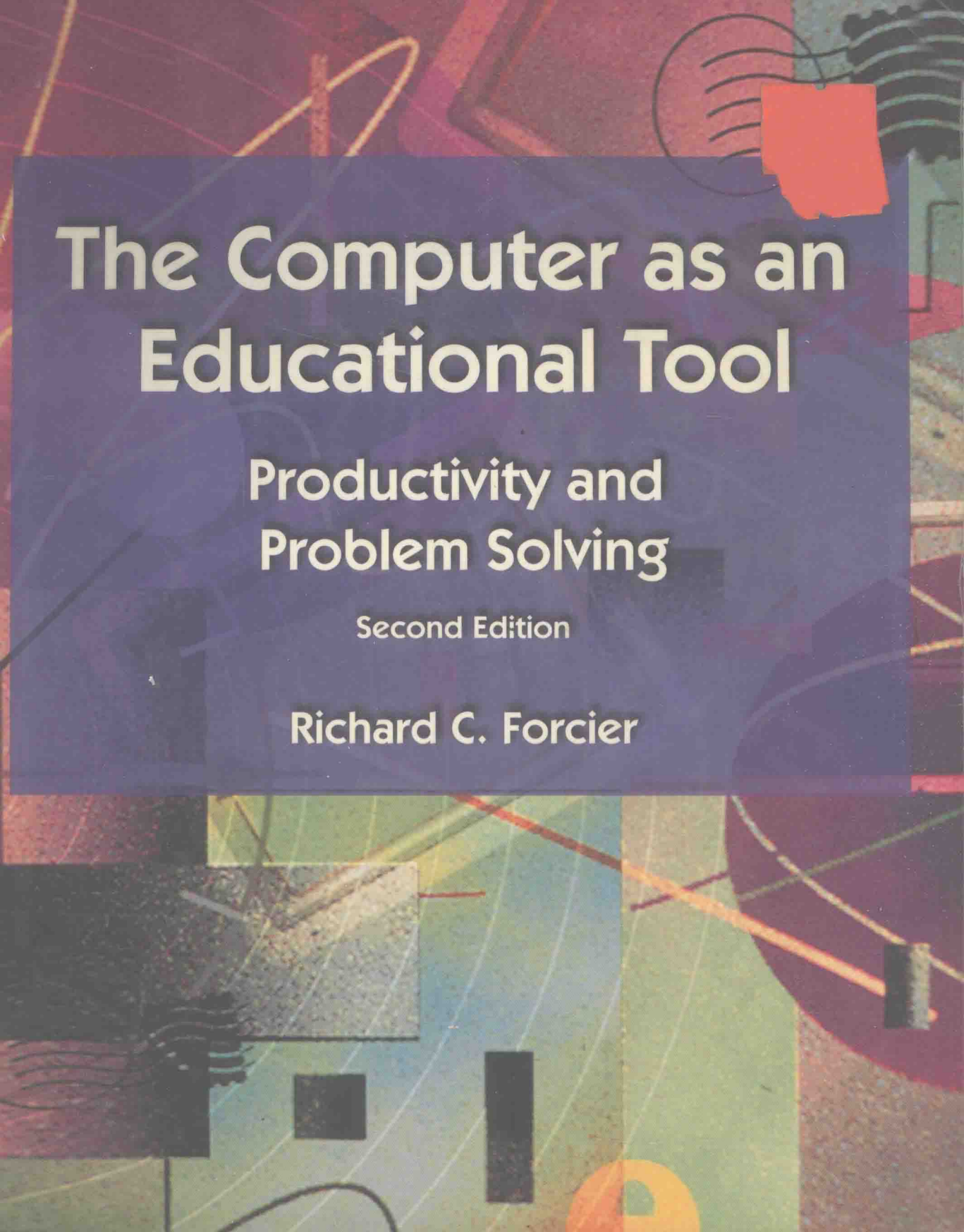
The Computer as an Educational Tool
Productivity and Problem Solving
Second Edition
Richard C. Forcier

The Computer as an Educational Tool

Productivity and Problem Solving

Second Edition

Richard C. Forcier
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Preface

The Computer as an Educational Tool: Productivity and Problem Solving, Second Edition, is based on the author's long-held view that technology should be as transparent as possible—that is, that the use of technology should not call attention to itself. Technology, specifically computer technology, should be a means to an end—not the end in itself. The computer should empower the user to solve problems effectively and efficiently.

