

## STEM LITERACY

We in the United States now live in a world where individual states, as well as the nation, increasingly must generate their own human capital with the STEM literacies that will allow them to succeed in the knowledge-based work place and community. STEM literacy refers to an individual's ability to apply his or her understanding of how the world works within and across four interrelated domains.

**Scientific literacy** is the ability to use scientific knowledge (in physics, chemistry, biological sciences, and earth/space sciences) and processes to understand the natural world but to participate in decisions that affect it (in three main areas — science in life and health, science in Earth and environment, and science in technology).

**Technological literacy** in the modern world means the ability to use, manage, understand, and assess technology. Students should know how to use new technologies, understand how new technologies are developed, and have skills to analyze how new technologies affect us, our nation, and the world. Technology is the innovation, change, or modification of the natural environment to satisfy perceived human needs and wants.

**Engineering literacy** is the understanding of how technologies are developed via the engineering design process; lessons are project-based and integrate multiple subjects, making difficult concepts relevant and tangible to students and tapping into students' natural interest in problem-solving. Engineering design is the systematic and creative application of scientific and mathematic principles to practical ends such as the design, manufacture, and operation of efficient and economical structures, machines, processes, and systems.

**Mathematical literacy** means the ability of students to analyze, reason, and communicate ideas effectively as they pose, formulate, solve, and interpret solutions to mathematical problems in a variety of situations.

STEM literacy is an interdisciplinary area of study that *bridges* the four areas of science, technology, engineering, and mathematics. STEM literacy does not simply mean achieving literacy in these four strands or silos. Consequently, a STEM classroom shifts students away from learning discrete bits and pieces of phenomenon and rote procedures and toward having investigating and questioning the interrelated facets of the world. One hallmark of a STEM classroom is an emphasis on design and problem-solving in “intellectually messy” learning situations that weave together the disciplines through topics such as nanotechnology, biomedical engineering, and astrobiology. Thus, for example, a STEM classroom might pose a problem and then require students to do original research inspired by a class-wide inquiry project, where they must use technology to gather and analyze data, design, test, and improve upon a proposed solution, and then communicate their findings to their peers in another country. A STEM student might spend after-school time, mentored by a local engineer, building a robot that can walk up stairs.

*Adapted from “Building a Science, Technology, Engineering and Math Agenda”. National Governor’s Association, 2009).*