TEACHING AND LEARNING WITH TECHNOLOGY

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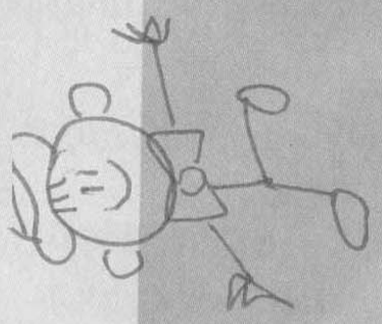

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Library of Congress Cataloging-in-Publication Data

Lever-Duffy, Judy.
Teaching and learning with technology / Judy Lever-Duffy, Jean B. McDonald, Al P. Mizell.
p. cm.
Includes bibliographical references and index.
ISBN 0-321-05405-9 (pbk.)
1. Educational technology. 2. Computer-assisted instruction. 3. Computer network resources. 4. Audio-visual materials. I. McDonald, Jean B. II. Mizell, Al P. III. Title.

LB1028.3 .L49 2003
371.33'4—dc21 2002033253

Printed in the United States of America
10 9 8 7 6 5 4 3 2 1 VHP 07 06 05 04 03 02

FOREWORD

The role of computers in instructional technology has been a topic of interest for much of the past fifty years and has been of special interest since the invention of low-cost personal computers in the late 1970s. Much of the dialog has centered on the effectiveness of these tools in the framework of an existing educational system. When viewed in this context, computers take their place alongside books and blackboards as aids for the teacher. The idea that the very structure of education needs to be reexamined in light of these tools was not a dominant theme in the field of instructional technology until recently, and even now there are many who believe that the utility (or lack thereof) of computers in the classroom must be measured against the educational paradigm inherited from a Taylorist model of schooling befitting the industrial era.

To think intelligently about computers in education today requires that we broaden our view of learning to include self-directed activities in which students explore primary source materials on their own, tasks that are increasingly performed on networked computers found in a preponderance of America's homes. Coupled to this extension of the spaces for learning is the challenge of recognizing that computer-based instructional media (such as the web) are fundamentally different from print-based or television-based media. This insight (which can be deduced from any proper understanding of media theory) is essential, especially when educators set out to design instructional activities that make effective use of a variety of media types.

The mechanics of the machine are not nearly as important as the effect it produces in us as we use these tools to learn, to create, and to communicate our learning with others. If educators (in general) are not taking full advantage of technology in the classroom, it is not because it lacks the power to transform the practice of schooling, but because we lack the deep understanding of this expressive medium needed to apply its power most directly in support of our young people.

The children themselves have an intrinsic grasp of the power of these tools to navigate informational pathways in nonlinear ways. To paraphrase Douglas Rushkoff (in *Playing the Future*), many teachers prefer the linear ski slopes of a well-defined scope and sequence, while students in their classrooms skateboard with abandon across the bumpy edges of informational chaos. As Marshall McLuhan long ago observed, media are extensions of mankind. In the beginning of instructional media, books functioned as a grand extrasomatic memory of our culture. By freezing the works of masters in written form, their ideas could achieve a level of immortality that had been impossible to imagine before. There is little question that modern instructional media have at least as much power to transform education as did the printed word. That we still don't know the scope of this power only confirms its vastness.

Technology doesn't necessarily make us think better, but it most assuredly makes us think differently. It allows us to move beyond the nouns of education (the "who, what, when, where" of traditional history classes, for example) to focus on the verbs (the "why"). Picasso once said that computers are useless—they provide answers, never questions. In fact, he was looking through the wrong end of the telescope. Computer-based instructional technology can be of tremendous utility in support of inquiry-based learning—not because the computers ask the questions, but because they function as vehicles for the intrepid knowledge navigators who ride the waves of the web in search of answers to compelling questions. I believe that, properly used, the instructional technology can help us retain our childlike sense of wonder, a skill that will serve us masterfully in the coming years.

And so we come to this text, a book that is ostensibly about instructional technology but is more deeply about the nature of the educational enterprise and the role technology can play in support of learning for all. The mechanics of educational technology pale in com-

parison with the effects of these tools. This book helps you understand that and provides you with more questions than it answers. If it did nothing else, it would be great reading!

