

Table of Contents

Acknowledgements	v
Preface	vii
Engineering byDesign™ – A Standards-Based Approach	vii
<i>Technology for All Americans: A Rationale and Structure for the Study of Technology</i>	vii
<i>Standards for Technological Literacy: Content for the Study of Technology</i>	vii
<i>Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards</i>	ix
Advancing Technological Literacy: ITEA Professional Series	ix
The Center to Advance the Teaching of Technology and Science – ITEA-CATTS	x
Pathways and Career Clusters	xi
Using This Guide	xi
Introduction: Engineering By Design: Model Program	1
Introduction	2
The Vision – Engineering byDesign™	3
The Mission – Engineering byDesign™	3
The Organizing Principles	3
Program Description	3
Engineering byDesign™: District/State Level Description	3
Engineering byDesign™: Student-Oriented Program Description for Registration Booklets	4
Course Descriptions	5
Grades K-2	5
Grades 3-5	5
Exploring Technology	6
Invention and Innovation	6
Technology Systems	7
Foundations of Technology	7
Impacts of Technology	8
Engineering Design	9
Overview: Technological Issues	11
Introduction to: Technological Issues: A Model High School Course Guide	
Course Information	12
Course Goals and Objectives	13
Course Assessment Criteria	14
Course Content Outline	18
Course Lessons and Corresponding Assignments (Activities)	19
Unit I: Recognizing Technological Issues	21
Standards and Benchmarks Addressed in Unit I	22
Big Ideas and Objectives	23
Unit Assessment	23
Teacher Preparation	23
Lesson I-1: Introduction to Technological Issues Using an Historical Case Study	24
Lesson I-2: Relating Technological Issues to Other Subject Areas	32
Lesson I-3: Examining a Technology and It's Adoption	39
Lesson I-4: Technology Alternatives – Benefits and Risks	47
Unit I: Concurrent Activity	55

Unit 2: Sources of Technological Issues	59
Standards and Benchmarks Addressed in Unit 2	60
Big Ideas and Objectives	61
Unit Assessment	61
Teacher Preparation	62
Lesson 2-1: Examining Exponential Growth	63
Lesson 2-2: Evaluating Technology Transfer	72
Lesson 2-3: Issues From Engineering Design Failures	81
Lesson 2-4: Examining Earth's Limited Resources	89
Unit 2 Concurrent Activity	96
Unit 3: Examining Technological Issues	99
Standards and Benchmarks Addressed in Unit 3	100
Big Ideas and Objectives	101
Unit Assessment	101
Teacher Preparation	101
Lesson 3-1: Design and Technology for Quality of Life	102
Lesson 3-2: Criteria for Safe and Ergonomic Design	111
Lesson 3-3: Design Ethics and Product Liability	118
Lesson 3-4: Modeling Monitoring Technology	126
Unit 3 Concurrent Activity	133
Unit 4: Addressing Technological Issues	137
Standards and Benchmarks Addressed in Unit 4	138
Big Ideas and Objectives	139
Unit Assessment	140
Teacher Preparation	140
Lesson 4-1: Appropriate Technology Design	141
Lesson 4-2: Model City Design Based on Recycling and Green Products	150
Lesson 4-3: Debating Current Technologies and Their Issues	158
Lesson 4-4: Protecting Technology	166
Unit 5: Predicting Technological Issues	175
Standards and Benchmarks Addressed in Unit 5	176
Big Ideas and Objectives	177
Unit Assessment Criteria and Tools	177
Teacher Preparation	177
Lesson 5-1: Weighting and Predicting Design Trade-Offs	178
Lesson 5-2: Using Models, Simulations, and Games	189
Lesson 5-3: Applying Technology Assessment Tools	196
Lesson 5-4: Applying Forecasting/Futurology Tools	206
Unit 5 Concurrent Activity	212
Appendices 215	
Appendix A: Program Responsibility Matrix – Technology/Mathematics/Science (with STL Technological Literacy Standards)	217
Appendix B: Listing of Mathematics and Science Standards	218
Appendix C: References and Suggested Readings	230
Appendix D: Glossaries	237
Appendix E: Pre/Post Content Knowledge Questions	255
Appendix F: Pre/Post Test Answer Key	266