



### **TOTAL INSTRUCTIONAL FOCUS: ASSESSMENT GUIDES AND INFORMS INSTRUCTION**

*Assessment is an important tool that guides and informs STEM instruction. An effective design will mirror the STEM curriculum and instruction methods, employing a range of assessment strategies. Both formative and summative assessments are incorporated so the resulting data can guide instruction and learning.*

#### **Mirror the STEM Curriculum**

An effective assessment of the engaging and rigorous STEM classroom mirrors the curriculum and its innovative instruction methods. Taking a standards-based, integrated approach with real world applications, the assessment measures students' ability to innovate, problem-solve and apply 21<sup>st</sup> century skills at each grade level. At the high school level, a diligent assessment also gauges students' readiness for college, careers and productive citizenship.

#### **Range of Assessment Strategies**

According to Hays B. Lantz of CurrTech Integrations, traditional modes of assessment alone are not sufficient to gather evidence of student understanding of the rich and robust STEM curriculum. Paper and pencil tests and quizzes are valid formats for gaining evidence of student learning; however, authentic assessment methods require students to find novel solutions to complex challenges within and beyond school contexts. An effective assessment of STEM instruction engages individual and collaborative teams in incorporating design processes, technology and standards-based content to show what students are learning, the knowledge they've retained and what they are able to do as a result.

#### **Formative Assessment**

Formative assessment, also called assessment *for* learning, takes place during instruction. It enables instructors to identify necessary adjustments while teaching and learning are in progress.

In a STEM classroom, teachers purposefully design tasks to reveal students' progress towards defined learning targets. These tasks simulate professional work environments, requiring students to apply their learning in meaningful ways. Because the work is not graded, these projects encourage innovation and risk-taking. Students have the advantage of descriptive feedback from their teachers and peers to incorporate with self-critique into final products. Teachers have the advantage of identifying and clarifying student misconceptions before final evaluation. Collaborative technology tools such as wikis, Google docs and other online sharing formats can aid in the formative assessment process. The teacher and fellow students use such tools to access and provide ideas for refinements of ongoing work, leading to enhanced summative assessment results.

#### **Summative Assessment**

Summative assessment, also known as assessment *of* learning, takes place at the end of an instructional unit, quarter, semester or year. It is the culminating evaluation of a teaching and learning progression in which a student has had multiple opportunities to hone and build on knowledge, skills and assignments. For example, a STEM-focused summative assessment may require students to produce a documentary highlighting a compelling community or world problem. Photos and video clips taken with a mobile phone or a Flip camera could be imported into the students' choice of digital media to vividly underscore key points. The final product might be in the form of a digital story or a podcast. Students might be expected to maintain a blog to keep the teacher and fellow students abreast of their progress and new learning along the way. Although this type of assessment is summative and subject to a grade, data from it can still be used to guide next steps in instruction.

### **Data Guides Instruction and Learning**

Decisions about what is next in instruction come from various data sources and can be collected through observations, dialogue and analysis of formal and informal student responses. Using data from formative and summative assessments, individual misunderstandings can be addressed as trends in student fallacies are identified. This information can be used to make adjustments in instructional plans and learning strategies. To promote school wide congruence between what is taught and what is assessed, time should be embedded in the school day for teachers to collaborate on assessment design and take informed action based on student assessment results.

### **Bibliography**

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#### **Guiding Questions**

*Use the reflection questions below to guide discussions. We recommend documenting evidence to support each question. Doing so will assist you in setting action plans, goals, and progress monitoring.*

#### **Mirrors the STEM Curriculum**

- In what ways does your assessment design mirror your STEM curriculum?
- In what ways is your assessment design standards-based, integrated, real world?
- In what ways are students' ability to innovate, problem solve, and apply 21<sup>st</sup> century skills assessed?
- In what ways does your assessment design gauge students' readiness for college, careers, and productive citizenship by the end of high school?

#### **Range of Assessment Strategies**

- What assessment practices do you currently employ to guide and inform instruction in the STEM classrooms?
- How might you incorporate more authentic assessment methods that require students to find novel solutions to complex problems within and beyond the school contexts?

#### **Formative Assessment**

- In what ways do assessment practices highlight needed adjustments in ongoing teaching and learning?
- How well do assessment tasks simulate professional work environments requiring students to apply their learning in meaningful ways? Explain.
- What strategies do teachers employ to incorporate design processes, technology and standards based content in assessments?

#### **Summative Assessment**

- What do STEM focused summative assessments look like at your school?

#### **Data Guides Instruction and Learning**

- In what ways does assessment guide your next steps in instruction? Be specific.
- How do administrators promote school wide congruence between what is taught and what is assessed?