David Thornburg, Ph.D.
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www.tcpd.org

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PREFACE

Introduction

Educational technology can enrich and enhance instructional experiences for both the teacher and the learner. *Teaching and Learning with Technology* explains on many levels how educational technology can provide resources for teachers and students and open the door to more comprehensive learning as well as extend the learning process.

The power of the Internet can put the world body of knowledge quite literally at one's fingertips. A computer in a classroom can be an endlessly patient and positive tutor. An audio recording of a children's story can encourage the development of good listening skills and meet the needs of auditory learners, and a nature video can bring the most remote corner of the world into the classroom. These technologies, from traditional audiovisual technologies to the newest digital counterparts, provide powerful tools for creative teachers and support diverse learners.

However, educational technology remains underutilized in many classrooms. Too often teachers have not learned how to work effectively with educational technologies in teaching and learning. Current and future teachers need exposure to and experience with the many and growing number of technologies that exist in schools and that schools are likely to acquire. Teachers also need a basic understanding of the technologies themselves; they need hands-on practice with them; and they need to explore how the technologies fit into the teaching and learning process.

In response to these needs, courses in educational technology are becoming a critical part of teacher preparation programs across the country. Some are computer courses adapted for educators. Others are courses in traditional media. Still others are focused on the historical and theoretical aspects of educational technology. Each approach has merit, but perhaps the most effective and pragmatic solution is a balance that includes components from all of them. To find the points at which these many approaches intersect has been challenging. This text is a result of that challenge.

Organization of This Text

***Teaching and Learning with Technology* was designed to combine theoretical, technical, and experiential components into a single pragmatic approach suitable for current and future teachers of technology education.**

In creating the text, we followed three basic principles:

1. Grounding the study of educational technologies in effective teaching, and learning, and in the real-world classroom;
2. Exploring all technologies likely to be found in the classroom; and

3. Offering pragmatic tools and activities throughout the text that prepare students to effectively use educational technology.

We present technology throughout this text within the framework of education and from a classroom perspective. We follow our principles in three parts. **Part One** provides an overview of learning theories and instructional design, maintaining a focus on teaching and learning as the force that drives the selection and implementation of technology.

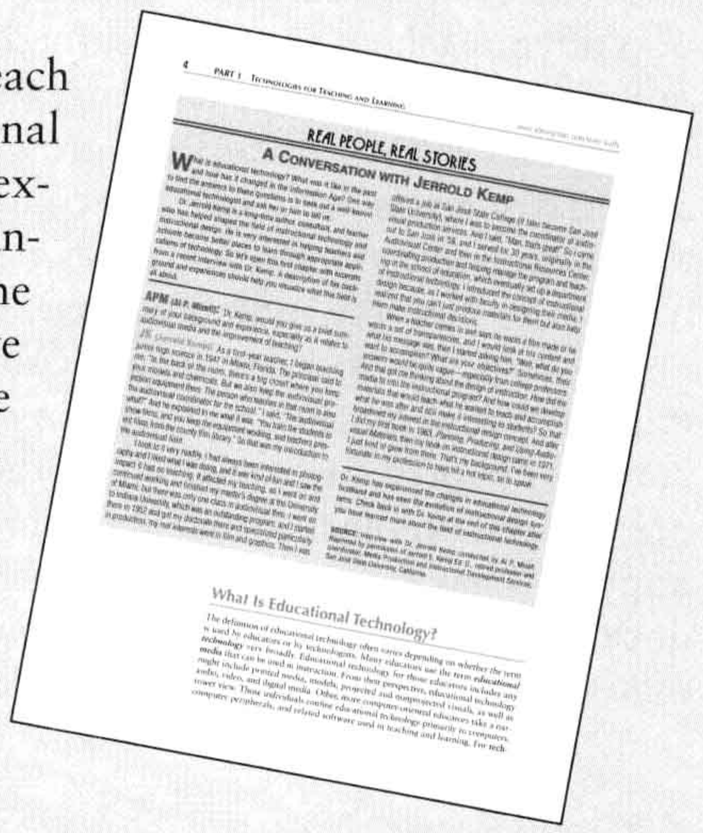
In **Part Two,** we thoroughly study the major categories of educational technologies likely to be found in schools, from traditional audiovisual technologies to the current and emerging digital technologies. These technologies are examined both as objects of instruction to be mastered by technology-literate educators and, more importantly, as tools within the broader framework of teaching and learning.

