

**Transforming STEM Learning
and
Evaluation of the North Carolina Race to the Top STEM Initiative**

Classroom Observation Protocol

RTI International
SERVE Center at UNC-Greensboro
Friday Institute at North Carolina State University

Suggested citation:

Arshavsky, N., Edmunds, J., Charles, K., Rice, O., Argueta, R., Faber, M., Parker, B. (2012). STEM Classroom Observation Protocol. Greensboro, NC: The SERVE Center, University of North Carolina at Greensboro. Available at <http://www.serve.org/STEM.aspx>



The development of this classroom observation protocol was supported by the National Science Foundation, under grant #1135051 and by the Race to the Top grant to the state of North Carolina by the U.S. Department of Education. Any opinions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation or the U.S. Department of Education.

Study of STEM Learning

Classroom Observation Protocol: Academic Year 2012–2013

Observer/Interviewer: _____ School Name: _____

Observation date: _____ Time Start: _____ End: _____

Teacher Ethnicity: _____ Teacher Gender: Male ___ Female ___

Grade Levels of students: _____ Course Title: _____

Students: Number of Males _____ Number of Females _____

Classroom Race/Ethnicity: % Minorities (approximate) _____

Please give a brief description of the class observed, including:

- the classroom setting in which the lesson took place (space, seating arrangements, environment and personalization, *etc.*),
- when in the overall lesson sequence this class takes place (toward the beginning of a unit, in the middle of a unit, toward the end)
- any unusual context of the lesson (interruptions, *etc.*)

Use diagrams if they seem appropriate.

Lesson Topic:

Lesson Goals as presented *by the teacher to the students:*

Curriculum Materials Used: (include any textbook, lab materials, or resources used)

Lesson Structure: Briefly describe the structure of the lesson (e.g. 5 min quiz, followed by 25 min of homework review, followed by 10 min of whole class discussion, followed by 15 min individual work on worksheets; note whether there was a conceptual summary at the end of the lesson; if summative assessment is present, please describe).

As implemented, the lesson mostly focused on (most time was spent on):

- Most time spent on practicing algorithms/basic skills and procedures/vocabulary
- About equal time spent on practicing algorithms/basic skills and procedures/vocabulary and on concept development and meaningful learning
- Most time spent on inquiry/meaningful learning and genuine problem solving

1. Mathematics and Science Content

Select one from scale: 0 = not observed, 1 – minimal, 2 – to some extent; 3=very descriptive of the observation.
 DK = Observer does not know or is not able to make this determination.

1a. Math and science content information was accurate.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	DK <input type="checkbox"/>
1b. Teacher’s presentation or clarification of mathematics or science content knowledge was clear.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	DK <input type="checkbox"/>
1c. Teacher used accurate and appropriate mathematics or science vocabulary.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	DK <input type="checkbox"/>
1d. Teacher/students emphasized meaningful relationships among different facts, skills, and concepts.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	DK <input type="checkbox"/>
1e. Student mistakes or misconceptions were clearly addressed (emphasis on correct content here).	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	DK <input type="checkbox"/>
1f. Teacher and students discussed key mathematical or science ideas and concepts in depth.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	DK <input type="checkbox"/>
1g. Teacher connected information to previous knowledge.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	DK <input type="checkbox"/>
1h. Appropriate connections were made to other areas of mathematics/science or to other disciplines.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	DK <input type="checkbox"/>
1i. Appropriate connections were made to real-world contexts.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	DK <input type="checkbox"/>
Summary: Quality of Mathematics and Science Content	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	

Record specific examples below.

2. Student Cognitive Engagement in Meaningful Instruction

Select one from scale: 0 = not observed, 1 – minimal, 2 – to some extent; 3=very descriptive of the observation.

2a. Students experienced high cognitive demand of activities because teacher did not reduce cognitive demand of activities by providing directive hints, explaining strategies or providing solutions to problems before students have a chance to explore them, etc.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
2b. Students were asked to explain or justify their thinking.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
2c. Students were given opportunities to summarize, synthesize, and generalize	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
2d. Students used a variety of means (models, drawings, graphs, concrete materials, manipulatives, etc.) to represent phenomena.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
2e. Students were asked to apply knowledge to a novel situation.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
2f. Students were asked to compare/contrast different answers, different solutions, or different explanations/interpretations to a problem or phenomena	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
Summary: Quality of Student Cognitive Engagement in Meaningful Instruction	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>

Record specific examples below.

3. Inquiry learning; Project-based learning; and Problem-based instruction

Select one from scale: 0 = not observed, 1 – minimal, 2 – to some extent; 3=very descriptive of the observation.

