



Introduction

What is VisTE? The Visualization in Technology Education (VisTE) project is an outgrowth of a long-standing interest in graphics in education by faculty in the Graphic Communications Program at North Carolina State University. Our program originally taught drafting to industrial arts education and engineering students at the University. However, changes in technology, curriculum, and job opportunities for our students led our program to think more broadly about graphics and the role graphics could play in technology and engineering education.

As a result of this change, the authors developed a course in 1992 in scientific visualization for engineering, technology, and design students. A few years after that, the authors were involved in the development of a course of study in scientific and technical visualization for high school students in North Carolina. In 2002, the National Science Foundation funded the VisTE project, allowing us to take some of the core ideas we developed in this curriculum project to a national audience.

The VisTE project's primary goal is have students use graphics as a central means of communication with the newly developed Standards for Technological Literacy (STL). The STL, developed by the International Technology Education Association (ITEA) in partnership with NSF and NASA, are meant to provide a new vision for how technology education can be used to develop technological literacy in school children. The VisTE project uses graphics communication as a vehicle for helping to develop that literacy.

Going into the future, our goal is to continue to develop and promote this approach to technological literacy through graphic communications. While it is only one of many possible approaches to developing technological literacy, it is one that is greatly underutilized in many technical, engineering, and scientific education arenas.

This CD contains the first four Units we have developed. Eight more Units are under development and will be available through Thomson Delmar Learning.

Learning Units

This CD contains four **Units**:

- Unit 1 – Communications Technology: Introduction to Visualization
- Unit 2 – Medical Technology: Imaging
- Unit 3 – Biotechnology: The Polymerase Chain Reaction (PCR)
- Unit 4 – Transportation Technology: Visualizing Rocketry

As you can see by their names, each Unit focuses on a particular technological area, or designed world. These Units are composed of multiple projects, each of which explores this designed world theme using different instructional approaches and graphic technologies and techniques.

These projects are grouped into two levels: **Introductory** and **Intermediate**. Generally, you will want to complete the Introductory Projects prior to starting on the Intermediate Projects. Since these materials are meant to be used by both middle school and high school students (grades 6-12), these two levels also provide a way to have

projects geared for different ages and abilities. While high school students will still want to go through the Introductory Projects, they are likely to be able to complete them more rapidly than the middle school students.

In addition to the Introductory and Intermediate Projects, students also have the opportunity to build off their knowledge and skills by engaging in **Advanced Projects**. These projects would be custom designed by the teacher and students to take advantage of the students' interests and abilities and the instructional goals of the teacher.

Most projects involve the progression of skill and knowledge development from the early to later projects. These projects both develop knowledge about the designed world focus of the Unit and graphic communication skills in expressing this knowledge. In addition to projects focused around the technology itself, some projects also give the students the opportunity to explore the societal and environmental impacts of the technology being studied.

The Units all follow a similar structure. Each Unit begins with an **Overview** that includes:

- Section I: General background on the designed world theme and any special graphic technologies that are going to be employed is given.
- Section II: A clear list of learning goals is given. These goals will be covered by one or more of the projects in the Unit.
- Section III: The Projects are connected to the **ITEA's Standards for Technological Literacy** through a matrix that maps each project to the 20 standards. By doing most of the projects in a Unit, many of the standards are touched upon, often more than once.
- Section IV: Advice is given on how to navigate the projects in the Unit, providing example sequences of projects depending on the time available and the interest and ability of your students.
- Section V: A brief overview of all of the projects is given. These projects are hot-linked so that you can go directly to the project materials.
- Section VI: The Unit Resources are detailed. The Resource Index Document is hot-linked so you can go directly to these resources.

Within the projects in the Unit themselves, each begins with a **Project Lesson Plan**. This plan has a description of the project along with a detailed list of **Learning Objectives**. These objectives are both tied to the general objects for the Unit and to specific standards shown in the matrix in the Unit Overview. Next, a **Teacher's Guide** provides a general teaching plan and suggested strategies. Also included is a list of what materials or tools the students need. Finally, some projects have **Optional Approaches and Extensions** for the teacher to use at his or her discretion.

