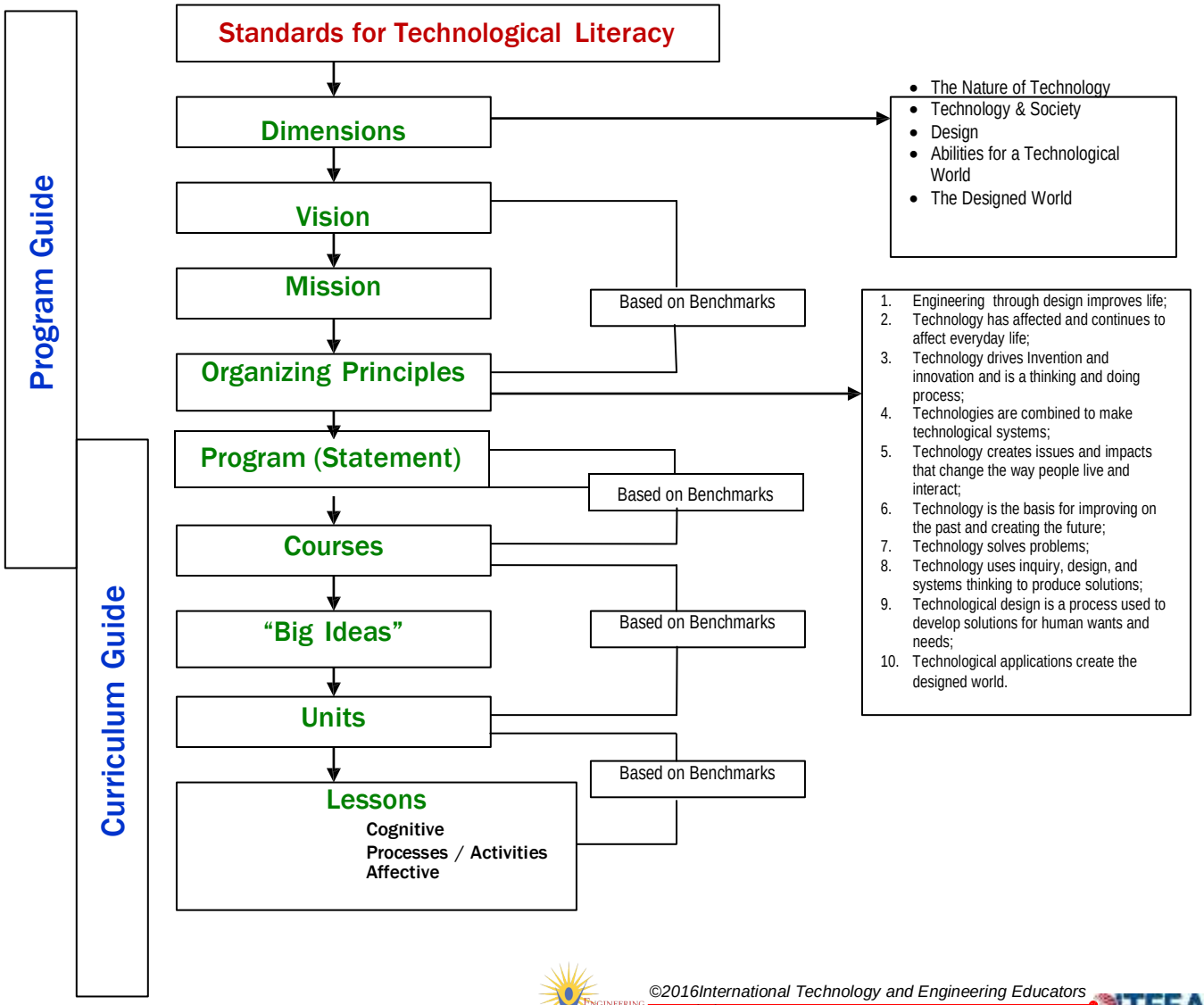
## The Engineering byDesign™ Model Program

***Engineering byDesign™*** is a National Model Program that was developed in collaboration and consultation with the ITEEA-STEM⌖Center for Teaching and Learning™, Technology Education Advisory Council, ITEEA institutional members, and the mathematics, science, and engineering communities. The reader will see, as the structure of the Program unfolds, that the intent of the program is related to the development of technological literacy for students in Grades K-12, and delivered in the context of STEM (Science, Technology, Engineering, and Math).

