The International Encyclopedia of Educational Technology

Edited by

Michael Eraut

Advances in Education

Pergamon Press

THE INTERNATIONAL ENCYCLOPEDIA OF EDUCATIONAL TECHNOLOGY

Edited by

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PERGAMON PRESS
OXFORD · NEW YORK · BEIJING · FRANKFURT
SÃO PAULO · SYDNEY · TOKYO · TORONTO

U.K.	Pergamon Press plc, Headington Hill Hall, Oxford OX3 0BW, England
U.S.A.	Pergamon Press, Inc., Maxwell House, Fairview Park, Elmsford, New York 10523, U.S.A.
PEOPLE'S REPUBLIC OF CHINA	Pergamon Press, Room 4037, Qianmen Hotel, Beijing, People's Republic of China
FEDERAL REPUBLIC OF GERMANY	Pergamon Press GmbH, Hammerweg 6, D-6242 Kronberg, Federal Republic of Germany
BRAZIL	Pergamon Editora Ltda, Rua Eça de Queiros, 346, CEP 04011, Paraiso, São Paulo, Brazil
AUSTRALIA	Pergamon Press Australia Pty Ltd., P.O. Box 544, Potts Point, N.S.W. 2011, Australia
JAPAN	Pergamon Press, 5th Floor, Matsuoka Central Building, 1-7-1 Nishishinjuku, Shinjuku-ku, Tokyo 160, Japan
CANADA	Pergamon Press Canada Ltd., Suite No 271, 253 College Street, Toronto, Ontario, Canada M5T 1R5

Based on material from *The International Encyclopedia of Education*, first published 1985, with revisions and updated material.

First edition 1989

Library of Congress Cataloging-in-Publication Data

The International encyclopedia of educational technology edited by Michael Eraut.—1st ed.
p. cm.—(Advances in education)
Includes bibliographies and indexes.
1. Educational technology—Dictionaries. I. Eraut, Michael. II. Series.
LB1028.3.1567 1989
371.3'07'8—dc19 89-3006

British Library Cataloguing in Publication Data

The international encyclopedia of educational technology.—(Advances in education)
1. Educational Technology
I. Eraut, Michael. II. Series
371.3'07'8

ISBN 0-08-033409-1

Database design and computer composition by Maxwell Data Management Ltd., Derby

Printed in Great Britain by BPCC Wheatons Ltd, Exeter

Preface

Thirty years ago, in 1959, the term *educational technology* had yet to be introduced. However, the contributory streams of educational television, programmed learning, and audiovisual instruction had already begun to bubble with innovatory excitement. Ten years later, in 1969, there was an embryonic field of study with a few research units and academic qualifications already carrying the *educational technology* label. A fourth contributor, computer-based learning had arrived on the scene, and integrating concepts such as learning resources, instructional development, and systems approach were beginning to be explored. By 1979 these concepts had been well-researched, if not fully exploited, yet the field was far from unified and its organization still reflected particular media traditions and subcultures. Distance education was a major concern and nonformal education was also attracting increased attention. Now, in 1989, it can be seen that further integration is coming through technological convergence. What is now called *information technology* is both integrating media for learning, as in interactive video, and transforming simple telephone lines into interactive information networks. It is no longer possible to regard computing, video, and telecommunications as separate areas of technical development.

The time then is particularly ripe for taking stock of developments in educational technology. Practitioners need to know what has been happening across the whole field and it is particularly important that the developers of new learning systems and resources do not neglect the knowledge and know-how that has been built up over the last thirty years. They rightly perceive much earlier work as having been technologically limited, but they themselves are in danger of becoming conceptually limited even to the extent of repeating some of the mistakes of the early pioneers. The purpose of this *Encylopedia* is to meet the current need for educational technologists to broaden and consolidate their knowledge base by providing state-of-the-art reports which cover the whole field of educational technology.

A further characteristic of the *Encyclopedia* is its international orientation. Authors come from 14 different countries, though authors from the United States (48 percent) and the United Kingdom (27 percent) still form a significant majority. This reflects partly the decision to keep the whole *Encyclopedia* in English, and partly the difficulty for many third world experts in finding time and library facilities. All authors were asked to adopt an international perspective and many were chosen because they had the knowledge and experience to do so. Some articles were specially commissioned to redress the balance by presenting specifically regional or developing country perspectives. Overall, there are very few articles that are not relevant to the particular needs and concerns of any individual nation.

