Camp Bioscience - Buo, et al.

Appendix 1. Student Understanding of Science and Scientific Inquiry Questionnaire

Please read EACH statement carefully, and then indicate the degree to which you agree or disagree with EACH statement by circling the appropriate letters to the right of each statement (1= Strongly Disagree; 2 = Disagree More Than Agree; 3 = Uncertain or Not Sure; 4 = Agree More Than Disagree; 5 = Strongly Agree).					
1. Observations and Inferences	1	2	3	4	5
A. Scientists' observations of the same event may be different because the scientists' prior knowledge may affect their observations.	1	2	3	4	5
B. Scientists' observations of the same event will be the same because scientists are objective.	1	2	3	4	5
C. Scientists' observations of the same event will be the same because observations are facts.	1	2	3	4	5
D. Scientists may make different interpretations based on the same observations.	1	2	3	4	5
With examples, explain why you think scientists' observations and interpretations are the same OR different*.					
2. Methodology of Scientific Investigation	1	2	3	4	5
A. Scientists use different types of methods to conduct scientific investigations.	1	2	3	4	5
B. Scientists follow the same step-by-step scientific method.	1	2	3	4	5
C. When scientists use the scientific method correctly, their results are true and accurate	1	2	3	4	5
D. Experiments are not the only means used in the development of scientific knowledge.	1	2	3	4	5
With examples, explain whether scientists follow a single, universal scientific method OR use different methods.					

Taxonomy of Views about Nature of Science and Scientific Inquiry

Aspect	Explanation/Description	Items
Observations and Inferences	Science is based on both observations and inferences. Observations are descriptive statements about natural phenomena that are directly accessible to human senses (or extensions of those senses) and about which observers can reach consensus with relative ease. Inferences are interpretations of those observations. Perspectives of current science and the scientist guide both observations and inferences. Multiple perspectives contribute to valid multiple interpretations of observations.	1A (+); 1B (-); 1C (-); 1D (+)
Scientific methods	Scientists conduct investigations for a wide variety of reasons. Different kinds of questions suggest different kinds of scientific investigations. Different scientific domains employ different methods, core theories, and standards to advance scientific knowledge and understanding. There is no single universal step-by-step scientific method that all scientists follow. Scientists investigate research questions with prior knowledge, perseverance, and creativity. Scientific knowledge is gained in a variety of ways including observation, analysis, speculation, library investigation and experimentation.	6A (+); 6B (-); 6C (-); 6D (+)

Appendix 1. Modified version of the Student Understanding of Science and Scientific Inquiry survey with category explanations (Liang et al., 2006).