Educational Considerations

Volume 10 | Number 2 Article 11

4-1-1983

Education technology in the near-term future

Kent L. Gustafson

Recommended Citation

Gustafson, Kent L. (1983) "Education technology in the near-term future," *Educational Considerations*: Vol. 10: No. 2. https://doi.org/10.4148/0146-9282.1801

Technology has been a two-edged sword. Educational technology is no exception. We can use it wisely and well or take the other path. The choice is ours.

Educational technology in the near-term future

by Kent L. Gustafson

Introduction

Despite profound improvements in our understanding of many technologies, the technology of crystal ball gazing has not shared in that happy trend. Gazing into the crystal ball, or technology forecasting as some prefer to call it, remains a hazardous occupation. While there is an element of chance in all forecasts (even tide charts are stated as forecasts), technological forecasters have a particularly poor record. However, believing any forecast is better than none, I offer a number of near-term prognostications for your consideration.

There is some evidence to suggest that near-term (3-7 years) technological futures can best be predicted by examining current trends. Beyond that time, as yet unforeseen, scientific and engineering breakthroughs could dramatically alter the scenario. With that caveat, this article projects probable near-term developments in educational technology.

A Definition

First, what is educational technology? Educational technology is much more than the glittering pieces of hardware we have become accustomed to in our daily lives. Rather, it includes a variety of people (learners, instructors, designers, managers, etc.), materials (sometimes called software), knowledge and information and their accompanying communication channels and lastly the hardware. Advanced technology also assumes specialization of labor, division of work and rapid accurate flow of information to and from all parts of a system. By this definition a computer is not technology. It is **part** of a technology which also requires people, knowledge, materials, and information if it is to perform any useful tasks. Further, educational technology is not limited to schools. Industry is now spending three times as much on education and training as is spent on **all** of public education. Having less tradition and fewer existing instructional practices in place, business and industry and the military are very much in the forefront of applying "educational" technology. Almost without exception they will be among the first to adopt the technology described herein.

Why, you may be asking, is such emphasis being placed on a definition of educational technology? The reason is that many of the most important events of the near-term future will focus on improving the **interfaces** among these components of technology in order to reap their potential benefit. By interface, we mean the interconnection and interaction among the parts. Technology simply doesn't work if the components don't interact as specified. In the near future, I believe the greatest impact on education and training will occur as a result of improving these interfaces rather than as a result of spectacular hardware breakthroughs. Let's now examine several existing types of hardware to see how developments in the area of interfaces will likely occur.

Computers

Consider the increasingly popular small computer. As a piece of hardware it has a number of useful applications,—paper weight, boat anchor, conversation piece, child's toy, etc. However, coupling it with appropriate applications programs and people who know how to use it opens a vast array of options. The key new element is not the computer—it has been around for some time. Unlocking its potential are its lower cost and relative ease of use. The biggest news about computers in education and training in the near future is that they will continue to become more readily available and much easier to use.

Easier use will result from software that is more friendly to users. That is, users will be able to interact with computers in common English language rather than the esoteric languages so popular with computer freaks. For example, until now, administrators who wished to use data based management systems had to rely on computer specialists to obtain output from a computer. Any variation in the format of requested data required incantations from the programmer and often a long wait. New data based management systems are on the horizon which will make it possible for managers to examine and manipulate large data bases, analyze data and prepare reports quickly and directly without knowing any significant amount of programming. This development has greater near-term implications for administrators than the fact that "x" company is about to announce a new super chip capable of storing one megabyte of information, etc., etc. The key development will be computer application programs structured to correspond to how people think and communicate. This contrasts sharply with current programs which force people to think like computers and learn to speak their language.

Other significant news about computers is that most of them will not be used to "compute." Word processing, data management and instruction (in that order of acceptance) will become the principal applications of computers in education and training. Word processing holds enormous potential for improving the quality and effi-

Kent L. Gustafson is a professor and acting chair of the Department of Educational Media and Librarianship at the University of Georgia.

ciency of both instruction and administration. Preparation of instructional materials such as handouts, worksheets, curriculum guides, etc., can be greatly enhanced by use of word processing. Similarly, administrative correspondence, record keeping and reporting can be made more efficient by using word processing. Word processing packages are becoming available which require virtually no knowledge of computers or programming and will run on multi-purpose computing machines. Further, these packages will have built-in dictionaries to check spelling and grammar programs to analyze sentence structure and length, subject-verb agreement and incorrect or poor use of vocabulary. (No more embarrassment due to misspelled words in flyers sent home to parents or to potential business clients.)

