Supplementary Materials 3

This resource lists the observable features (i.e., action and context) identified within the 17 reviewed active teaching practices along with a description of each of the observable actions. Further, this resource lists the purpose for enacting the observable action and which of the 17 review practices employs each of these actions.

Observable Features		**Description**	**Learning Outcomes (reason for use)**	**Associated effective STEM teaching practices**
Action	**Learning context**			
Writing	Individual, Small group	Students putting pen to paper or typing words	in order to • solve problems • collect data • brainstorm • answer questions • communicate ideas • reflect on learning • demonstrate understanding • complete computations • map concepts • solve problems • assess learning	• Argument Driven Inquiry, • Challenge-based learning, • Jigsaw, • Models/Analogies/ Representations, • Problem-Based learning, • Project-Based learning, • Science Writing Heuristic, • Student inquiry, • Studio courses, • Think/Write-Pair-Share
Reading	Individual	Students using print sources of information including: • Texts • electronic media	in order to • to access information • solve problems • complete tasks • compare what has been observed and analyzed to what is already known • support or refute claims made based on prior knowledge or research	• Argument Driven Inquiry, • Challenge-based learning, • Computer simulations, • Jigsaw, • Problem-Based learning, • Project-Based learning, • Student inquiry, • Studio courses
Observing	Individual	Students using their senses including: • Looking • Touching • Tasting • Smelling • Listening	in order to • ask questions • make interpretations	• Argument Driven Inquiry, • Computer simulations, • Interactive demonstration, • Models/Analogies/ Representations, • Science Writing Heuristic, • Student inquiry, • Studio courses

Building/ Manipulating	Individual, Small group	Students constructing or using STEM materials (beakers, probes, demonstration equipment) Can be done by hand or simulated through computer aided software.	In order to • perform experiments, • use models or • represent design • engage in STEM practices.	• ADI, • Computer simulations, • Student Inquiry, • Studio courses
Speaking	Small group, Whole class	Student verbal exchange	in order to • develop knowledge • develop understanding • reshape knowledge as part an interplay between prior knowledge and social interactions	• Argument Driven Inquiry, • Challenge-based learning, • Cooperative learning, • Collaborative learning, • Interactive Demonstration, • Interactive lecture, • Jigsaw, • Just-in-Time Teaching, • Peer Instruction, • Problem-based learning, • Project-based learning, • Science Writing Heuristic, • Socratic dialogue, • Student Inquiry, • Studio courses, • Think/Write-Pair-Share
Facilitating Discussion	Small group, Whole class	Teacher asking questions of students	in order to • facilitate classroom dialogue • assess student understanding in order to 1. continue with classroom activities or 2. modify those activities to meet current learning needs of students.	• Interactive demonstration, • Interactive Lecture, • Just-in-Time Teaching, • Peer Instruction, • Socratic Dialogue, • Think/Write-Pair-Share

Facilitating activities	Small group, Whole class	Organizing materials, groups	in order to • encourage student engagement in the learning activity	• Argument Driven Inquiry, • Challenge-based learning, • Cooperative learning, • Interactive Demonstration, • Interactive lecture, • Jigsaw, • Just-in-Time Teaching, • Peer Instruction, • Problem-based learning, • Project-based learning, • Science Writing Heuristic, • Socratic dialogue, • Student Inquiry, • Studio courses, • Think/Write-Pair-Share
Waiting	Small group, Whole class	Teacher providing time during instruction	in order to • facilitate students' information processing and retention in order to 1. formulate an idea 2. question 3. response	• Peer Instruction, • Think/Write-Pair Share