guide can promote teacher reflection on their actions and behaviors, as well as those of students. This reflection can identify areas for personal growth and result in improved instructional effectiveness.

Planning Curricular Units: The guide can be used to emphasize or implement instructional best-practices that might not be evident in the units as-written.

Citations

Bransford, J.D., Brown, A.L., & Cocking, R.R. (1999) *How people learn*. Washington, DC: National Academy Press.

Horizon Research Inc. (2000) *Inside the classroom observation and analytic protocol*. Retrieved August 11, 2006 from http://www.horizon-research.com/instruments/clas/cop.php

Landel, Carolyn, Warren, Shannon, Evenson, Marion, and Tjoelker, Cindy. Science Classroom Observation Guide: A tool for administrators to collaboratively reflect on effective science instruction." *In preparation.*

Minstrell, J., Anderson, R., Lenssen, E. (2007). "Constructing Understanding in Science Protocol" (CUSP). Unpublished document; adapted with permission of the author.

Kraus, P., Minstrell, J. (2007). "Diagnostic Learning Environments" (DLE). Unpublished document; adapted with permission of the author.

Teachers Development Group (2007). "Best Practices in Teaching Science: Teacher Reflection Tool." Institute Notebooks. Organization information available at: http://www.teachersdg.org/.

Weiss, Iris R. et al (2003). *Looking Inside the Classroom – A Study of K-12 Mathematics and Science Education in the United States*. Horizon Research Inc., Chapel Hill, NC., found at http: www.horizon-research.com, August, 2003.

Supported by NSF under Grant No. DUE-0315060

NORTH CASCADES AND OLYMPIC Science Partnership

Science Classroom Observation Guide

Reference Edition

NCOSP Science Classroom Observation Guide: Reference Edition

Supported by NSF under Grant No. DUE-0315060