As an outgrowth of this technological exploration, we then present distance and alternative learning as an instructional model in **Part Three.** We examine these approaches both as professional development tools and as delivery systems that have the potential to redefine the classroom. The final chapter in *Teaching and Learning with Technology* offers an in-depth consideration of the issues associated with implementing technologies in education including the teacher's role in strategic planning for technology and the ethical, legal, and social issues resulting from its implementation. Together these topics converge to provide a powerful and complete experience for those who must soon face the challenges of the effective application of technology to their own classrooms and in their schools.

Features of the Text

Every chapter includes several features that reinforce the classroom, hands-on approach.

Real People, Real Stories, at the beginning of each chapter, initiates the discussion of the educational technology under study in the chapter with an exemplary case, interview, or personal story by an in-service teacher. The case study is revisited at the end of the chapter to reinforce what students have read and help students connect what they have learned to the world in which they will teach.


4 PART 1 Technologies for Teaching and Learning

REAL PEOPLE, REAL STORIES

A Conversation with Jerrold Kemp

What is educational technology? What was it like in the past and how has it changed in the Information Age? One way to find the answers to these questions is to seek out a well-known educational technologist and ask her or him to tell us.

Dr. Jerrold Kemp is a long-time author, consultant, and teacher who has helped shape the field of instructional technology and instructional design. He is very interested in helping teachers and schools become better places to learn through appropriate applications of technology. So let's open this first chapter with success stories from a recent interview with Dr. Kemp. A description of his background and experiences should help you visualize what this field is all about.

APM (*Al P. Minetti*): Dr. Kemp, would you give us a brief summary of your background and experience, especially as it relates to audiovisual media and the improvement of teaching?

JK (*Jerrold Kemp*): As a first-year teacher, I began teaching junior high science in 1947 in Miami, Florida. The principal said to me, "In the back of the room, there's a big closet where you keep projection equipment there. The person who teaches the audiovisual program is also the audiovisual coordinator for the school." I said, "The audiovisual what?" And he repeated to me what it was. "You train the students to show films, and you keep the equipment working, and teachers get films from the county film library." So that was my introduction to audiovisual.

I took to it very readily. I had always been interested in photography and I liked what I was doing, and it was kind of fun and I saw the impact it had on teaching. It attracted my teaching, so I went on and continued working and finished my master's degree at the University of Miami, but there was only one class in audiovisual then. I went on to Indiana University, which was an outstanding program, and I started there in 1952 and got my doctorate there and specialized particularly in production. My real interests were in film and graphics. Then I was offered a job at San José State College (it later became San José State University), where I was to become the coordinator of audiovisual production services. And I said, "Man, that's great!" So I came out to San José in '58, and I served for 30 years, originally in the Audiovisual Center and then in the Instructional Resources Center, coordinating production and helping manage the program and teaching in the school of education, which eventually set up a department of instructional technology. I introduced the concept of instructional design because, as I worked with faculty in designing their media, I realized that you can't just produce materials for them but also help them make instructional decisions.