States, districts, and schools may wish to use this introduction as the basis for the development of a new program in STEM, or to use it just as it is written. Note that either way, the assessments that are used in the program and in this course are designed specifically to measure achievement of the *Standards for Technological Literacy* (*STL)* content standards and corresponding benchmarks.

## ITEEA Engineering byDesign™
## A Standards-Based Program



## The Vision of Engineering byDesign™

We live in a technological world. Living in the 21st century requires much more from every individual than a basic ability to read, write, and perform simple mathematics. Technology affects every aspect of our lives, from enabling citizens to perform routine tasks to requiring that they be able to make responsible, informed decisions that affect individuals, our society, and the environment. Citizens of today must have a basic understanding of how technology affects their world and how they exist both within and around technology.

Technological literacy is fundamentally important to all students. Technological processes have become so complex that the community and schools collaborate to provide a quality technology program that prepares students for a changing technological world that is progressively more dependent on an informed, technologically literate citizenry.

## The Mission of Engineering byDesign™

The ITEEA Model technology program is committed to providing technological study in facilities that are safe and facilitate creativity, enabling all students to meet local, state, and national technological literacy standards. Technological study is required at sixth, seventh, and eighth grades. Students are prepared to engage in additional technological study in the high school years and beyond. Students will be prepared with knowledge and abilities to help them become informed, successful citizens who are able to make sense of the world in which they live. The technology program also enables students to take advantage of the technological resources in the local community.

## The Organizing Principles

The Program consists of seven organizing principles. These principles are very large concepts that identify major content organizers for the program. As stated earlier, Engineering byDesign™ is to be taught in the context of science, technology, engineering, and math. In order of importance, the seven identified technology and engineering Organizing Principles are listed below:

1. Engineering through design improves life.
2. Technology has and continues to affect everyday life.
3. Technology drives invention and innovation and is a "thinking" and "doing" process.
4. Technologies are combined to make technological systems.
5. Technology creates issues that change the way people live and interact.
6. Technology impacts society and must be assessed to determine if it is good or bad.
7. Technology is the basis for improving on the past and creating the future.
8. Technology uses inquiry, design, and systems thinking to produce solutions.
9. Technological design is a process used to develop solutions for human wants and needs.
10. Technological applications create the designed world.

## Program Descriptions

The program statement on which the courses are developed is based on the identification of benchmarks for each organizing principle. (Note that the number of courses does not necessarily have to be the same as the number of organizing principles—there may be more than one organizing principle for each course.)

## Engineering byDesign™: District/State Level Program Description

This program provides students with a foundation in the role of technology and engineering in everyday life along with a broad range of technology and engineering skills that make them aware of technology and engineering around them. Students completing the program will become technologically literate by learning key concepts about engineering, design,

invention, and innovation as well as the roles they play in creating technological systems to help make life easier and better. Students learn that technology must be evaluated to determine the positive and negative effects and how these have shaped today's global society. A key aspect of the program is that students become knowledgeable about technology and engineering and use hands-on lessons to apply and transfer this knowledge to common problems. The program consists of ten courses in Grades 6–12 that build on experiences provided in elementary school.

## Engineering byDesign™: Student-Oriented Program Description for Registration Booklets

Students in this program use hands-on lessons to learn key concepts about engineering, design, invention, and innovation and the roles they play in creating technological systems to help make life easier and better. Students learn to apply and transfer this knowledge to common, everyday problems. Students learn how to evaluate technology, its impacts and resulting issues, and present the positive and negative consequences and how these have shaped today's global society. The program incorporates the applications of technology, engineering, mathematics, and science concepts and provides a strong background for students investigating careers in all career-focused academies.