**FOREWORD**

*Exploring Design, Technology, & Engineering*, by R. Thomas Wright and Ryan A. Brown, presents the core of technological knowledge and skills demanded to actively participate in our ever-improving society. Studying and applying the lessons included in this textbook provides you with the solid content and the hands-on and minds-on experiences that will enable you to understand contemporary technology, while preparing you to make good decisions regarding future technology opportunities and options. This book was written and illustrated to support the growing importance of technology in our democratic society. *Exploring Design, Technology, & Engineering* is entirely based on the Standards for Technological Literacy: Content for the Study of Technology. The organization and content of *Exploring Design, Technology, & Engineering* align with the objectives described in the Standards for Technological Literacy, regarding what the content of technology education should be.

*Exploring Design, Technology, & Engineering* presents curriculum content in five easily understood sections. Therefore, the reader masters the essential core of technological knowledge. The first section defines technology and explains technology as a system. The second section describes the input resources of tools, materials, energy, information, people, time, and capital. The third section covers creating technology, the invention and design processes, and problem solving in a technological world. The fourth section explains technology contexts, utilizing comprehensive coverage, while providing hands-on applications for the essential technology core areas of agriculture, construction, energy, information and communication, manufacturing, medicine, and transportation. The fifth section relates technology to our society and our future opportunities and challenges.

Additionally, *Exploring Design, Technology, & Engineering* provides exceptional hands-on learning opportunities supporting the Technology Student Association (TSA) competitive events. Active participation with TSA provides not only exciting student learning experiences, but also a framework for individual growth and leadership opportunities. You are encouraged to study *Exploring Design, Technology, & Engineering* to expand your understanding of the role technology plays in our contemporary society and the role it will play in our future. By applying the lessons, skills, and content of this book, you will be well equipped to make positive decisions to build our technological world for a better tomorrow.

The Publisher
INTRODUCTION

What is technology? Why is it important in our lives? We need only to look around to see how technology changes our lives. Tools and machines make our work easier. We have automobiles, cellular telephones, computers, and many other products to save us time and improve the quality of our lives.

Construction of all types provides shelter and convenience for all our activities. Houses and apartments keep us comfortable and protect us from the elements. Bridges allow us to cross rivers. We can choose many different kinds of vehicles for travel. Radios, telephones, computers, satellites, and television all help us keep in touch with each other and the rest of the world. All these advantages are the results of advances in technology.

Technology is the knowledge of doing. This knowledge is a means of extending human abilities. Technology allows us to make useful products better and more easily. This knowledge enables us to build structures on Earth and in space. Technology lets us move people and goods more easily.

This book, *Exploring Design, Technology, & Engineering*, introduces you to the various technologies. *Exploring Design, Technology, & Engineering* explains the technologies as systems. These systems have inputs (such as people and materials), processes, outputs, goals, and constraints. You will be able to learn about the effects of technology and see that, while most effects of technology are good, some are not. As a result, you will be able to form opinions and make decisions about how to use technology wisely.

*Exploring Design, Technology, & Engineering* does more than tell you about technology. At the end of each section, you have a chance to apply what you have learned through carefully designed activities. In some activities, you will build and test products. You might even use the products in competition with other students. In other activities, you might be introduced firsthand to mass production or the use of tools. We hope this combination of information and doing activities is a worthwhile experience for you.

R. Thomas Wright
Ryan A. Brown

ABOUT THE AUTHORS

Dr. R. Thomas Wright is one of the leading figures in technology-education curriculum development in the United States. He is the author or coauthor of many Goodheart-Willcox technology textbooks. Dr. Wright is the author of *Manufacturing and Automation Technology, Processes of Manufacturing*, and *Technology & Engineering*. He has served the profession through many professional offices, including President of the International Technology and Engineering Educators Association (ITEEA) and President of the Council on Technology Teacher Education (CTTE). His work has been recognized through the ITEEA Academy of Fellows Award, the ITEEA Award of Distinction, the CTTE Technology Teacher Educator of the Year, the Epsilon Pi Tau Laureate Citation,
the Epsilon Pi Tau Distinguished Service Citation, the Sagamore of the Wabash Award from the Governor of Indiana, the Bell Ringer Award from the Indiana Superintendent of Public Instruction, the Ball State University Faculty of the Year Award, the Ball State University George and Frances Ball Distinguished Professorship, and the Educational Exhibitors Association–SHIP (EEA-SHIP) Citation.