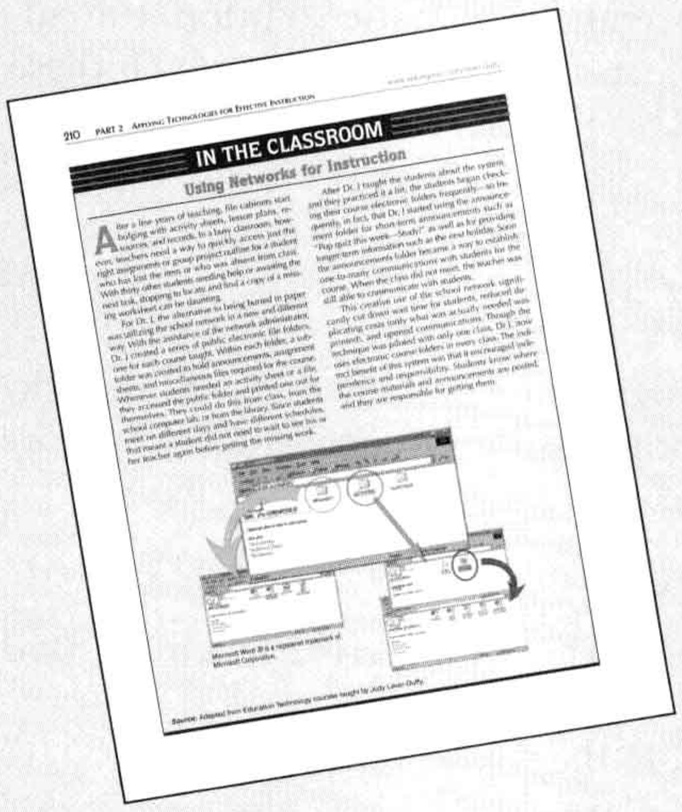
When a teacher comes to you and says he wants a film made or he wants a set of transparencies, and I would look at his symbol and what his message was, then I started asking him, "Well, what do you want to accomplish? What are your objectives?" Sometimes, they'd answer would be quite vague—especially from college professors. And that got me thinking about the design of instruction. How did the media to use, the instructional design concept. And after I did my first book in 1963, *Planning, Producing, and Using Audiovisual Materials*, then my book on instructional design came in 1971. I just kind of grew from there. That's my background. I've been very fortunate in my profession to have had a hot topic, so to speak.

Dr. Kemp has experienced the changes in educational technology firsthand and has seen the evolution of instructional design systems. Check back in with Dr. Kemp at the end of this chapter after you have learned more about the field of instructional technology.

SOURCE: Interview with Dr. Jerrold Kemp conducted by Al P. Minetti. Reprinted by permission of Jerrold E. Kemp Ed. D., retired professor and coordinator, Media Production and Instructional Development Services, San José State University, California.

What Is Educational Technology?

The definition of educational technology often varies depending on whether the term is used by educators or by technologists. Many educators use the term *educational technology* very broadly. Educational technology for those educators includes any media that can be used as instruction. From their perspectives, educational technology might include printed media, models, projected and nonprojected visuals, as well as audio, video, and digital media. Others, more computer-oriented educators take a narrower view. Those individuals combine educational technology primarily to computers, computer peripherals, and related software used in teaching and learning. For tech-


210 PART 2 Applying Technologies for Effective Instruction

IN THE CLASSROOM

Using Networks for Instruction

After a few years of teaching, file cabinets start bulging with activity sheets, lesson plans, resources, and records. In a busy classroom, however, teachers need a way to quickly access just the right assignments or gossip project outline for a student who has lost the ones or who was absent from class. With thirty other students needing help or awaiting the next task, shopping to locate and find a copy of a missing worksheet can be daunting.

For Dr. L the alternative to being buried in paper was utilizing the school network in a new and different way. With the assistance of the network administrator, Dr. L created a series of public electronic file folders, one for each course taught. Within each folder, a subfolder was created to hold announcements, assignment sheets, and miscellaneous files required for the course. Whenever students needed an activity sheet or a file, they accessed the public folder and printed one out for themselves. They could do this from class, from the school computer lab, or from the library. Since students meet on different days and have different schedules, this meant a student did not need to wait to see his or her teacher again before getting the missing work.

After Dr. L taught the students about the system and they practiced it a bit, the students began checking their course electronic folders frequently—so frequently, in fact, that Dr. L started using the announcements folder for short-term announcements such as "Pop quiz this week—Study!" as well as for possible longer-term information. The announcements folder became a way to establish one-to-many communications with students for the course. When the class did not meet, the teacher was still able to communicate with students.

