SCIENCE CLASSROOM OBSERVATION INSTRUMENT
Middle School Version

School ____________________**Name of Teacher** _______________________ **Level/Class**_________

Length of Observation: _______________________

Learning Target of the Lesson____

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I. LESSON OVERVIEW

A. Learning Objective of the Lesson (Mark all that apply)

☐ Clearly communicated by the teacher using multiple means ☐ Communicated orally only ☐ Communicated in writing only ☐ Student activities consistent with the lesson objective(s) ☐ Student activities not consistent with the lesson objective(s) ☐ Lesson objective communicated but not clear ☐ Lesson objective not communicated
☐ Lesson objective communicated but not observed

II. SCIENCE AND ENGINEERING PRACTICES (Check all that apply in each section)

The students are:

A. Asking Questions and Defining Problems

- ☐ Asked questions that arose from careful observations of phenomena, unexpected results or to clarify/seek information.
- ☐ Ask questions that require sufficient and appropriate empirical evidence to answer.
- ☐ Asked questions that could be investigated within the scope of the school's facilities & resources (laboratory, outdoors)
- ☐ Used a question to frame a hypothesis based on observations and scientific principles.
- ☐ Asked and/or evaluated questions that challenge the premise(s) of an argument or data set.
- ☐ Defined a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions.
- ☐ Did not address this practice

Comment:

B. Developing and Using Models

- ☐ Evaluated limitations of a model for a proposed object or tool.
- ☐ Develop or modify a model – based on evidence – to match what happens if a variable or component of a system is changed.
- ☐ Use and/or develop a model of simple systems with uncertain and less predictable factors.
- ☐ Develop and/or revise a model to show the relationships among variables, including those that are not observable but predict observable phenomena.
- ☐ Developed and/or used a model to predict and/or describe phenomena.
- ☐ Develop a model to describe unobservable mechanisms.
- ☐ Develop and/or use a model to generate data to test ideas about phenomena in natural or designed systems, including those representing inputs and outputs, and those at unobservable scales.
- ☐ Did not address this practice

Comment:

C. Planning and Carrying Out Investigations

- ☐ Planned an investigation, individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim.
- ☐ Conduct an investigation and/or evaluate and/or revise the experimental design to produce data to serve as the basis for evidence that meet the goals of the investigation.
- ☐ Evaluate the accuracy of various methods for collecting data.
- ☐ Collect data to produce data to serve as the basis of evidence to answer scientific questions or test design solutions under a range of conditions.
- ☐ Collect data about the performance of a proposed object, tool, process, of system under a range of conditions.
- ☐ Did not address this practice.

Comment:

D. Analyzing and Interpreting Data

☐ Construct, analyze, and/or interpret graphical displays of data and/or large data sets to identify linear and nonlinear relationships.
☐ Use graphical displays (e.g., maps, charts, graphs, and/or tables) of large data sets to identify temporal and spatial relationships.
☐ Distinguish between causal and correlational relationships in data.
☐ Analyze and interpret data to provide evidence for phenomena.
☐ Applied statistics and probability concepts (including mean, median, mode, and variability) to analyze and characterize data, using digital tools when feasible.
☐ Considered limitations of data analysis (e.g., measurement error), and/or seek to improve precision and accuracy of data with better technological tools and methods (e.g., multiple trials).
☐ Analyze and interpret data to determine similarities and differences in findings.
☐ Analyzed data to define an optimal operational range for a proposed object, tool, process or system that best meets criteria for success.
☐ Did not address this practice.

Comment:

E. Using Mathematics and Computational Thinking

☐ Use digital tools (e.g., computers) to analyze very large data sets for patterns and trends.
☐ Used mathematical representations to describe and/or support scientific conclusions and design solutions.
☐ Create algorithms (a series of ordered steps) to solve a problem.
☐ Apply mathematical concepts and/or processes (such as ratio, rate, percent, basic operations, and simple algebra) to scientific and engineering questions and problems.
☐ Use digital tools and/or mathematical concepts to test and compare proposed solutions to an engineering design problem.
☐ Did not address this practice.

Comment:

F. Constructing Explanations and Designing Solutions

☐ Construct an explanation that includes qualitative or quantitative relationships between variables that predict(s) and/or describe(s) phenomena.
☐ Construct an explanation using models or representations.
☐ Construct an explanation based on valid and reliable evidence obtained from a variety of sources.
☐ Apply scientific ideas, principles and/or evidence to construct, revise, and/or use an explanation for real-world phenomena, examples, or events.
☐ Apply scientific reasoning to shop why the data or evidence is adequate for the explanation or conclusion.
☐ Apply scientific ideas or principles to design, construct, and/or test a design of an object, tool, process, or system.
☐ Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints.
☐ Optimize performance of a design by prioritizing criteria, making tradeoffs, testing, revising, and retesting.
☐ Did not address this practice

Comment:

G. Engaging in Argument from Evidence

☐ Compared and critique two arguments on the same topic and analyze whether they emphasize similar or different evidence and/or interpretations of facts.
☐ Respectfully provided and received critiques about one’s explanations, procedures, models and questions by citing relevant evidence and posing and responding to questions that elicit pertinent elaboration and detail.
☐ Constructed, used, and/or presented an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for phenomenon or a solution to a problem.
☐ Made an oral or written argument that supports or refutes the advertised performance of a device, process, or system, based on empirical evidence concerning whether or not the technology meets relevant criteria and constraints.
☐ Evaluated competing design solutions based on jointly developed and agreed-upon criteria.
☐ Did not address this practice

Comment:

Adapted from NGSS Appendix F

H. Obtaining, Evaluating and Communicating Information

☐ Critically read scientific texts adapted for classroom use to determine central ideas and/or obtain scientific and/or technical information to describe patterns in and/or evidence about the natural and designed world(s).
☐ Integrate qualitative and/or technical information in written text with that continued in media and visual displays to clarify claims and findings.
☐ Gathered/read/synthesized information from multiple sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence.
☐ Evaluate data, hypothesis, and/or conclusions in scientific and technical texts in light of competing information or accounts.
☐ Communicated scientific and/or technical information (e.g., about a proposed object, tool, process, system) in writing and/or through oral presentations.
☐ Did not address this practice.

Comment: