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Educational Technology and the Re-Creation of the University

I

It is often said that if educational technology is to be of real service it must be an integral part of the learning and research system which is a university, not merely an afterthought. In the case of the British Open University a successful attempt has been made to design the institution using educational technology as a basic approach.[1] It is to be noted, however, that the Open University is, in a sense, more of a college or a pre-university than a university, in that introductory teaching rather than scholarly or research activity is its central pre-occupation. The central preoccupation of a true university is the initiation of novices into scholarly and creative work through constructive and critical dialogue with the most eminent minds in the fields of concern. The principal *output* goals of a university, as perceived by a sample of 7,224 university faculty and administrators, are to train students in methods of scholarly research, and to carry on pure research.[2] In this respect the Open University is only half way toward being a true university; a great deal more is needed.

Scholarly and creative work requires intercommunication on a selective basis among devoted and capable people who have access to the material and informational resources appropriate to their field of study. This is what a university system should be designed to provide; not merely instructional subsystems, but also participation in the ongoing development of knowledge. Educational technology can be used to design and develop communications and organizational arrangements of radically improved kinds to provide for these needs. Moreover, in providing for the needs of scholars and researchers

within the university, much greater access to the forefront of knowledge for potential students and other onlookers in society at large is now possible. Hence my idea of the "transparent" university. By using formal systems-design approaches and employing television, computers and telecommunications, to bring together the library and laboratory work of the scholar and researcher on the one hand and the studious and creative enquiries of people at large on the other, a new and more satisfying kind of university will be developed.

Theoretically at least, any idea, image or form can be coded in binary digits and be transmitted, stored, edited or otherwise manipulated in a computer communications system. At present, certain practical limitations, notably the unavailability of large capacity, cheap, rapid access memories, the high cost of broad-band telecommunications and the lack of suitable terminals, mitigate against the implementation of general purpose "cyberculture" systems. These limitations are not of a fundamental nature however and are bound to be overcome.

II

A personal carrel for creative and scholarly work equipped with two color-TV screens, a typewriter-like keyboard, a stylus (for free-form graphics), stereo headphones and a microphone, all coupled into a small local computer, which in turn may telephone other computers and other "cyberwork" carrels, is well within the range of possibilities for the 1980's.[3] Such a delightful toy however will be of little significance without appropriate systemic and institutional arrangements. Our present universities have for the most part evolved from training colleges of one sort or another under the aspirations of faculty and their host communities to undertake more sophisticated work.[4] Alas, the social pressures for the provision of wide access to higher education combined with institutional, political and financial constraints have resulted in the construction of "esoteric boxes"[5] which do not well serve either the student or the researcher. Attempts to graft bits of instructional technology (A-V, TV, Computer Assisted Instruction, etc. . .) onto conventional instructional programs are rarely more than qualified successes and usually collapse when the instigating professor moves on, as by the nature of the profession he usually does.

Currently, I am recording dialogues between scholar-tutors

and students in order to provide stored study materials for other students.[6] The facility required to do this involves both closed-circuit television and the university computer system. With certain modifications which are becoming apparent, such a hybrid video-computer system could provide a convenient work-space for scholars which could also be open to the explorations of students and potential students in society at large. By contrast, the chalkboard, the typewriter, paper and pencil are the main working media of the scholar; all are limited in audience to a handful of people, whereas a computerized work-space may be opened selectively to large numbers of people. By providing a system to make the scholar's study and the researcher's laboratory selectively "transparent," we may do far more for higher education than will ever be possible by merely concentrating on the design of improved instructional modules for specific behavioral objectives, although these latter are of course also important to the student.