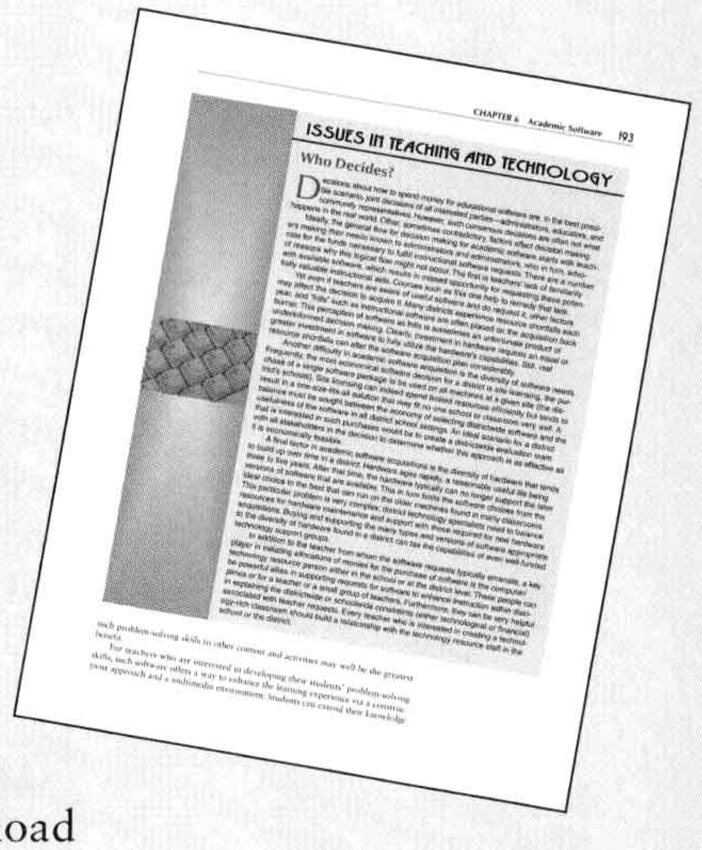
This creative use of the school network significantly cut down wait time for students, reduced duplicating costs (only what was actually needed was printed), and opened communications. Through the network, and paired with only one class, Dr. L now has the electronic course folders in every class. The technique was piloted with only one class. The individual benefit of this system was that it encouraged independence and responsibility. Students know where the course materials and announcements are posted, and they are responsible for getting them.

Microsoft Word ® is a registered trademark of Microsoft Corporation.

Source: Adapted from Education Technology courses taught by Judy Lever-Duffy.

In the Classroom stories throughout the text demonstrate real-world implementation of the technology under study by highlighting particular teachers and their lessons.

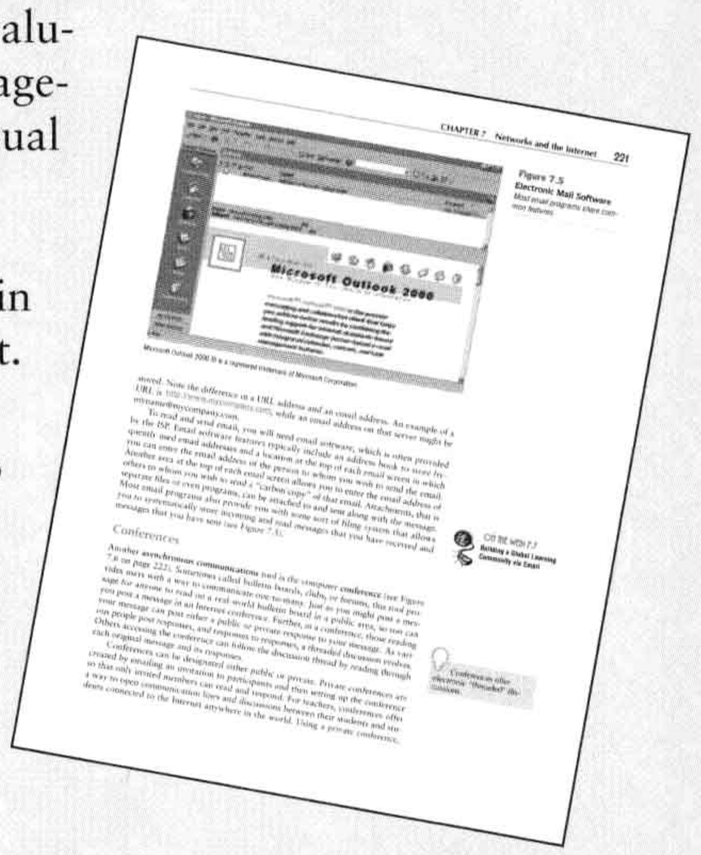
Connecting Theory to Practice boxes bridge the gap between the technology and the learning theory that supports its use.



Issues in Teaching and Technology offer a deeper examination of critical issues related to using or implementing the technology under study in the chapter.

Rubrics offer students pragmatic tools and myriad opportunities to evaluate and study technologies throughout the text. They are also available for download from the web site.

Rubrics appear throughout the text and include many topics pertinent to technology use and coverage in the classroom, such as: learning space, hardware evaluation, classroom equipment evaluation, productivity software, classroom management software, academic software, web site evaluation, academic web sites, visual displays, multimedia software, and evaluation of videos.

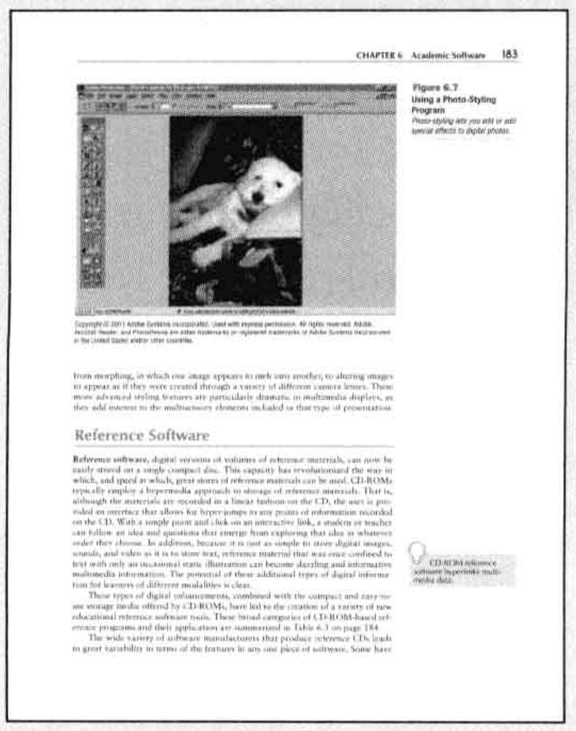


Topical Notations in the margin, preceded by a light bulb, reference key points in adjacent paragraphs to assist students in recognizing and finding significant content.

On the Web! icons in the margin direct students to the companion web site, where text content is expanded in Web Activities that deepen understanding of the concepts presented through individual and group discovery and exploration of related web sites.

Student Activities at the end of every chapter offer various exericises, from chapter review questions to group activities, to discussion topics, to hands-on experiences.

Illustrations that include screen grabs, figures, and flow and process charts, both historic and up-to-date photographs of equipment and classroom uses of technology are included to present content visually to assist students in achieving competencies.



Presentation of the Pragmatic Approach

A constant aspect of our pragmatic approach in *Teaching and Learning with Technology* is the reader-friendly style of the text. In order to maintain interest and readability in a content area that tends toward jargon and technical detail, we deliberately engage students with a conversational tone and easy-to-use definitions and tools. Together these elements present the complexities of educational technology in the most readable and engaging format possible.

Teaching and Learning with Technology provides current and future educators with a pragmatic survey of educational technology and an exploration of the applications and issues related to its use. This approach and style presents key technological content while remaining well grounded in the theoretical foundations of teaching and learning.

Supplements

Companion Web Site (CW) for Students

Students using this text can take advantage of a robust, interactive companion web site that expands the learning opportunities and teaching resources beyond the printed text. The web site is divided into a student companion web site and a faculty companion web site. In addition to On the Web! Activities, the student site includes

- **Chapter Outliners** to help students organize their reading and aid in studying chapter content.
- A **Real People, Real Stories** section that features in-service teachers talking about the issues they face using technology.
- **Online Practice Tests** and chapter **Power Practice** reviews to practice and reinforce chapter content.
- **Software Skills Builder** activities to exercise skills in productivity and other software packages.
- **Classroom Connections** to support students in an electronic forum to communicate with peers and other educational technology students.
- **Chapter Downloads** that let students download preformatted files and all chapter rubrics to help them with lesson planning and other chapter activities.

For Faculty

Available with the Instructor's Edition of this text is a CD that includes:

- A **Test Bank** for each chapter, which contains multiple-choice, true or false, matching, and short answer essay questions with an answer key.
- **PowerPoint Presentations** for each chapter that present key chapter points.
- **Classroom Activities Ideas** for each chapter to help in presenting chapter content.
- **Evaluation Suggestions** that provide alternative evaluation strategies for determining mastery of chapter concepts.
- **Supplemental Readings** on content areas presented in each chapter should faculty desire to further explore in the content presented.

- **Answers to Chapter Review Questions,** offering an answer key to all chapter review questions to assist in responding to student questions.
- **Portfolio Course Materials,** which present a completely articulated portfolio-based course based on the text's chapters, including extended syllabus, projects, evaluation rubrics, and miscellaneous handouts.
- **Additional Research,** offering annotated references presenting current research related to each chapter's content.
- **Audiovisual Supports,** presenting a list of audiovisual materials that can enhance presentation of the chapter topics and the sources from which they can be ordered.
- **Web Sites of Interest,** presenting annotated URLs of web sites that may be useful in teaching chapter topics.
- **Technology in Practice (TIP) Reproducibles,** prepared how-to handouts on technologies and procedures presented in each chapter.

Additional faculty resources are available on the faculty portion of the companion web site. This site includes:

- **Figures and Graphics** of key illustrations in the chapter that can be downloaded and used in the preparation of custom teaching materials
- **Links to Student Resources** to facilitate exploring the components of the student web site you may wish to include in your course.
- **Links of Interest** for every chapter that expand on the content presented in the text.
- **In the Field!** activities including observations logs, reflections, and hands-on activities to be used during educational technology field experiences.
- **A Virtual Suggestion Box** to communicate your feedback on the text, resource materials, and web site so that it can be more closely adapted to your needs.
- **Downloadable Files,** offered in Word format, so that resources available on CD and on the student site can be downloaded and customized to your course.
- **Classroom Connections,** an online forum to facilitate communication with the authors and with other educational technology faculty.

The authors of this text empathize with and understand the challenge of teaching and learning about how best to use our ever-changing technology resources to help people learn. With so many technological resources changing so quickly and so many diverse pressures affecting teachers and schools, it is difficult to determine what needs to be included in a first course in educational technology. In preparing this text for your use, we have used as our barometer the ongoing question, "What do teachers really need to know about this technology to help them use it effectively in teaching and learning?" The result of our continuous response to this question is this text, which we hope will offer you an inclusive, focused, and practical survey of educational technology.

It is our sincere desire that this text meet the diverse learning needs of educational technology students and the teaching requirements of educational technology faculty. We welcome any suggestions and comments you might have for improving the text, the companion web site, or the supplemental materials. We encourage you to share with us whatever we might do to make this text more effective in your teaching or your learning environment. We look forward to hearing from you and to making our efforts more responsive to your needs with every edition.

Acknowledgments

This text could not have come into existence without the help, encouragement, and support provided to all of us from those with whom we live and with whom we work. First, we would like to thank our families for their encouragement and for their tolerance of our long absences as we hunkered down in our offices over computers creating the raw documents that Allyn and Bacon ultimately turned into exactly what we had originally envisioned. Special thanks to Judy's husband, Mike Duffy, son, Jonathan Lever, and mom, Ena Schwartz, for the continual patience, help, and supportive words that kept her going throughout the writing and production process; to Al's wife, Mary Mizell, and for the many times that he couldn't stop to play long enough, love to his granddaughter Cristina for understanding; and to Jean's children and their spouses, Mike and Mary, Tom and Jenny, Melany, and Mark and Lynn, as well as her grandchildren.

And at Allyn and Bacon, we gratefully acknowledge the patience, hard work, creativity, and support of all those known and unknown to us who made this text a reality. Special thanks to Arnie Burvikovs, Education Editor, for shepherding us through the entire process and responding good naturedly and tirelessly to endless emails; to Kathy Deselle, Project Manager, who taught us how a manuscript becomes a book through frequent, patient, organized, and calm explanations of each step of the process and by assigning us lots of hands-on practice; to Barbara Willette, Copyeditor, who made us better than we really are; and to Matt Dorsey, Media Production Supervisor, and Deborah Brown, Production Administrator, who supported us in turning our ideas into electronic and hardcopy reality.

We also gratefully acknowledge the many reviewers of this first edition for their advice: Their suggestions and comments helped us to improve and refine this text and make it a more meaningful instructional support.

Dara Beam, Johnson Bible College; William Beasley, Cleveland State University; Roy Bohlin, California State University; Ralph Cafolla, Florida Atlantic University; Doris Carey, formerly with University of Colorado at Colorado Springs; Marcus D. Childress, Emporia State University; Joe Codde, Michigan State University; Fred Drake, Evangel University; Angela Gerling, Westminster College; Lorana Jinkerson, Northern Michigan University; Jerrold Kemp, San Jose State University (retired); John Kinslow, West Chester State University; Jyh-Mei Liu, Ashland University; Donald Kline, Lebanon Valley College; Dianne Kline, Miami-Dade Community College; Katie Klinger, National University; Judy Lee, University of Central Florida; Robert Lester, Faulkner University; Chris Migliaccio, Miami-Dade Community College; Jean Morrow, Emporia State University; Karen L. O'Brock, Nova Southeastern University; Teresa Orloff, Mount St. Joseph; Kay Persichitte, University of Northern Colorado; Laura Sujo de Montes, Northern Arizona University; and Lorraine G. Vitchoff, Nova Southeastern University

And finally, thanks to our many colleagues who offered themselves up without concern for their personal safety to become sounding boards for our ideas, complaints, frustrations, and happy interludes. At Miami-Dade Community College, we offer thanks to Professors Ray Fernandez, Fred Wolven, and Mary Levin, and Administrative Assistant Nancy Adkison, all of whom offered Judy continuous and collegial encouragement throughout the writing process, and a very special thanks to Professor Chris Migliaccio, who, after reviewing the text for us, became an advocate, cheerleader, and frequent contributor of creative ideas and needed improvements. At NSU, thanks to Provost H. Wells Singleton for the support offered, which is typical of his attitude toward and ongoing support for his staff and is especially appreciated; to Stan Hanah, Marsha Burmeister, Cleve Clark, George Kontos, and Ruth Chernet for

their encouragement, sympathetic ears, and support that kept Al motivated. And at Lambuth University, a sincere expression of gratitude for the tireless and cheerful help provided by the technical wizard, Charles Young, who was always "on call"; the reference librarian, Sammy Chapman, who indefatigably and cheerfully sought out sources; Dr. Belinda Anderson, the School of Education head, who gave gracious and valuable encouragement and ideas; Dr. Stacey Hall and Sherry Freeman, professors who were Jean's esteemed colleagues in the true sense of the word throughout the writing process; and the Academic Dean, Dr. Susan Kupisch, who understood and positively reinforced every effort.

Folks, we could not have done it without you!

Judy Lever-Duffy
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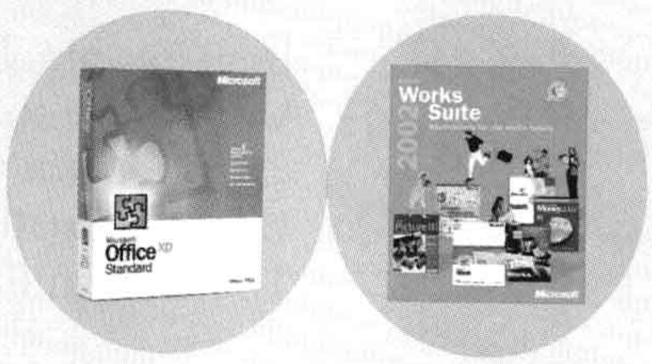

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