The goal of this book is to lead teachers and those aspiring to be teachers to become proficient at applying the computer to solve problems, to infuse the computer into the curriculum in order to help students do the same, and to encourage both teachers and learners to integrate technology into their professional, academic, and personal lives in useful and meaningful ways. Those who are successful in doing this will indeed come to see the computer as an extension of their human capability. The computer will allow them to do more, to do it faster, and to do it more creatively and more accurately.

A PROBLEM-SOLVING FOCUS

The Computer as an Educational Tool: Productivity and Problem Solving, Second Edition, provides a current, comprehensive look at the computer's role in education and problem solving, as well as the application of the computer as a tool of the mind. As the text examines the computer's various roles in education, topics are broken down into specific areas of interest to encourage an understanding of the computer's contribution to solving problems. Problem-solving models are included in the text to encourage an increase in computer productivity and to clarify the application of the computer in a thoughtful and deliberate manner, reinforcing the concept of the computer as a mind tool.

NEW IN THIS EDITION

Teachers and students will find that the strengths of the book in its first edition remain:

- A balance of *factual information, research, theory, and application*
- *Highly readable, student-friendly prose*
- *Technical matters explained clearly and accessibly* for the nonexpert audience
- *Examples drawn from both PC-based Windows and Macintosh platforms*

With the help of feedback from professors and student users delivered via e-mail and in teleconferences, this book has been revised extensively. Meaningful changes have been made to more effectively demonstrate the computer's capacity as an educational tool for problem solving and to show to a greater extent the range of classroom applications of computer technology available to teachers and learners. Highlights of this revision include

- *A new chapter on the Internet* (Ch. 11), which includes discussion of resources on the Internet (including e-mail, electronic conferencing, and LISTSERVs), Internet navigation and retrieval tools (including search engines and bookmarks), and applications of the Internet for both teachers and students. It also includes crucial information on "netiquette" and how to critically evaluate web sites.
- *A new chapter dedicated entirely to multimedia technologies* (Ch. 12), including information on, and classroom applications for, multimedia authoring tools, presentation software, and virtual reality.
- *A reorganized table of contents* that better contextualizes computer use in educational settings and *reflects a deeper integration of problem solving* throughout the book. In this edition, the text treats theory and current issues in technology first, discusses strategies for using computers in educational settings next, shows practical applications, and then discusses management and administrative concerns.
- *A better, more comprehensive explanation of the computer as a problem-solving tool that increases our productivity as learners and educators.* Along with improved definitions of key concepts such as "productivity tool" and "constructivism," this edition devotes an entire chapter to linear and nonlinear problem-solving processes early on in the book (Ch. 3), where the discussion can contextualize the more technical information and the applications of the problem-solving model in later chapters.
- *A greater emphasis on curriculum applications,* with numerous examples, model lessons, and suggestions for integrating the computer into educational curricula added.
- *A greater emphasis on social contexts for computer use* in the classroom, including treatment of issues such as assistive technologies for students with disabilities, selecting software to use when teaching gifted students and students with limited English proficiency or special needs, equity in computer access, and gender equity.
- *An updated research base, new screen captures, and discussion of new and emerging technologies* in a rapidly changing field.

TEXT ORGANIZATION AND SPECIAL FEATURES

Woven throughout this text is the use of the computer as a personal productivity and problem-solving tool for the teacher in both an instructional and a management role, as well as for the student in a learning role. The text, therefore, is organized with the following thematic frameworks:

- *Issues in information technology.* A number of issues are examined, including copyright, information ownership, equitable computer access, and gender equity. The computer's role in the educational reform movement is discussed, as well as its place in current and future trends in information technology.
- *Learning theory and instruction.* Theoretical structures are established to look at the computer's role in teacher-centered instruction and to examine student-centered learning. Both *behaviorist* and *constructivist* perspectives are examined. Underlying principles and theories of education and communication are reviewed and applied to discussions of computer applications in instruction and learning. Implications of emerging technologies are discussed.

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- *Strategies for computer use.* The computer as a productivity tool is applied to tutorial, drill and practice, simulation, and multimedia formats. The Internet, word processing, graphics, databases, and spreadsheets are seen as problem-solving tools. New and emerging technologies are examined, and their roles in education are discussed.
- *Selecting, evaluating, and managing a software collection.* A unique examination of the process of developing and sustaining a software collection is included to meet the information needs of teachers and students. The management of a software collection on *FileMaker Pro*™ is discussed, a complete *template* appropriate for both Windows and Macintosh platforms is developed, and then complete field definitions are presented in Appendix M.