1. The Origins of the Encyclopedia

This *Encyclopedia* has a parent, the 10-volume *International Encyclopedia of Education*, which was published in 1985. Now well-established in major academic libraries, it was

awarded the 1986 Dartmouth Medal for an outstanding reference work by the American Library Association as well as being selected by Choice as an Outstanding Academic Book of 1987. However, its size made the price high for many individual users and educational technology units to purchase their own copies, and its alphabetic mode of organization meant that the hundred or so entries on educational technology were widely distributed.

The use of advanced computer technology enabled the publisher to issue the *International Encyclopedia of Education* with far greater speed and accuracy than would have been possible with traditional editorial and printing techniques. For example, in the past it was necessary to complete pagination of the text before indexing could commence. In contrast, with computer database publishing techniques it is possible to key in the index terms at the same time as the article. The appropriate page numbers are then automatically generated for printing in the index. Furthermore, it is not necessary to keyboard the articles in any strict order. These techniques have made it possible to retrieve and update the educational technology articles for this volume with enormous savings in editorial and keyboarding time. Another important feature of the parent encyclopedia is its availability, since 1988, on a single compact disc (CD-ROM).

For this *Encyclopedia*, articles have been organized thematically rather than alphabetically. Relevant articles from outside the original Educational Technology section have been added, 11 new articles have been specially commissioned, and many others have been substantially revised. Moreover, each of the five parts has an Editor's introduction explaining the scope of its ideas and the range of applications covered. The offspring has taken on a life of its own. Indeed when one surveys the list of contents, one can see that the *Encyclopedia* has now become more than a substantial work of reference. It provides the equivalent of several authoritative books—a "series" under a single cover—with the additional advantages of cross-referencing and a common index. There are extensive and fully verified bibliographies for all entries to help the reader pursue a particular topic, and there are comprehensive subject and author indexes for easy access.

2. Boundaries, Foci, and Structure

Like most fields of study, educational technology does not have obvious natural boundaries. Nor is there a single uncontested, internationally recognized definition. Much of its claimed territory is also inhabited by people who do not seek their occupational identity within the educational technology community. Thus, the criteria for including articles in this volume have been essentially pragmatic. The topics selected represent areas of knowledge that are either taught on at least some educational technology courses or used by practising educational technologists; most will qualify under both these criteria. Those who consider that the Editor has set the boundaries too wide may find, on reading and reflection, that the "marginal entries" are more relevant than at first they thought. Those who find the boundaries too narrow will still, it is hoped, be able to consult the parent encyclopedia or other volumes in the series.

The only aspect of the educational technology literature which has been deliberately omitted has been writing about educational futures. There is always a danger that the potential use of educational technology will be constrained by current patterns for the organization and delivery of learning. Thus, it is important for educational technologists to suggest alternative patterns, especially when the rapid development of new technology is challenging our imaginative capacity to realize its potential. However, such futuristic thinking, vital though it is, does not fit easily within an encyclopedia which seeks to

provide authoritative reviews of current knowledge. The Editor's policy has been to restrict reviews to established knowledge and theorizing about established knowledge. More speculative thinking has therefore been excluded, left to books where single authors have the scope to expand their arguments about current trends and future possibilities, and to project their imaginations forward into alternative scenarios.

Otherwise the *Encyclopedia* aims to cover the major content interests of all those people who call themselves educational technologists and to make it easy for them to find what they want. It has avoided adopting a single view of educational technology in order to gain greater coherence: that would be highly desirable in a textbook but inappropriate for an encyclopedia. Thus, access by educational technologists across the field, with different needs and specialisms and different national backgrounds, has been the prime consideration in deciding both the structure of the *Encyclopedia* and the titles of individual articles.

The conceptual framework for the *Encyclopedia* is represented in Fig. 1. This shows the five main parts and their interrelationships. Part 1 is set apart from the other four because it is about the development and organization of Educational Technology as a Knowledge Field and Occupation. Thus, it sets the historical and organizational context for the more detailed articles in the other four parts. New articles have been added on specifically Asian and European perspectives to balance the number of British and American authors. Part 2 covers Technical Developments in information technology and the media which affect both Media Potential, Utilization, and Impact (Part 3), and the Distribution and Organization of Knowledge and Resources (Part 5). These parts are also interrelated with Instructional Development (Part 4), which many consider to be the heart of educational technology. Making resources available for teaching and learning requires knowledge from all three parts: instructional development know-how (Part 4), using knowledge of media potential and impact (Part 3) to create resources for organization, and distribution (Part 5) to the user. The last three parts are also rather larger than the first two, and therefore have been subdivided into four or five sections.