When computer-based instruction is mentioned, most educators think of students sitting at a computer engaged in drill and practice or question and answer exercises. While these are legitimate uses of computers and will continue, the future will see rapid expansion of other increased uses of computers. First, computers will be used more for managing rather than delivering instruction. Record keeping, test generation, machine test scoring, and on-line testing will be more acceptable to teachers than sending students to engage in drill and practice on a computer. Secondly, students will use the computer much more as tool than a tutor. For example, it will be used as a word processor for reports, calculator for arithmetic operations, simulator for case studies and processor for self-generated experiments. It will also be the object of instruction at all levels of education as we examine its operation, applications and very importantly, its impact on society. Personally, I just don't see it being used much as an ordinary tutor for drill and practice or programmed instructional materials. Students don't like them for these uses and neither do instructors.

How will all this new generation of case studies, simulations, etc. be created? Three sources will become important. It is my opinion that individual teachers will **not** become the primary source of computer-based materials. Why not? Teachers don't know enough about designing varied forms of instruction. The computer and its programs will not be the problem but rather teachers' lack of knowledge and experience in planning interactive learning experiences. Hence, there is a critical role to be played by commercial producers, school districts, consortia of institutions, professional associations and government agencies in producing and distributing materials. Commercial producers, educational agencies, teachers and students will all contribute to development of the necessary instructional packages. So-called "driver" programs will become available to facilitate local preparation of rather complex materials. Libraries of high quality graphics will be available as will large data bases for manipulation and experimentation.

Cable

The TV cables being installed in most urban and suburban areas also have major educational implications in the near future. Obviously, educational programs can be sent to homes as has been done over the airwaves for years. But the big news will be interactive cable. With the proper equipment on both ends, the cable can be used to request specific programming (a two-minute message on treating insect bites from the local hospital), interact with a simulation (assignment from the biology teacher on genetics) or take a test (home-bound student). Interactive cable systems capable of carrying large numbers of messages in both directions can link the school, library, museum, local college and home to provide a variety of educational alternatives to users.

Extended learning opportunities for adults will be increased by reducing travel time and cost and permitting study/interaction 24 hours a day. Home-bound students, working or part-time student interns and others who may just not want to go to school will have a vehicle for keeping involved in their studies. Electronic mail and message systems will provide necessary personal communication and general announcements for students not in the school. Administrators should note that messages for parents can also be distributed electronically to specified individuals or everyone via cable. Individually addressable TV sets make it possible to tailor messages or delete portions of communication not relevant to specific individuals.

All the physical technology for interactive cable has been available for several years. Recent developments make it likely that phone companies can also offer comparable services via their lines. Any delay in utilizing this hardware is based on cost and human factors. Since much of the cable is already being laid and most homes and offices have phones, the cost factor should decrease in significance. However, human factors such as school attendance requirements, funding procedures based on "school-age" children, labor intensive, teacher-oriented educational environments and tradition will remain obstacles.

Satellites

Satellite communication will also play an increased role in education and training. In particular, companies are beginning to use satellites to transmit training programs to numerous sites. Present cost figures make satellite communication feasible only under some conditions. However, substantial cost reductions in the near future are expected to accelerate its use. Relatively inexpensive receiver antennae will contribute to this cost reduction along with increased satellite capacity and greater competition among vendors. Educational conferences and meetings will make increasing use of satellite communication to reduce cost associated with travel and accommodations. Business and multiple-campus universities will increase their use of satellites to offer courses in several locations. However, other educational institutions will likely offer little educational programming via satellite.

Data transmission via satellite will greatly increase as educational institutions realize the benefit of accessing existing data bases and sharing data among themselves. Likewise, state and federal educational agencies will make greater use of satellites for collecting and disseminating information.

Video-Imaging

Integration of sound, simulated motion and very high quality graphics opens a variety of options never before available. For example, how about a 1,000 live resolution TV image (about 2 1/2 times as sharp as current images) which can be rotated or examined from any perspective. (Did I forget to mention it is a 3-D perspective?) This means in anatomy you can go **inside** the heart and look around or in architecture you can first look at the building from above and at ground level and then take a visual stroll

https://newprairiepress.org/edconsiderations/vol10/iss2/11
DOI: 10.4148/0146-9282.1801

inside. Computer-generated visuals which until now have been dismally poor in quality are about to make a quantum leap in improvement. Lasers will be employed to a greater extent to provide more realistic 3-D images which you can walk around or rotate. Reduction in cost, size and complexity of lasers is almost certain to bring about increased use, especially in training programs or other instruction which focuses on real objects.

Interactive Video

Learner-controlled interactive video will also become more common. Video disk and video tape will both be used to provide a vast array of still and motion images to learners. When learners are provided a computer and appropriate programming, they can be allowed to explore the contents of a video tape or disk as they desire or be carefully scheduled through its contents. Still and motion sequences, as well as sound and verbal material, can all be integrated into a single program. As of today, the principal limitation on use of interactive video is lack of well-designed sequences. There is a wealth of existing visual material and it seems likely that some portion of it will be tapped when knowledge of how to arrange it into interactive packages becomes known. As mentioned earlier, computer programs will become available which will make it very easy for non-programmers to prepare instructional programs around existing video materials once the psychological principles of effective interactive instruction become widely known.

Synthesized Speech

Synthesized speech is certain to play a role in education and training within a few years. Talking toys, elevators and shuttle buses are only the beginning. High quality human-like speech is already possible and its cost will drop rapidly in the near future. How about "talking" with a chip in a southern dialect or in Chinese? Language instruction (English and foreign) will change greatly as voice recognition devices improve. Carrying on a verbal conversation with your computer is closer than most of us think. Voice recognition and synthesis have enormous potential for conventional classrooms but may see their first wide use in special education where their applications are more obvious. However, it would be a gross error to assume that use by students with special needs is their primary application. Neither should voice recognition and synthesis be thought of solely as classroom devices. How about automated voice systems permitting you to register for college courses via the phone or to schedule parent/teacher conferences?

Instructional Design/Development

What can we expect in the area of designing instruction? Unfortunately, I see little of profound importance occurring in the next few years. It would appear we are continuing to plow the same worn ground in learning theory. While research on lateral specialization of the brain holds some promise, I personally doubt it will have a major near-term influence on how we design instruction. We already know more about teaching and learning than we apply. Like the proverbial farmer, "We don't farm now as well as we know how." This is a people interface which will be extremely difficult to modify in most educational settings. I am less than sanguine about rapid advances on this front in the near future.

Similarly, our models of the instructional development process show little prospect of soon leading us to any brave new world. Almost no significant conceptual advances have occurred in these models in the last few years and I predict none in the near future. Like a biological chain of organisms, our present approaches may have reached their maximum extent of development and be headed for extinction. We can hope this extinction would be due to replacement by conceptually more powerful models of how to modify institutional environments as well as instructional settings. Only when we can change the organization can we change how we "farm." As an aside, my hunch is that new significant contributions to the technology of instructional development will come from the fields of management, economics and evaluation rather than psychology.

Pharmaceuticals

Chemically modified learning along with retention is probably the most frightening technology to contemplate. Almost no one wants to even talk about it, but it is not going to go away. One of the great moral and ethical dilemmas we are certain to face in the near future is the role of chemicals in altering learning and memory. The scandal over use of depressants and other drugs to sedate "hyperactive" children provides only a glimmer of the magnitude of the issue. What about a pill to increase attention (an "upper") or another to calm noisy kids (a "downer") or one to enhance memory—or block it? When we learn how to stimulate the brain to recall more of what is known to be there, who will decide the when and how and why?

If you feel more than a little uneasy about chemical educational technology, welcome to the club. Although I am a supporter of educational technology, I have grave concerns about how we will approach pharmaceuticals. We can start the discussion now, or we can wait until they are already in wide use. I fear we will take the latter route.

Conclusion

The technologies described here **already exist.** They are not of the next decade, they are now and tomorrow. They are the educational technology we must wrestle with immediately. This article was written and rewritten on a personal computer. That same computer can "talk" via cable and satellites and central video tape and disk and lasers. It can synthesize speech, provide instruction, and structure simulation and gaming lessons if I want to create them. If this article disappointed you because it failed to alert you to some "gee-whizzy" technology, my goal is accomplished. The message is that the near-term future is now! I end on a cautionary note lest you think I am an educational technology Pollyanna. Technology can help but also harm, it can free but can also enslave. It can make us more human, but it can also dehumanize. Throughout recorded history, technology has been a two-edged sword. Educational technology is no exception. Make no mistake about it, **we will use more technology in education and training.** We can use it wisely and well or take the other path. The choice is ours.