The largest section of each project is typically the **Teacher Background Information**. This section provides the core background material needed by both the teacher and the students to conduct the project. All figures and core text concepts in this section are also included on a PowerPoint® located in the Resources folder (explained in the paragraph about the Resource Index).

Some projects will also contain **Extended Teaching Materials**. This material will not be on the Student CD but will provide additional background material that may be useful for teaching the Unit.

Finally, the **Student Materials** section contains all materials that would traditionally be printed out and given to the students. The teacher has the option to print the materials or have the students read from their own CD. Included in the Student Materials is a **Design Brief**. This brief provides a problem-based context for each of the projects. In many cases, students are asked to imagine themselves in a particular professional role in which they have to use graphic communication skills and the knowledge about the designed world technology focus to solve a particular problem.

Each Unit also has a **Resource Index**, which provides resources for the individual projects as well as those common to the entire Unit. These resources include web sites and other Internet resources, books and publications, and additional materials contained in a Resources folder on the CD. These additional materials might be Excel™ spreadsheets for assisting with calculations, examples of finished work, and tutorials to help support the use of the graphic software tools. Every Unit also contains the following items in the Resources folder:

- **Evaluation rubric**
- **PowerPoint® lecture materials**
- **Sample test questions and answers**
- **Glossary of terms**

Throughout each of the projects are terms that have been bolded. All of these words are defined in the Glossary. In addition, those terms most central to the project are also included in a **Key Terms** list at the end of each project.

Along with your Teacher's CD is a Student's CD. The Student's CD contains much of the same information as your CD, with some important differences. The Student's CD does *not* contain:

- Project Lesson Plan
- Extended Teaching Materials
- Sample test questions and answers
- PowerPoint® lecture materials

About the Authors

Eric N. Wiebe, Ph.D., is an Associate Professor in the Graphic Communications Program in the Department of Mathematics, Science, and Technology Education at North Carolina State University. He earned his B.A. degree in Chemistry from Duke University in 1982, an M.A. in Industrial Design in 1987, and a Ph.D. in Psychology (Ergonomics) in 1996 at North Carolina State University. Dr. Wiebe has authored or co-authored four texts on technical graphics used in over a hundred high schools, colleges, and universities nationwide. He has been involved in Computer-Aided Design (CAD)/3-D modeling development and use since 1986 and taught technical graphics and CAD at NCSU for the past fifteen years. During the past nine years, he has worked on the integration of scientific visualization



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Aaron C. Clark, Ed.D is an Associate Professor of Graphic Communications at North Carolina State University in Raleigh. After receiving his B.S. and M.S. in Technology and Technology Education from East Tennessee State University, he earned his doctoral



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industry and education administration in Tennessee and Maryland and currently does consulting work in many different states on curriculum development and integration. Dr. Clark also consults to businesses about technical animation techniques and processes.

Miriam Ferzli, Ph.D. is a teaching professor in the Biological Sciences Interdepartmental Program at North Carolina State University. She has a Ph.D. in science education and a Master's degree in the biological sciences. She also holds a Bachelor's of Science in biology and chemistry and a Bachelor's of Arts in English and psychology. Her diverse background and interests have allowed her to merge the sciences with issues related to technological and scientific literacy in secondary and higher education. Her research efforts have focused on the development of higher order thinking skills and conceptual learning in students through the use of innovative educational technology that promotes the interpretation and communication of experimental data. Dr. Ferzli is also interested in the interplay between biotechnology and technology education curricula in middle schools and high schools. She has worked with the VisTE project to develop curriculum materials that link the technology of various scientific fields with the Standards for Technological Literacy.



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Feedback

We are always interested in improving our instructional material. If you have any additional information or comments, please send them to either Eric Wiebe or Aaron Clark at viste@thomsonlearning.com. Due to the high volume of email we receive, we cannot promise you a direct reply. However, all thoughts and comments are appreciated.

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