

# An Overture

---

## Computers in Bioeducation: The Expanding Universe

Every educator and administrator realizes that perhaps the most widespread issue in education today is computers in education. The only other major topic is the quality and amount of science education in general. Yet computers are even deeply associated with that topic by their being suggested as the most likely means to provide the nation's students with better and more science education. Naturally if computers do play a role in this national challenge it will be as enhancers of good educators, certainly not as their replacements.

Several general concepts related to educomputing must be understood. To confuse them is to reduce our insight into the potential and the problems of computers in bioeducation. *Computers in education* (CIE) is a neutral, general term for any aspect of educomputing. It has the following three major components: *Computer awareness* (CA) is the appreciation of how computers affect us in our everyday lives, both individually and as members of society. Examples include airline reservation systems, computer control of buildings, income tax analyses, and defense warning systems. *Computer literacy* (CL) is the ability of a particular person to perform a particular task via computer. This may or may not require knowledge of a programming language such as BASIC. Examples are the use of a word processing program to prepare a term paper in ecology, of a statistics package to summarize a physiology experiment, or of a student writing a BASIC program to predict Hardy-Weinberg outcomes in genetics. Some writers include computer literacy within computer awareness, but confusion often results from doing so. *Computer assisted education* (CAE) is the use of computers to learn a subject *other than* computing. Examples include computer simulations of biological systems. Naturally, the same use of computers in education can involve one, two, or all three components. For instance, the examples given above for computer literacy all involve computer assisted education since they relate to learning a subject (biology) other than computing.

Computer assisted education in biology is in a rapid growth and diversification phase, as is its use in other disciplines. Taken as a whole the articles in this special *ABT* theme issue reveal that. Papers were chosen to reflect many aspects of the state of the art today, including a rationale for using microcomputers in education (Ellis), the evolution and evaluation of educational software (Crovello), and the most recent findings on the topic from educational psychologists (Alessi). Several papers report on results of actual use of computers in bioeducation (Ballou, Lee, and Weitze), including uses that allowed statistical testing of the value of computers in those settings (Self; Collins). Others report on the use of microcomputers in the biology teaching laboratory (McMillen and Esch), and describe a simple program to generate biology examinations (Vittitoe and Bradley), and one for cataloging items (Highfill and Swindler). Since many readers are just beginning to consider using computers, a short report on one educator writing his first program is also included (Blom). To counterbalance any overenthusiasm about computers in education, we offer a consideration of whether computers in bioeducation have already gone too far (Schrock). For readers who still want to write a program that is *more than* a quick and simple one, a summary of one biologist's experience is included (Kosinski). Finally, readers can glimpse the future where sound learning theory will become the context for computer use in education (Heinze-Fry, Crovello, and Novak). Articles mentioned here but not included in this issue because of space limitations will appear in a later issue this Spring.

My thanks to all of the authors who contributed to this special issue. My only regret is that we could not present more papers on more aspects. But my hope is that these will excite and motivate you to learn more about computers in bioeducation. Whether or not you decide to use computers in your courses, they are bound to benefit from evaluation of the role of computing in them. For we cannot truly evaluate computers in education without also evaluating computers without education!

Theodore J. Crovello, *Guest editor*