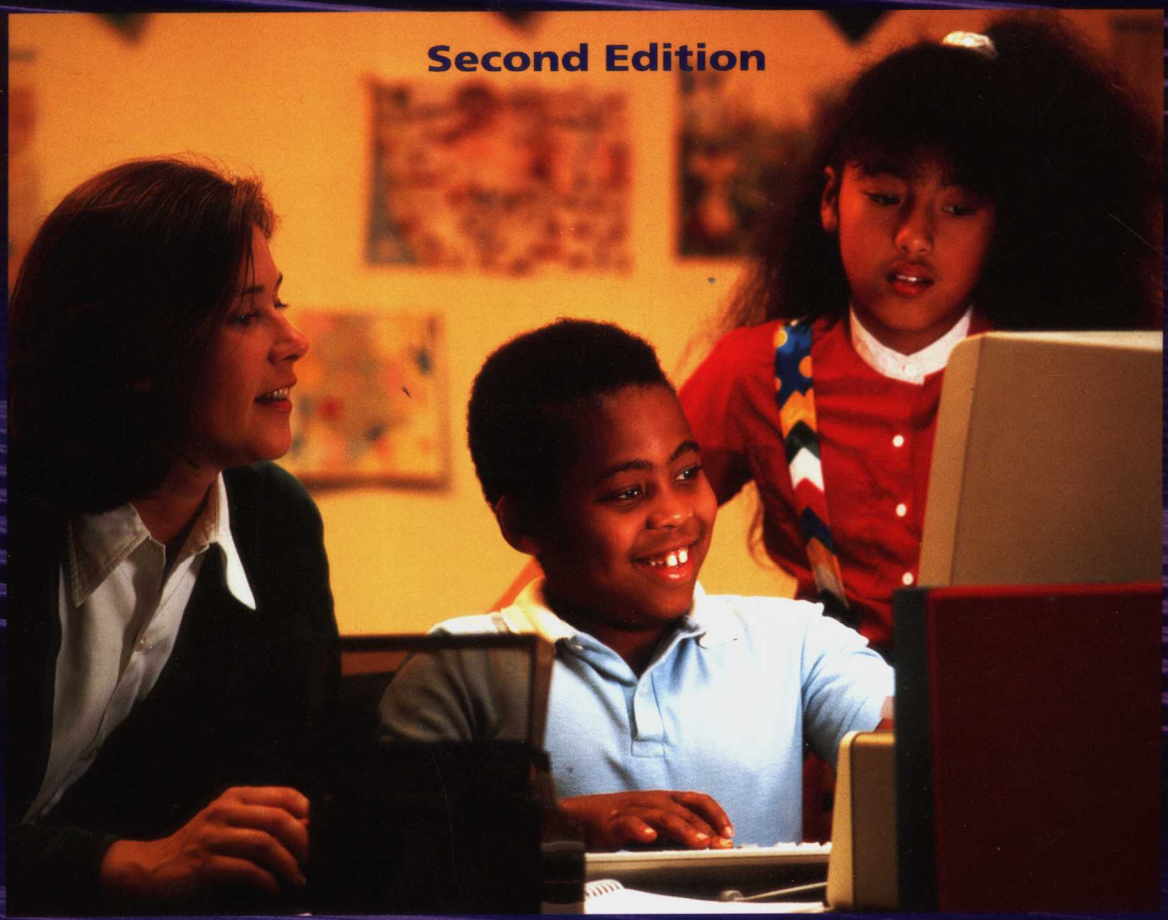
Computer Education for Teachers



Second Edition

VICKI SHARP

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California State University, Northridge

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Preface

Background

The author's first involvement with computers was in 1969 when she learned Fortran. In the early eighties, she bought pocket computers and taught programming off campus. At that time, educational software was limited and inadequate, and the focus was teaching BASIC, followed shortly thereafter by Logo.

In the last ten years there have been many technological changes, and the computer has emerged as an important tool in society. With the production of quality software, the computer's role has changed from a device used for computer programming to an instrument that can be efficiently integrated into the curriculum. Furthermore, an increasing number of teachers utilize the computer for such tasks as word processing, database management, graphics generation, desktop publishing, telecommunications, and multimedia.

With this increased interest in computers, computer literacy is becoming as necessary as reading literacy. Because computers are so commonplace, teacher education programs require students to take computer literacy courses. In order for teachers to use computers, they must acquire the skills to evaluate and use the software that is being produced and marketed.

Book Audience

Computer Education for Teachers, which assumes no prior experience with computers, is designed to meet the needs of the computer novice. It is written for undergraduate and graduate students who want an up-to-date, readable, practical, concise introduction to computers. This book should help students acquire the knowledge and skills necessary to effectively integrate computers into the classroom.

Contents of the Text

The content of the text is arranged in a logical teaching order. However, the chapters are not dependent on each other and can be taught in the order the instructor requires.

This edition offers the following salient features:

- **Chapter objectives.** The objectives at the beginning of each chapter operate as a map of the chapter's contents, thus guiding the reader in his or her travel.