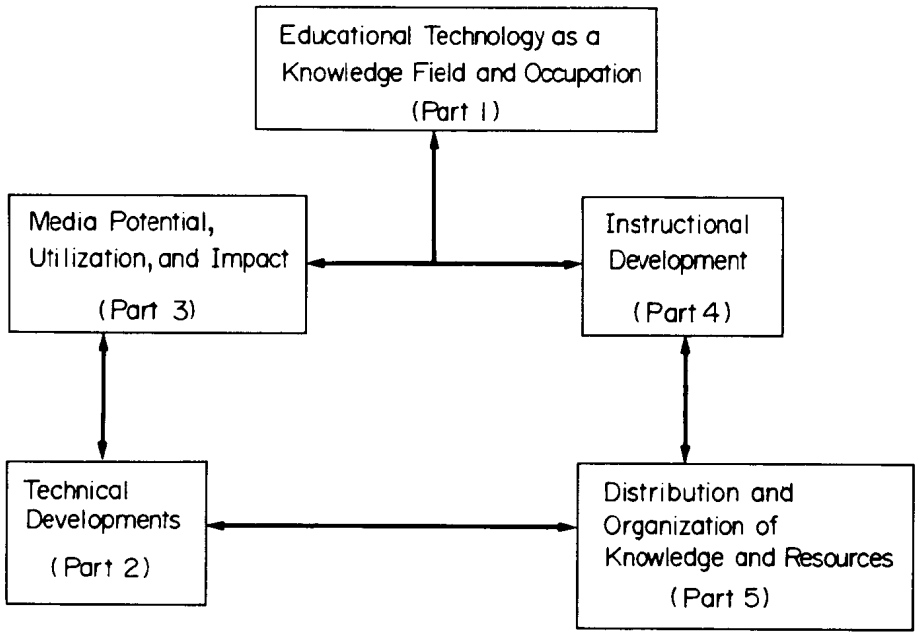

Figure 1
Schematic representation of the *Encyclopedia*

3. *The Content of the Five Parts*

Part 1 sets the scene for the *Encyclopedia* as a whole by providing answers to the following central questions:

(a) How did the term *educational technology* arise?

(b) For whom does it provide an occupational identity?

(c) How are educational technologists trained, and for what kinds of job?

(d) For what kinds of organizational settings are educational technologists employed?

(e) What do educational technologists do?

(f) To what degree can educational technology be described as a distinctive field of knowledge?

The answers to some of these questions are not clear-cut, because there are strong national traditions which affect occupational labels and how people classify and categorize knowledge. In a field like educational technology these labels are not static but changing. Thus, one could find two people performing what looks like the same job, one of whom claimed to be an educational technologist while the other did not. The difference might be attributable to their nationality, their age, their training, or even the employing organization, and it would probably affect how they perceived their job and their relationship with colleagues. This poses particular problems for anyone trying to take an international perspective.

The Editor has contributed an opening article on *Conceptual Frameworks and Historical Development*, which examines the origins and development of the term *educational technology* and some of the key ideas that have been associated with it. Questions concerning educational technology as an occupation and field of study are addressed next in articles on *Field of Study*, *Personnel*, *Training*, and *Professional Associations*. Educational technology units are reviewed under *National and International Centers*, *Local Centers*, *Higher Education Support Services*, and *Higher Education Consultancy*, and these are followed by an article on *Media Program Administration*. These units are largely concerned with educational technology in general rather than one specific aspect of it, with coordinating different areas of expertise, and with instructional development. More specialized units or subunits, for example those concentrating on such matters as computer-based learning, television production, graphic production, broadcasting, or the organization of learning resources are covered in later sections under the appropriate headings. Finally, two articles review educational technology from *Continental European Perspectives*, and *Asian Perspectives*. These indicate some different ways of looking at the field, and show how the Anglo-American initiatives and literature have influenced, but not determined, the way in which educational technology is perceived and organized in these other parts of the world.

The Technical Developments part opens with an important article on the *Economics of Educational Technology*. This examines the costs and effectiveness of large-scale educational technology programmes whose aim is to improve educational productivity. The review covers within-school programmes and out-of-school programmes on five continents, and includes some of the most ambitious attempts so far to harness the potential of educational technology to nontraditional patterns of delivery, that is, not only through recognized teachers working in schools. Whether its conclusions will be significantly

affected by changes in the technology itself must remain a matter for conjecture for some time yet.

