

Introduction

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Thus education forms the common mind;
Just as the twig is bent, the tree's inclined.

Alexander Pope (1688-1744)

I have hope that society may be reformed,
when I see how much education may be reformed.

Gottfried Wilhelm von Leibnitz (1646-1716)

THE CHALLENGE OF CHANGE

The audience for this 5th edition of *Education for an Information Age* is the pre-service/in-service K-12 teacher. The primary goal of the text is to help you incorporate instructional technologies in general, and computer-based technologies in particular, into the curriculum. A secondary goal is to help you become the most effective educator you can be. The computer, along with the expanding range of associated technology, is just one of many tools and techniques that can improve the learning environment that you provide for your students.

To this latter extent, the book cannot be taken in isolation. The ideas and skills presented form part of the continuum of learning and experience related to your profession that began when you were yourself a student K-12, continues during your college studies as an Education major, and ultimately bears fruit in your role as a teacher in the classroom.

The Need for Change

There has been a great deal of hype about the computer as a tool for teaching. Perhaps it is in the nature of the profession, but teachers are more skeptical than most about the advent of yet another fad, yet another experimental methodology, yet another pedagogical imposter destined to come and go like so many others. But change is something we have to accept. "The most fundamental element in education is change. This is implicit in its very definition. All learning requires change. Education as a 'process' must 'proceed' or move ahead. Stagnation is therefore directly and fundamentally opposed to education. It is the basic evil for education." These words of Philip Phenix are a rallying cry to those associated with children's education, calling on them to accept the inevitability of change and embrace it judiciously as the need arises.

Change, in and of itself, is not usually welcomed with open arms. As Machiavelli¹ observed: "It must be remembered that there is nothing more difficult to plan, more doubtful of success, nor more dangerous to manage, than the creation of a new system. For the initiator has the enmity of all who would profit by the preservation of the old institutions and merely lukewarm defenders in those who would gain by the new ones."

People in general are resistant to change, even when it is for the better. There is a certain inertia built into time-tested ways of doing things. "If it ain't broke don't fix it," as they say; and the fact is that time-tested methodologies—chalk and talk, competition, rote learning, regimentation—

¹ Niccolo di Bernardo Machiavelli, 1469-1527.

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have been successful until relatively recently in achieving the goal of turning out at least an educated *elite* from our schools.

But with the collapse of agriculture and of industry as the primary providers of people's bread and butter (robots will be doing most all of the agricultural and industrial work in the future), today's increasingly service-oriented, information-based societies are waking up to the fact that an educated *elite* will put food on only a small number of plates on a nation's table. Today, we have to ensure that *everyone* has a realistic opportunity to develop the intellectual skills required to prosper in an information age.

To this end education needs help. We continue to be *A Nation At Risk* (National Committee on Excellence in Education, 1984). A growing number of young people graduating from our public schools are ill-prepared to find gainful employment in today's workplace, let alone tomorrow's. Already, the majority of well-paying jobs require higher order intellectual skills—strong communication skills, information gathering and analysis skills, interpersonal skills, learning skills, creative skills, and critical-thinking skills (SCANS, 1991).

This is not to deny the progress that American education has made over the years. In fact there is cause for great optimism, as pointed out in the report *Workplace Competencies: The Need to Improve Literacy and Employment Readiness* (Information Services Office, 1990). A century ago, one was considered literate if one could sign one's name. Today, almost *all* young adults can do that. Fifty years ago, the criterion for literacy was the ability to read at fourth grade level. Today, 95% of young adults meet this criterion. Twenty-five years ago, one was deemed literate, by the War on Poverty standards, if one could read at the eighth grade level. Today, 80% of young adults read at that level. These are indeed grounds for optimism.

But young adult preparedness for a productive and prosperous life requires more than merely the ability to read at an eighth grade level. To quote from the above-mentioned *Workplace Competencies* report:

The requirements [for America's work force] are likely upward, at least in many important sectors of the economy and in particular employers' needs. The present technological environment has enlarged some workers' responsibilities. The lines between workers and supervisors and managers blur as "work teams" or "quality circles" are used to raise creativity and productivity. The team members put their heads together and solve problems. The members can do each other's jobs. They must be flexible. And they have to deal with print, often in more complex forms than before. In short, the requirements are rising in some areas that are highly visible to employers and to observers of the economy in general, and it is against these growing demands and expectations that the adequacy of preparation for the entering work force must be viewed.

