

Quantifying Changes in Instructional Practices (QCIP) for Science, Technology, Engineering, and Mathematics (STEM)

The QCIP for STEM criteria are:

- Teacher uses warm-ups and discussion to activate prior knowledge related to the STEM lesson.
- Teacher introduces scientific concepts and generates interest through technology, e.g., video clips, demonstrations, and other media, and includes all students from the beginning of the lesson.
- Teacher integrates reading and analyzing informational text with ongoing science explorations and experiments and requires students to take and organize notes into a science notebook or equivalent, including their graphs, conclusions, and proposed next steps based on experiments.
- Teacher incorporates mathematics content with hands-on experiments and group activities into each STEM lesson appropriately, based on student engagement with specific STEM content.
- Teacher provides opportunities for student discourse through teacher modeling of STEM practices (e.g., reasoning through the engineering design process) and requiring student presentations of their STEM thinking within small groups and to the whole class.
- Teacher provides formative assessment during each lesson, and includes debriefing after each STEM activity.
- Teacher lowers the affective filter to create a safe environment for student learning, thinking, reasoning, and discussion, supporting students to learn from their mistakes without anxiety (i.e., teacher spurs student interest in STEM and STEM careers, and provides a low anxiety environment, while reducing self-doubt and boredom).

QCIP-STEM uses a five-point scale, where “1” means little implementation, “3” means some implementation, and “5” means full implementation. Data is collected in fall and spring to analyze the degree to which teachers improve in their implementation of these instructional practices.