Dr. Wright’s educational background includes a bachelor’s degree from Stout State University, a master’s of science degree from Ball State University, and a doctoral degree from the University of Maryland. His teaching experience consists of 3 years as a junior high instructor in California and 37 years as a university instructor at Ball State University. In addition, he has also been a visiting professor at Colorado State University; Oregon State University; and Edith Cowan University in Perth, Australia.

Dr. Ryan A. Brown is an assistant professor in the Department of Curriculum and Instruction and an associate director of the Center for Mathematics, Science, and Technology at Illinois State University. He currently teaches courses for preservice teachers on topics such as instructional methods and assessment. Previously, he taught a variety of courses at the secondary level, including design processes, transportation systems, and fundamentals of engineering. Dr. Brown coauthored *Energy, Power, and Transportation Technology* with Dr. Len S. Litowitz. He has also written titles in both the *Humans Innovating Technology Series (HITS)* and the *Kids Inventing Technology Series (KITS)* for ITEEA, as well as in the *Activity!* series for the Center for Implementing Technology in Education. Dr. Brown’s educational background includes a bachelor’s degree and master’s degree from Ball State University and a doctorate degree from Indiana University. Dr. Brown; his wife, Heather; and his sons, Benjamin and Samuel, reside in Normal, Illinois.

**TSA MODULAR ACTIVITIES**

The Technology Student Association (TSA) is a nonprofit, national student organization devoted to teaching technology education to young people. TSA’s mission is to inspire the association’s student members to prepare for careers in a technology-driven economy and culture. The demand for technological expertise is escalating in American industry. Therefore, TSA’s teachers strive to promote technological literacy, leadership, and problem solving to their student membership.

The TSA Modular Activities are based on the TSA competitive events current at the time of writing. Please refer to *The Official TSA Competitive Events Guide* for actual regulations for current TSA competitive events. This guide is periodically updated. TSA publishes two *Official TSA Competitive Events Guides*: one for middle school events and one for high school events. To obtain additional information about starting a TSA chapter at your school, to order *The Official TSA Competitive Events Guide*, or to learn more about TSA and technology education, contact TSA:

Technology Student Association  
1914 Association Drive  
Reston, VA 20191-1540  
www.tsaweb.org
THE CAREER CLUSTERS

The Career Clusters are 16 groups of different types of occupational and career specialties, which are further divided into pathways. Looking ahead at these pathways will help determine the course of study for your chosen career. The Career Cluster icons are being used with permission of the:


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Introduction
Did You Know? features in every chapter offer bits of trivia about the content covered in the chapter.

Key Words list new vocabulary covered in the chapter, enhancing student recognition of important concepts.

Objectives identify the topics covered and goals to be achieved by students.

Preparing to Read features provide students with questions to think about while reading the chapter.

Technology Headline features in each section highlight an emerging technology.
Technology Explained features briefly explain how technological devices and systems work.

Safety notes identify activities that can result in personal injury, if proper procedures or safety measures are not followed.

New Terms appear in bold italics where they are defined.

Career Highlights identify and explain different careers related to the chapter material.

Think Green features briefly explain environmental concepts related to technology.
STEM Connections at the end of each chapter encourage students to apply math and science concepts to real-life situations and develop skills related to chapter content.

Curricular Connections in every chapter offer suggestions of activities and assignments that connect the content to other subject areas.

Activities at the end of each chapter encourage students to apply concepts to real-life situations and develop skills related to chapter content.

Test Your Knowledge questions help students review the topics and the material covered in the chapter.

Summary provides the student a review of major concepts covered in the chapter.
**Chapter Activities** correlate to the Tech Lab Workbook and provide suggested laboratory activities requiring creativity and critical thinking skills.
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