Teachers Make a Difference

The challenge is enormous, but we must hold on to the conviction that each one of us, in making our contribution, can make a difference. There indeed *is* the source of joy in teaching—the act, day by day, of "putting a spark" in young minds. As Anatole France observed, "If there is some good inflammable stuff, it will catch fire."

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This text examines all aspects of computer-based technologies as part of the set of tools in a teacher's methodological toolbox. In the pages that follow, you will have the opportunity to learn about computing in general and about computer-based education in particular. The computer is clearly not the whole solution to the challenge of broadening and deepening the base of appropriately-educated citizens; but it may be part of the solution. How significant a part that is depends on you, the teacher.

Teachers, like most everyone else, sometimes find technology off-putting, even scary. The most effective way to overcome fear is to face it. So the ideal accompaniment to the study of the material in this book is hands-on experience with, and review of, a wide range of applications of value in K-12 teaching and learning. It is assumed that students reading this book will have such an opportunity in the School of Education where they are being prepared to teach in tomorrow's schools.

OBJECTIVES OF THE TEXT

1. To encourage the use of computers in the classroom by removing the mystery that surrounds the technology

Many teachers resist using computers in their classrooms because they are intimidated by the technology. For this reason, an objective of *Education for an Information Age* is to take away the mystery that often surrounds these machines by emphasizing their use as tools. You will read about the hardware and software of digital computers at a level that will help you understand what makes them tick.

You will also be introduced to several of the most important communications and audio-visual innovations, such as networks, scanners, smart boards, overhead projection systems, interactive video, and multimedia systems in general, that have come to depend on computer technology.

2. To apply the principles of educational theory to the use of computers in the classroom

Another objective of this text is to help teachers at all levels of education, but especially K-12, to discern quality educational software among the plethora of packages available today. In pursuit of this objective, you will review educational theory (at various points throughout the text, pulling everything together in chapter 14) and apply it to the use of computers in education.

Over thousands of years, philosophers and educationists have expounded upon various theories of learning, from mental discipline to constructivism. You will be expected to apply these theories in your professional life. As a result of reviewing learning theory, you will be more informed in your selection of computer-based materials for classroom use, ensuring that they meet the objectives of the learning experience which you plan to provide for your students.

Notice that knowledge of learning theory, accompanied by a deep understanding of how children learn, precedes and underpins any use of technology in the classroom. Just because the makers of courseware indicate that the learning outcomes for students using their

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software will be thus and so does not mean that those outcomes will occur. Children, unsupervised, get the darndest unexpected benefits, or lack of benefits, from using courseware, as the case study at the end of Chapter 6 shows. For this reason, as Caftori (1994) puts it so well: "The teacher should come 'bundled' with the software."

Children need teachers. There are those in the teaching profession who fear that computers in schools will bring about a reduction in the number of teachers in the workforce. As this book, however, will show, the opposite is more likely to be true because computers will promote individualized instruction. Individuals have unique needs that are difficult to diagnose. Tomorrow's teachers, working closely with fewer students than ever, will be given the opportunity to help each of their students select from a rich variety of multimedia material to sew together a tailor-made learning experience.

3. To provide opportunities for hands-on computer experience

It is beyond the scope of this book to profile in more than a superficial fashion specific courseware for teaching and learning. Here we are concerned with concepts, rather than keystrokes because keystrokes are essentially ephemeral; concepts endure.

Hands-on experience with computing is nonetheless important, and to this end the author has worked with colleagues to prepare sets of tutorials—for Microsoft's *Office 2000* and *Office XP* suites of productivity software. These tutorials are designed to help the pre-service and in-service teacher learn, step-by-step, the various classroom-relevant functions of these general purpose software tools.

The author has also set up a home page on the Internet (<http://www.pitt.edu/~edindex>) with links to Web sites worldwide that are sources of information (lesson plans, teaching materials, workshops, books, and other items of interest) for teachers and students K-12 who are interested in finding out more about almost any subject under the sun.

Ideally, you will also have at hand a wide selection of special purpose learning software (also called "courseware") designed for use in the learning process. This selection might include the graphical organizer *Inspiration* along with the version designed for young users called *Kidspiration*. It might also include the drawing and presentation program *KidPix*, also for young users, or the more sophisticated *PowerPoint* or *HyperStudio*. These programs are but the tip of the iceberg that represents the plethora of courseware items designed for all age groups and for every subject in the K-12 curriculum.

