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general tendency for technology to reduce the need for less-skilled employees, but shows that in all the sectors of the electronics industry at least, the demand for scientists and tehnologists is increasing.

Finally the authors use a capital vintage simulation model to forecast employment levels in the electronic and electrical industries, assuming rates of output, investment and best-practice productivity growth. Three scenarios are assessed, based largely on observed rates of the above parameters in previous periods. One questions the value of the sparsely detailed exercise and the significance of the figures, even though the assumptions seem reasonable. The authors themselves point out that the model is for a closed economy, and also that the overall economy-wide employment implications of microelectronics cannot be judged on such a basis. To make further progress much more needs to be known about the diffusion process for microelectronics and the authors hint that this will be a subject for their future investigation. The work in this book differs from much in the area of technological change and employment in seeking out data on which to base deductions; this is the type of approach needed if our understanding of the effects of technological change on employment is to make real progress.

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New Information Technology in Education, by David Hawkridge (Croom Helm, London & Canberra, 1983), pp. ix + 238, \$20.25

This book should prove to be a useful introductory text in teacher education, since there are as yet so few in this field, but it is nonetheless disappointing. The better parts are on the applications of new technology in all branches of education, and their problems and limitations. The first Part, an attempt to review the whole field of information technology, is irritating and imbalanced, too short to be of value, and doubtless would confuse a real tyro.

Hawkridge, a Professor of Applied Educational Sciences and the Director of the Institute of Educational Technology at the Open University, writes in the Preface of his excitement as he studied information technology and its uses in education, but remarks that 'it is important to think about how education can take advantage of technology, rather than the other way round' (p. vii). This is a refreshing change from the approach of many naive technological enthusiasts.

Part One attempts, in a mere 66 pages, to cover: definitions of 'technology' and 'information technology'; the key ideas of Machlup, Bell, Stonier and others; binary codes, microelectronics and the nature and use of computers and telecommunications; information and communication; the whole range of devices for input, output, processing and storage; and the 'makers and sellers' and 'buyers and users' of information technology. The result is clumsy, hopelessly compressed and in places inaccurate, or at the least, imprecise and confusing. For example, the terms 'information' and 'communication' are each used in several different senses, and the assumed lay reader would surely have great difficulty in relating the concepts of 'uncertainty', 'feedback' and 'noise', which have precise meanings in the mathematical theory of communications, to the more commonplace uses of 'information'. Attempts to bridge the gap between these sorts of 'information' have been attempted by eclectic and scholarly writers such as Colin Cherry and Stafford Beer, but are fraught with difficulty. Not only the knowledgeable reader, but the lay person also, should skip Part One.

Part Two has chapters which describe the various uses of information technology in, respectively, learning at home, primary and secondary education, teacher training, higher education, vocational and continuing education, and informal adult learning. Most attention is given to microcomputers, but videodisc, videotex and other technologies are also discussed.

These chapters lack a clear organisation or taxonomy to guide the reader, other than a very broad classification by major technology. Every chapter is basically a succession of paragraphs, each briefly summarising one reference cited by the author from his wide, but necessarily selective, reading of the now substantial literature. The numerous examples, though, give a fair impression of the range of computer and other applications now available at the various levels of education. A much better understanding would of course be imparted by actually using each piece of software for a few minutes, but one cannot criticise a book for the limitations of its medium.

There are some doubtful and contentious statements, such as that 'To acquire computer literacy [which is not explicitly defined] children must learn by actual experience and practice in programming' [p. 83].

Four chapters each cover one sector of post-secondary education, and they vary in length from four to eight pages. Since each chapter deals with several technologies, the treatment is inevitably superficial.

Part Three is on 'Problems and Constraints', of an educational, social, political, economic and technical nature. Hawkridge speaks here with more confidence and authority.

The chapter on educational problems brings out some of the substantial differences that exist between the various pedagogies in educational technology, with their quite opposed underlying views of the learning process, views at least partly ideological in nature. He relates these (belatedly) to a highly simplified classification of forms of computer-assisted learning. All too often writers and practitioners fail to recognise the gulf between the different purposes and educational philosophies of (say) Skinnerian drill-and-practice and the Piagetian work of Papert, which is referred to several times, usually with approval. Hawkridge brings out well some of the main arguments about the purposes of educational technology.

Some useful comments are made on commercial bias in information technology, on people's ambivalence towards technology, on the probably widening gap between the information-rich and the information-poor, on public versus private control of the technology, and the likelihood of biases based on age, sex, culture and class. The discussion of cost and technical difficulties introduces a note of healthy scepticism.

He concludes with two views, each a collage of the frequently expressed views of others, of information technology in education in the year 2000. One is extremely but not absurdly optimistic, the other quite pessimistic — or, rather, it is a set of alternative grounds for pessimism: declining funds for education, increased government control and centralisation, privatisation, and the domination of education by technology. Finally, he presents his own, cautiously optimistic and humane, view of the likely future, in which, despite the commercial and political pressures operating and inequality of access to enrich education.

There are some surprising ommissions or lacks of emphasis. A lot is said in the book about the use of television, but only half a page [p. 155] is devoted to the long term effects on children of watching television. Little is said about the images or stereotypoes presented by video games or educational courseware presented in a games format; nothing is said about violence.

The book limits itself to the use of information technology in education. Consequently, hardly anything is said on the subject of teaching about technology, especially in the important sense of empowering students to understand and form critical judgements about the place of information technology in society. The use of technology for educational administration receives scant mention, nor is a great deal said about the role of technology in information and library management.

Hawkridge writes well and clearly. The continual citing from his large list of references, however, is overdone, intrusive and often inappropriate for what is essentially a textbook. There is no need to provide authority for simple factual statements. Many of the references, moreover, are unsuitable for student use or are relatively inaccessible (such as newspaper articles, the more obscure journal articles, and internal reports). While he cites one of Weizenbaum's more recent papers, he does not include his classic work of technological scepticism, *Computer Power and Human Reason* (Freeman, 1976), nor the even earlier book of Oettinger, *Run, Computer, Run* (Collier, 1969).

In summary, since there are so few books yet on new technology and its use in education written by people with knowledge and understanding of education, this will be a useful text for a few years. It would, however, have greatly benefited from trial as the basis of a course or from greater critical review by people with good knowledge of both information technology and of educational theory and practice.

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Economic Analysis of Telecommunications: Theory and Applications edited by L. Courville, A. de Fontenay, R. Dobell (North Holland, Amsterdam, 1983) ISBN: 0-444-86674-4

This book is a valuable addition to the relatively sparse literature on the economics of telecommunications. The editors have rendered a great service in