- **Clear illustrations.** There are over 300 illustrations used to highlight pertinent points, facilitate understanding, and explain software.
- **Universal applicability.** The book discusses general concepts and principles that are applicable to any personal computer.
- **Chapter mastery tests.** Questions selected according to sound learning principles appear at the end of each chapter to help readers ascertain if they understand the material.
- **Recommended annotated software listing.** A complete, up-to-date annotated listing of software, including CD-ROM and laser discs, helps the reader make a more informed purchase decision.
- **Classroom activities and projects.** An assortment of learning activities and projects motivate students, enhance learning, integrate the computer in the classroom, and help students apply the chapter concepts.
- **Summary of current computer research.** These summaries provide readers with an understanding of past and current research, effective and ineffective uses of the computer, and promising new directions for further research.
- **Exposure to state-of-the-art technology developments.** Explorations of advances in computer technology keep the student on the cutting edge of computer knowledge.
- **Extensive bibliography.** The reader can use the selected bibliography to investigate a wide spectrum of topics.
- **A chapter on desktop publishing.** The chapter on desktop publishing, which is one of the primary applications for the computer, teaches the student to create such products as newspapers, bulletins, and signs that can enrich the curriculum and enhance the classroom atmosphere.
- **A chapter on multimedia.** This chapter introduces the student to ways of using the computer to combine text, graphics, and sound into effective multimedia presentations.
- **A chapter on telecommunication, the Internet, and on-line services.** This chapter gives the student an introduction to telecommunications, the Internet, the information highway, and the various commercial services.
- **A teacher's manual.** This manual supplies the teacher with chapter summaries, lecture outlines, answers to mastery test questions, suggested activities and projects, transparency masters, additional test items, and sample software evaluations.

New to the Second Edition

Computer Education for Teachers has been changed in numerous ways from the last edition to reflect the changes that are occurring in the computer community. All chapters have been revised and updated and IBM and compatibles are given equal treatment. The new edition offers the following features:

- over 250 new illustrations;
- new annotated list of software including CD-ROM and laser disc (see Appendix A);
- a new chapter on telecommunication, the Internet, and on-line services;
- an expanded and updated multimedia chapter;

- discussion of current topics such as virtual reality, morphing, warping, videoconferencing, advanced technology labs and classroom ergonomics, and distant learning; and
- additional chapter questions and projects.

A Message for the Readers

If you would like to see some topic in a future edition or have any comments or questions, please send your responses to one of the following addresses:

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2. America On-line address: VickiFS@aol.com
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Brief Contents

Contents

History of the Computer

1

Objectives

Upon completing this chapter, you will be able to

1. identify and place in proper sequence five of the major inventions in the history of computing;
2. discuss succinctly each of the following six individual's contribution to the field of computing:
   a. Herman Hollerith,
   b. Joseph Marie Jacquard,
   c. Charles Babbage,
   d. John Atanasoff,
   e. Howard Aiken, and
   f. John Von Neumann; and
3. differentiate among the generations of computers according to their technological advances.

Early Times

Primitive humans found it necessary to count and the natural instruments to use were their fingers. With their fingers, they could show how many animals they killed on a hunt or the number of people in a village. To indicate large numbers they used all ten fingers; since humans have ten fingers, ten became the basis of our number system today.

As time passed, life became more complex, and people needed a way to keep track of their possessions. They began to use rocks as a way to store information, using one rock to represent each animal they owned, for example. Later, wanting a record of this information, they carved notches and symbols in stone or wood, an effective record-keeping method until the abacus was invented.

The Abacus

The **abacus** was different from any recording device that came before it because it allowed manipulation of data.

In 1854, at Senkereh near Babylon, archaeologists found a clay tablet resembling a primitive abacus. They believed it was nearly 4,000 years old (J. M. Pullan, 1968). The discovery of this artifact indicates that some form of calculation existed in Babylon about 3000 B.C. (The tablet now resides in the British Museum.)

Records show that ancient civilizations, such as India, China, Egypt, and Mesopotamia, were using calculating devices several thousand years ago. The Greeks in about 500 B.C. drew lines on plain boards or counters in order to perform calculations. Approximately 200 years later, the Romans developed a calculating device called the *calculi,* which consisted of a smooth board or table marked with lines. Even though no boards have survived from these times, stones have been found at many archaeological sites. The stones found in China, Japan, and Russia are similar to the stones used in the Roman bead-frame, which suggests that the use of these instruments spread from Rome to China to Japan and then to Russia, although there is no concrete evidence of this hypothesis. What is known for certain is that the Chinese devised rules for the abacus in the thirteenth century, and they are often given credit for perfecting its use.

The abacus (Fig. 1.1) user manipulates beads in a wood frame to keep track of numbers and place values. Users can perform calculations almost as quickly as people who use calculators. Of all the early aids to calculation, the abacus is the only one used today.

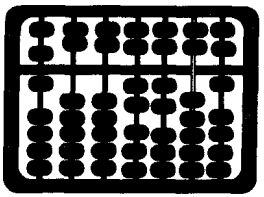

Figure 1.1
Abacus

Next we will discuss the pioneers of computational devices and their inventions prior to the computer. Some of these inventions made mathematical calculation and tabulation faster and simpler, while others paved the way for inputting information into computers and controlling more complicated data processing.

The Pioneers

John Napier

John Napier, a Scottish mathematician, invented **Napier's Rods** or **Bones** in 1617. The rods, shown in Figure 1.2, were sometimes carved out of ivory in the form of an Arabian lattice. The user was able to multiply large numbers by manipulating these rods. These devices simplified tedious calculations, and they were faster and more accurate. Napier rods preceded Oughtred's slide ruler by nearly four decades.

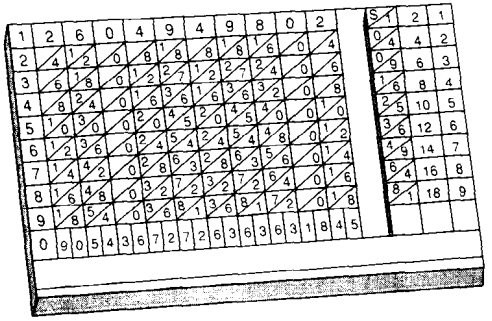

Figure 1.2
Napier's Bones