The rest of Part 2 provides authoritative reviews of current developments. *Computer Technology and Telecommunications* and *Videodisc Technology* provide introductions for the nonexpert to the fundamental technology, while new or revised articles on *Information Storage and Retrieval*, *Videotex and Electronic Mail*, and *Interactive Video* cover three areas of particularly rapid change. Developments in more familiar technologies are covered by articles on the *Distribution and Reception of Television Programs*, *Audio Production and Distribution*, and *Audiovisual Equipment* which are supplemented by short specialist articles on *Microforms* and *Time-compressed and Time-extended Speech*. Another important area to be discussed is the design of *Learning Environments* for optimum use of new technology. Finally, there is a specialist article on *Information Technology for Disabled Students*, which indicates how far new technology has transformed learning possibilities for that particular group.

While Part 2 deliberately concentrates on the hardware aspects of new technology, Part 3, Media Potential, Utilization, and Impact, is about the design and use of software and the potential-for-learning of different forms of media and learning resources. This is the largest part of the *Encyclopedia* and has been divided into four separate sections.

The Computers section contains five articles describing the different ways in which computers have been used to support teaching—*Computer-assisted Learning*, *Computer-managed Learning*, *Computer-managed Testing*, *Computer-assisted Counseling*, and *Computers in the Curriculum*—and two articles reviewing the degree and kind of penetration achieved by microcomputers into schools and adult education. Three of the seven articles in this section are new.

Film, Television, and Video opens with an article on the changing *Role of Film, Television, and Video*. Then two entries on the *Use of Television in the Classroom* and the *Use of Film in the Classroom* are complemented by one on *Video Production as a Learning Activity*. Four specialist articles on microteaching are followed by a review of *Video Recording in Educational Research*. There is no attempt to provide anything resembling a production manual for aspiring producers, for that would be well beyond the scope of an *Encyclopedia*, and a separate but related section on Broadcasting can be found in Part 5.

The next section, on Simple Media, is included for a number of reasons. First, it is mainly concerned with resources which teachers can produce and find for themselves, though some of the more complex examples will continue to be produced commercially. Second, their use does not depend on complicated or expensive equipment. Third, their potential for enhancing learning is considerable, and there is a danger that they will be forgotten as attention is focused on newer and more glamorous technologies. This makes it of particular relevance to those engaged in teacher training and/or units for producing and distributing learning resources. The coverage is split between articles on production and articles on utilization, and some include both. Three articles on *Graphic Production*, *Photographic Production*, and *Reprography* are followed by three on presentation—*Overhead Transparency Projection*, *Bulletin Board Displays*, and *Boardwork*. Flexible use of simple resources is emphasized in entries on *Printed Materials in the Classroom* and *Sound Resources in the Classroom*, and slightly more complex equipment is discussed under *Language Laboratories*. A general article on *Media Utilization* reviews evidence on the classroom use of both simple and complex media. The final article on *Simulation and Gaming* sits a little uncomfortably in this section, but it is a thorough review of an important and growing area of education that is directly accessible to teachers without any need for special technological support.

The fourth and final section of Part 3 is devoted to Distance Education. This is a relatively small section as many of its concerns are dealt with elsewhere under Technical Developments (Part 2), Instructional Development (Part 4) and Broadcasting [Part 5(b)]. The articles here include *Children's Television* and *Mass Media in Adult Education*, neither of which is mediated through formal educational institutions. A general article on *Distance Learning Systems* and specialized articles on *Self-directed Learning in Distance Education* and *Telephones in Education* conclude the section.

Part 4 on Instructional Development is comprised of five small but interrelated sections. General Approaches to Design and Development indicates the range of contexts in which designers work, the different models that guide or describe the design process, and differing conceptions of what design is essentially about. The Editor's introduction to these issues is followed by two reviews: the first covering those conceptions of design that influence the field of curriculum, and the second examining the range of systems approaches advocated by instructional technologists. This leads naturally to Needs and Objectives, beginning with processes for assessing needs and selecting objectives for adult education and for schools. Then a long article on *Specifying and Using Objectives* reviews the literature, discusses practical concerns, and clarifies some of the major issues of public debate. Finally, the research on *Taxonomies of Objectives* is surveyed and their purpose and use are explained.

The section on Instructional Design is concerned less with procedures than with assembling available knowledge for the benefit of the designer. Thus, it summarizes important areas of research and introduces different ways of thinking about the learning process which a designer has to consider. Three articles on the analysis of instruction show a move from the simple behavioural models of the 1960s to a much more complicated cognitive approach, while similar trends towards more complex interpretations of the design problem can also be found in the four articles concerned with media research.

The section on Individualized Learning Systems opens with two general articles introducing the wide range of approaches found in higher education and in schools. Many of these are then given more detailed treatment in the four subsequent articles. At one end of the spectrum is the *Mastery Learning Model* whose applications include *Programmed Learning* and the *Keller Plan*, while at the other end is *Self-planned Learning*.