NA = not applicable to activity being observed (since projects may not occur in every lesson)

3a. Students were engaged in open-ended tasks or questions.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	NA <input type="checkbox"/>
3b. Students engaged in hands-on or real-life problem solving activities or a lab experiment.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	NA <input type="checkbox"/>
3c. Students developed their own questions and/or hypotheses to explore or test.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	NA <input type="checkbox"/>
3d. Students engaged in scientific inquiry process (tested hypotheses and made inferences)	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	NA <input type="checkbox"/>
3e. Students determined which problem-solving strategies to use.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	NA <input type="checkbox"/>
3f. Students had to present or explain results of project.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	NA <input type="checkbox"/>
3g. Students worked on a project requiring creativity.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	NA <input type="checkbox"/>
3h. There was an explicit evidence of teacher modeling engineering (or reverse engineering) design process.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	NA <input type="checkbox"/>
3i. There was an explicit evidence of students using engineering (or reverse engineering) design process.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	NA <input type="checkbox"/>
Summary: Quality of Inquiry learning; Project-based learning; and Problem-based instruction	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	<input type="checkbox"/>

Record specific examples below.

4. Teacher Instruction/ Formative Assessment

Select one from scale: 0 = not observed, 1 – minimal, 2 – to some extent; 3=very descriptive of the observation.

4a. Teacher provided clear learning goals to students.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
4b. Teacher provided clear criteria for success/examples of good work to students.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
4c. Teacher used a variety of strategies to monitor student learning and understanding throughout the lesson.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
4d. Teacher provided specific feedback to students.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
4e. Students were engaged in self- and/or peer-assessment.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
4f. Teacher adjusted or differentiated instruction based on evidence of student learning.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
4g. Students were given opportunities to reflect on their own learning.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Summary: Quality of Teacher Instruction/ Formative Assessment	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>

Record specific examples below.

5. Common Instructional Framework

Select one from scale: 0 = not observed, 1 – minimal, 2 – to some extent; 3=very descriptive of the observation.

5a. Students worked collaboratively in teams or groups.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	
5b. Students used writing to communicate what they had learned.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	
5c. Teachers asked open-ended questions that required higher level thinking.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	
5d. Teachers provided assistance/scaffolding when students struggled.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	
5e. Students engaged in discussion with each other.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	
5f. Students participated in guided reading discussions.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	NA <input type="checkbox"/>
Summary: Overall rating of Quality of Common Instructional Framework implementation	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	

Record specific examples below.

6. Student Engagement

Select one from scale: 0 = not observed, 1 – minimal, 2 – to some extent; 3=very descriptive of the observation.

6a. Students were behaviorally engaged (following directions, on-task behavior, responding to teachers' questions).	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
6b. The time in class was spent productively on meaningful tasks.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
6c. Teacher pursued the active engagement of all students.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
6d. Students appeared cognitively engaged (ask questions of the teacher and each other related to the content and ideas being discussed, follow up on each other's responses, clear evidence of students working/thinking hard on a problem).	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
6e. Students showed perseverance when solving math/science problems.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
Summary: Student Engagement	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>

Record specific examples below.

7. Use of technology

Select one from scale: 0 = not observed, 1 – minimal, 2 – to some extent; 3=very descriptive of the observation.

7a. Technology was used to a high extent (as a proportion of time of the lesson and intensity of use)	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
7b. Students used technology to explore or confirm relationships, ideas, hypotheses, or develop conceptual understanding.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
7c. Students used technology to generate or manipulate one or more representations of a given concept or idea.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
7d. Students used technology as a tool to meet a discreet instructional outcome (like an assignment or specific objective).	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
7e. Students used technology to practice skills or reinforce knowledge.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
7f. Technology was used but did not appear to provide any added benefit.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
7g. Teacher used technology to achieve instructional goals. (Emphasis on the “teacher” here)	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
Summary: Use of technology	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>

Record specific examples below.

8. Classroom Culture

Select one from scale: 0 = not observed, 1 – minimal, 2 – to some extent; 3=very descriptive of the observation.

8a. Students exhibited positive classroom behavior.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
8b. The classroom exhibits a respectful environment.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
8c. There is a climate of respect and encouragement for students' ideas, questions, and contributions; mistakes are viewed as an opportunity to learn	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
8d. Students and teacher appear to have positive relationships and to enjoy spending time with each other (laughing, easy relationship).	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
8e. Students actively seek and provide assistance or guidance.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
8f. Teachers and students provide positive reinforcement and feedback to each other.	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>
Summary: Classroom Culture	(0) <input type="checkbox"/>	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>

Record specific examples below.