It will be a valuable learning experience to review the myriad examples of computer-based learning systems that are available today. Free, shareware, and demo versions of much of this software can be downloaded and reviewed prior to use in the classroom.

At <http://www.pitt.edu/~poole/download.html> you will find links to several on-line companies that offer courseware either free of charge or at steeply discounted prices.

By the time you have completed your journey through this text, you will have strengthened your commitment to keeping abreast of developments in educational computing. You also will have laid a solid foundation for the classroom of the future in which you will recognize and pursue opportunities to integrate computer-based technologies into the curriculum.

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Every hour you spend physically and mentally interacting with the computer will increase your familiarity with the technology and your competence in its use. Indeed, you will come to marvel at its applicability to the learning process. Most important of all, you will empathize with your students' enthusiasm for computer-based systems and become caught up in that enthusiasm yourself.

4. To help teachers understand the effect that computing and communications is having on the society in which their students live

Our times are variously referred to as The Computer Age, The Information Age, and The Age of Technology. There is no doubt that the last fifty to sixty years have brought about a dramatic change in the very infrastructure of almost every society on the planet, some more than others. Technological innovation has permeated so many areas of our lives—in the home, in medical care, in travel, in communications, in government, in finance, in industry, in recreational activities—and, of course, in schools.

Children growing up in these societies have a different frame of reference from those of previous generations. Marshall McLuhan pointed out that "The medium is the message": the very technological transformation that is taking place will have an impact on the culture that adopts it, and those most likely to experience the acculturation at its deepest level will be the children of the culture.

As teachers, we must at least keep an open mind on the ever-changing world of our students' experience, and if we can integrate the changes into our own experience, so much the better.

This is not to say that teachers should shift gears into the era of classroom computerization just for the sake of it, just because it is there. There must be a rationale, a conviction born of research and experience, which makes the adjustment part of their general predisposition to provide the best possible educational opportunity for the children in their care. For this reason, the book sets out, in chapter 1, by addressing the important questions: Is learning enhanced by the appropriate incorporation of technology, especially computer-based technology, into the curriculum? And are students disadvantaged when they are denied access to computer-based systems for teaching and learning?

NEW IN THE 5TH EDITION

The most significant addition to this 5th edition of EDUCATION FOR AN INFORMATION AGE is the collaboration with Elizabeth Sky-McIlvain. Elizabeth brings a wealth of both technological and pedagogical experience which has greatly improved the currency and relevance of those sections of the book (chapters 5 through 8 and chapters 10 and 11) that she has taken under her wing.

Other than this, the changes in this edition, as in any new edition, are included to bring the text up to date so that it reflects the current state of the art in technology and the current state of practice in technology-integrated education. This state of the art is in a constant state of flux, more now than ever before, which is why we will try to make it no more than a year between each new edition of the book.

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CONCLUSION

Most teachers choose the teaching profession because they are excited by the challenge of helping children learn. These teachers are sustained in the profession by the joy that comes from seeing the light of newfound knowledge gleaming in a child's eyes. If this book, by helping you to discover the value of computers in an educational setting, empowers you to more effectively meet the challenge of education in today's increasingly technology-infused schools, then it will have succeeded in its overall goal—to help you become a better teacher.

None of this will happen overnight, so you will need a good dose of patience and perseverance during the initial stages of your journey towards becoming a computer literate teacher. But you will find that the rewards of successful integration of computers into the curriculum and into your classroom administration will be incalculable. You are going to be glad you set out on this adventure.

It is still not unusual to find just one computer in a classroom. Sometimes it sits there gathering dust. The children would love to get their hands on it, but the teacher perhaps does not know where to begin allowing its use in a pedagogically powerful way, perhaps even fearing that uncontrolled use will result in its being damaged or destroyed!

If you are one of those many teachers who recognize the need to start using computers but have hesitated till now to take the first step, know that every step you take will lessen any fear you may feel and will increase your potential as an effective teacher in this Information Age. If this book helps you take these steps, all the effort that has gone into its creation will have been worthwhile.

Bernard John Poole, Elizabeth Sky-McIlvain, and Lorrie Jackson, May 2004.