



THE ITEEA

6E Learning byDeSIGN™ Model

MAXIMIZING INFORMED DESIGN AND INQUIRY
IN THE INTEGRATIVE STEM CLASSROOM

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In April, 2013, the role of technology and engineering in schools and classrooms shifted forever.

When the *Next Generation Science Standards (NGSS)* document, (NRC, 2013) was released in April 2013, teachers in the profession had mixed emotions. Many viewed the standards as invasive to their classrooms, while others found them a refreshing take on what technology and engineering educators have been doing for years. The reality is that *NGSS* provides an opportunity to *Engage, Explore, Explain, eENGINEER, Enrich, and Evaluate* technology and engineering programs and classrooms within the school and greater community. As stated by Sanders (2011), *NGSS* validates an integrative STEM approach by recognizing that technology and engineering provide opportunities for students to develop deeper knowledge about science.

The question is—“*How should we look at design and inquiry?*” Most technology and engineering educators would say they have been doing both for years. Others would say that inquiry should be done in science, while design should be done in technology and engineering. Curriculum designers everywhere look for the perfect way to plan and integrate content in order to give students the want and need to learn. Can we legitimately combine inquiry and design in a way that makes sense and builds on the ability to deliver Integrative STEM—by strengthening the T and E (Technology and Engineering)? How can we implement research-based strategies using engineering

concepts to ensure that materials developed have a strong Integrative STEM focus?

I propose that a new, modified model, based on the Biological Sciences Curriculum Study’s (BSCS) 5E Instructional Model (Bybee, 1997), will maximize the concepts of *Design and Inquiry* in an *Integrative* way (Sanders, 2009). The ITEEA 6E Learning byDeSIGN™ Model provides a student-centered framework for instruction that leverages the T and E of STEM as it integrates content in a purposeful and informed way.

BSCS 5E INSTRUCTIONAL MODEL

Many are familiar with the BSCS 5E Instructional Model. Developed by the Biological Sciences Curriculum Study (BSCS), the 5E model is a learning cycle based on a constructivist view of learning (Rowrich, 2005 p.29). The objective of a constructivist model is to provide students with experiences that make them reconsider their conceptions. Then students “*redefine, reorganize, elaborate, and change their initial concepts through self-reflection and interaction with their peers and their environment*” (Bybee 1997, p. 176). The 5E model provides a planned sequence of instruction that places students at the center of their learning experiences, encouraging them to explore, construct their own understanding of scientific concepts, and relate those understandings to other concepts (Rowrich, 2005 p.29).