The final section, Evaluation, is necessarily selective because evaluation has become a burgeoning field in its own right, and occupies a companion volume to this *Encyclopedia*. The four articles were chosen for their particular relevance to instruction developers. Thus, a short introductory article on *Formative and Summative Evaluation* is followed by three specialist reviews on *Program Evaluation*, *Evaluation of Learning Resources*, and *Criterion-referenced Measurement*.

Part 5, Distribution and Organization of Knowledge and Resources, is comprised of four sections. Three represent organizations and traditions that have not been linked together as closely as they should: (a) the curriculum development/textbook publishing tradition which has typically distributed resources directly to schools, (b) the educational broadcasting tradition which represents another mode of mass distribution of packaged knowledge, and (c) the library tradition which has emphasized individual-user access to knowledge and diversity rather than uniformity. The fourth and last section looks more generally at knowledge organization and knowledge use in our society.

Curriculum Packages and Textbooks ranges wider than its title implies. The analysis of *Curriculum Development* in a number of countries examines how knowledge is officially selected, recommended, or approved for dissemination in schools and colleges, while the review of *Curriculum Implementation* highlights the significance of the mediation process

and the gap between rhetoric and reality. The *Role of Textbooks* and *Curriculum Packages* are examined, and the consequences for transnational influences on the curriculum are discussed.

Educational Broadcasting is covered by seven regional articles. These reflect not only regional preoccupations but some of the special concerns of their authors. Thus, issues raised in one region may be equally significant for others where the authors have given them less attention. Taken as a whole, they constitute a thorough and authoritative review of educational broadcasting worldwide. They are supplemented by an eighth, newly commissioned article which examines *Transnational Influences in Broadcasting.*

Libraries and Resource Centers is also a substantial section. Five articles look at functions, roles, and policies of different types of library—school, public, college and university, film, and special, while a sixth examines the role of *Libraries in Adult Education.* Three further articles look at the *Processing of Library Materials*, the *Storage and Handling of Learning Resources* other than books, and *Learning Centers.*

Finally, there are six articles concerned with Knowledge Organization and Knowledge Use. The first three cover *Knowledge Industries and Knowledge Occupations*, the expanding area of research on *Knowledge Utilization*, and the more familiar topic of *Knowledge Diffusion in Education.* These provide important perspectives on the work of educational technologists that are only rarely given the attention they deserve. A short article on the *Educational Resources Information Center* (ERIC) is followed by a review of *Copyright* which highlights issues raised by educational technology and discusses recent changes in national laws. The section concludes with a new article on *Electronic Publishing*, a rapidly developing area that promises to challenge many of our current assumptions about the distribution and organization of knowledge and resources.

4. How to Use the Encyclopedia

The Encyclopedia is designed to serve two main purposes: reference book and textbook. A user with a specific topic or question already in mind will find it useful to proceed either via the list of Contents at the beginning of the book or the Subject Index at the end. More general questions are best pursued through the Contents, more specific questions through the Subject Index. On the other hand, a user wanting a more general review of a large segment of the field would do better by starting with the introductions to each part. These give useful overviews and sufficient guidance on the contents of individual entries to assist the reader in deciding where to go next.

Further assistance is provided by a list of references at the end of each article which the reader will find useful in locating further reading. In addition to the Subject Index at the back of the book, there is an Author Index covering all authors cited, and a full list of contributors and their affiliations.

5. Acknowledgements

Robert Maxwell conceived the idea for the parent encyclopedia, while Torsten Husén and Neville Postlethwaite took on the enormous task of finding Section Editors and guiding it through its development. Together with Barbara Barrett, the Editorial Director at Pergamon Press, they were largely responsible for initiating and overseeing that remarkable work. Many entries in this *Encyclopedia* were originally commissioned and edited by other Section Editors, to whom I am especially grateful. They also assisted me with my own section, as did Donald Ely and colleagues at the University of Illinois and the University

of Indiana. To all of them I am profoundly grateful, and also to Joan Burks and Debra Rosen who were responsible for the more detailed work at Pergamon Press.

I also received help from the "invisible college" of friends and colleagues across the world who were always reacting with suggestions, encouragement and advice; and support from the University of Sussex, particularly from my secretary Margaret Ralph, who transformed so many edited manuscripts into new copy on top of her normal duties.

Finally, I should like to thank the Authors, without whose expertise, enthusiasm, commitment, and forbearance this *Encyclopedia* would never have been produced.

June 1989

MICHAEL ERAUT
Brighton, UK

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