

Supplementary material for JGE review

Copyrighted, published material from Baumfalk, B., Bhattacharya, D., Vo, T., Forbes, C.T., Zangori, L., & Schwarz, C. (2019). [Impact of model-based curriculum and instruction on 3rd-grade students' scientific explanations for the hydrosphere](#). *Journal of Research in Science Teaching*, 56(5), 570-597.

Appendix B: Modeling Observation Protocol

Item Description _____ Date of Rating _____ Rater _____

Teacher _____ Investigation Part Duration _____

<i>Students are afforded the opportunity to...</i>	Rating
A1. CONSTRUCT: consider a central question or anchoring phenomenon	
A1.1 Teacher explains the central question or anchoring phenomenon	3 2 1 0
A1.2 Teacher elicits students' ideas about the central question or anchoring phenomenon	3 2 1 0
A1.3 Students provide connections between prior knowledge and central question or anchoring phenomenon	3 2 1 0
A1.4 Students discuss the central question or anchoring phenomenon with peers	3 2 1 0
A2. CONSTRUCT: share/discuss their initial ideas about scientific modeling	
A2.1 Teacher describes the general process of scientific modeling	3 2 1 0
A2.2 Teacher elicits students' ideas about scientific modeling	3 2 1 0
A2.3 Students provide connections between the central phenomenon and scientific modeling	3 2 1 0
A2.4 Students discuss their ideas about scientific modeling with peers	3 2 1 0
A3. CONSTRUCT: observe /construct a scientific model	
A3.1 Teacher demonstrates the construction of a model	3 2 1 0
A3.2 Teacher explains the components, process, or mechanism involved during the construction of the model	3 2 1 0
A3.3 Teacher elicits students' ideas about the construction of the model and integrates them	3 2 1 0
A3.4 Students construct a model with peers	3 2 1 0
B1. USE: observe how scientific models are used to predict, investigate, or explain a phenomenon	
B1.1 Teacher explains how models are used to predict, investigate, or explain a phenomenon	3 2 1 0
B1.2 Teacher demonstrates using a model to predict, investigate, or explain a phenomenon	3 2 1 0
B1.3 Teacher elicits students' ideas about using a model to predict, investigate or explain a phenomenon	3 2 1 0
B2. USE: document observations as they use scientific models to predict, investigate, or explain a new phenomenon	
B2.1 Teacher describes the process of documenting observations as models are tested on a new phenomenon	3 2 1 0
B2.2 Teacher elicits students' ideas about investigating a new phenomenon or documenting observations	3 2 1 0
B2.3 Students investigate a new phenomenon and document observations	3 2 1 0
B3. USE: communicate/justify an explanation of a new phenomenon	
B3.1 Teacher elicits students' thoughts about their explanations or justifications	3 2 1 0
B3.2 Students communicate/justify their explanations of a new phenomenon	3 2 1 0
B3.3 Students discuss their explanations with peers	3 2 1 0
C1. EVALUATE: observe how to evaluate scientific models based on specific criteria	
C1.1 Teacher explains the process of evaluating a model based on specific criteria	3 2 1 0
C1.2 Teacher demonstrates the evaluation of a model based on specific criteria	3 2 1 0
C1.3 Teacher elicits students' ideas about process of evaluating a model or the criteria for judging quality	3 2 1 0
C2. EVALUATE: evaluate their scientific models based on specific criteria	
C2.1 Teacher asks guiding questions as students evaluate their models	3 2 1 0
C2.2 Students evaluate their models individually or with peers	3 2 1 0
C2.3 Student communicate the results of their model evaluations	3 2 1 0
D1. REVISE: make modifications to scientific models based on evaluations	
D1.1 Teacher explains the process of making modifications to models based on evaluations	3 2 1 0
D1.2 Teacher elicits students' thoughts about making modification to models based on evaluations	3 2 1 0
D1.3 Students make modifications to their models based on evaluations	3 2 1 0

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D2. REVISE: construct a class consensus model				
D2.1 Teacher constructs a consensus model	3	2	1	0
D2.2 Teacher and students negotiate ideas to be included in the consensus model	3	2	1	0
D2.3 Teacher incorporates student ideas into the consensus model	3	2	1	0
D2.4 Students compare and revise their individual model to the consensus model	3	2	1	0