Furthermore, the text is organized to provide thorough coverage of computer knowledge and educational applications, including the following:

- *The computer itself and its user interfaces.* An explanation of computer hardware commonly found in schools is presented. A look at current and emerging user interfaces is examined.
- *Word processing.* Applications are suggested and examples are used to illustrate them.
- *Graphics.* Bit-mapped and vector graphics are explored and examples given. Proper selection of chart types and the interpretation of data represented by graphs are analyzed. Information on the use of the computer to generate display graphics for charts and graphs, signs, posters, bulletin boards, and overhead transparencies is presented.
- *Spreadsheets.* Problem-solving models are applied to the development of spreadsheets. Applications are suggested and examples are used to illustrate them.
- *Databases.* The organization and retrieval of information are examined. Problem-solving models are applied to the development of databases. Applications are suggested and examples are used to illustrate them.
- *Telecommunications.* Networking schemes are explored, as are the fundamental concepts of telecommunications. Applications are suggested and examples are used to illustrate them. An introduction to the Internet is presented, followed by an in-depth look at the World Wide Web.

CHAPTER FEATURES

This edition maintains the style of the first edition, which drew acclaim from students for presenting important and useful information in a highly readable format. The following features are included in each chapter:

- Each chapter begins with an *advance organizer.*
- *Charts and line drawings* are used to illustrate concepts in a concrete manner.
- *Screen displays* illustrate concepts and application software in, as much as possible, a nonspecific hardware platform.
- *Exercises* allow the student the opportunity to process the information presented in the chapter and apply it in a practical manner, using higher-order thinking skills.
- *Important terms are printed in boldface* when they are introduced to the reader. They are then defined in the chapter glossary and are included in the index at the end of the book to facilitate reference.
- The *appendixes* serve as a ready reference to the student. They include sample software evaluation forms, a sample parental permission form for telecommunications, a

practical listing of Internet resources and their addresses, field definitions for a software database, and a list of software publishers, with a statement of each one's sales and support policies. These forms are perforated for ease of use.

ACKNOWLEDGMENTS

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I would also like to express my gratitude to the reviewers who so thoughtfully read and offered constructive criticism to the work in progress. Their expertise contributed greatly to the strength of this book and to its potential usefulness in a course dealing with computers in education. They include Sylvia S. Bienvenu, University of Southwestern Louisiana; David Edyburn, University of Wisconsin, Milwaukee; Teresa J. Franklin, Ohio University; Jho-Ju Tu, University of Southwestern Louisiana; Bonnie H. Keller, Valdosta State University; Lee McCanne, Boston University; Al P. Mizell, Nova Southeastern University; and Lynn Pachnowski, University of Akron.

A Message to the Reader

We often encounter trite sayings such as "We are living in the Information Age." This term has been overused to the point that we do not appreciate what it really means. I believe, though, that each one of us will have our own "aha!" moment, where we will reach a personal understanding of the true impact of its meaning. I venture to guess that this personal understanding will relate in some manner to shifting paradigms associated with teaching and learning and to the pertinent use of technology. We will fully realize that we cannot teach in the manner that we ourselves were taught.

It is my fervent hope that each and every one of you, as readers of this text, will sharpen your skills related to information creation, storage, access, retrieval, analysis, and dissemination. Do not take the term *Information Age* at face value, but dig deeply to derive your own personal understanding. Let this insight guide your teaching behaviors.

The title of this book should challenge you to seek a deeper definition of productivity than the one based on the factory model of the efficient creation of products. Think of productivity as encompassing effectiveness as well. Include quality, quantity, time, and space in your definition. Think of productivity when you read the quote that begins Chapter 1. Examine your knowledge base as you conceptualize productivity before you encounter the concept put forth in Chapter 2.

In our profession, change is not only inevitable, it is rapid and significant and it is upon us as a new generation of teachers. Allow me to share an inscription that is carved in the stonework above the entrance to the Instructional Technology building on our campus at Western Oregon University: "Who dares to teach, must never cease to learn." We must always seek the unknown so that we can provide the information and the guidance that will allow our students to create new knowledge and understandings. Let us allow the computer to become for us the productivity tool that extends our human capability as we teach and continue to learn.

Richard C. Forcier

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