III

At this juncture some of the major problems which need to be solved to permit the establishment of "transparent universities" can be considered in outline. They are:

1. Fundamental Communication Problems

If one is wholly engaged in a serious creative relationship, four basic and independent kinds of interchange will be occurring: 1) semantic-cognitive, 2) pragmatic-financial, 3) pragmatic-status and 4) pragmatic-affection. Learning is a passionate undertaking.[7] While visual-symbolic communication links may be quite adequate for semantic-cognitive type dialogue, the conferring of status and the expressing of affection usually requires personal contact. It may be that the "Telegrasp" and the "Communicouch"[8] are not as ridiculous as they at first seem. Although propinquity through physical transport of people and things from time to time is probably essential to a really satisfying work situation, much can be done with computer terminals incorporating closed-circuit television. Appropriate computer languages exist for some areas of mathematics and science (notably APL, ALGOL, SIMSCRIPT, LISP) and there is a real prospect that limited

subsets of English and other natural languages may be used directly in computer mediated communication.[9] Special languages of visual symbols and graphics elements and special languages for representing and manipulating sounds—speech, music—are under development[10] and should greatly facilitate sophisticated creative and scholarly dialogue.

2. Access and Accounting Problems

All activities would have to be classified to control access and allocate costs and benefits. In general, each person who works and stores his work in the system could be remunerated in proportion to the use other people make of his contributions. If work is entered on a strictly confidential basis then perhaps the system should charge the worker. Particular classes of scholars, researchers and students could readily be subsidized; some others could be prohibited! Theoretical studies regarding the classification and retrieval of information need to be extended to cover the basic parameters of 1) Potency, 2) Activity and 3) Value[11] which, in my view, are central to the very efficient operation exhibited by human memory.
By making system use cheaper and more convenient than copies, many copyright problems could be eliminated. A small royalty would in effect be charged for each access via the system.

3. The Provision of Ancillary Instruction Modules

Ancillary instruction modules and facilities to do properly what conventional undergraduate courses *attempt* to do will be a major development, second only to the actual provision of open access to the scholarly and creative work of the universities.[12] This task will however be made very much easier by the changed roles for faculty, centering on research and scholarly or creative production which should be both attractive and secure enough so that the introduction of pre-packaged, mass-produced teaching and testing modules will pose no threat to the faculty. At present fear and false pride virtually rule out the use of "not produced here" instructional packages for undedrgraduate teaching. A learning module development team would, in conjunction with delegated faculty members, produce modules only in those curriculum areas

where unique expertise or unique needs exist. Other modules would be obtained from other universities and from commercial firms.

Courseware development is not a one-shot process, since both knowledge and the character of student populations change. Hence it is desirable that the student users of modules should be able to contribute comments and addenda to be employed in updating the courseware. If many standard modules are to be used at all universities then direct communication links will be required for the updating of these modules. The provision of introductory instruction of this kind and level of sophistication is underway via the OISE/NRC/CAL network, and is proposed for wide scale implementation: e.g.—the Alberta "Academy-Access" system described in the Worth Report.[13] Obviously there is a minimum scale on which this system could be implemented. The cost of developing *validated* modules is such that hundreds and preferably thousands of users are required for each module.[14] A scale comparable to that of the British Open University is therefore probably imperative for a successful implementation.

The instructional modules available through the Library-Resource Centre and through the computer communications system would be available to whoever wished to use them. There would also be the possibility of instituting a usage charge inversely proportional to society's needs for people trained in the subject concerned.[15] Normally however, a student would have frequent direct contact with a faculty advisor who would interpret progress records and suggest or prescribe further modules.[16] At the appropriate time, the faculty advisor would recommend the student for the conferring of a degree and thereby for direct participation in the development and research work of society.

4. Socio-Political Implementation Problems

At present there is a lamentable tendency to regard universities as merely tertiary schools.[17] It is perhaps not unnatural that engineering schools, medical schools and business schools should often be regarded in this light. However, even in these professional schools, a major proportion of the effort is placed on obtaining new knowledge and reassessing old knowledge for new uses. And it is these latter activities which most clearly justify the presence of professional faculties in the university. If worthwhile research and scholarly work are to

continue, we must ensure that universities do not fall under the dead-bureaucratric hands which in most places have, for political reasons, come to hold sway over primary and secondary education.[18]

Universities must become more open to the community to avoid this. One of the main needs of our society is to find ways of providing sophisticated and valuable employment for an educated populace. Defence, social service projects and environment development projects are three of the areas currently being financed on a large scale to provide moderately useful work. Two more areas, these properly the province of universities — the development of new critical knowledge and the production of cultural works — are ripe for further development. If faculty and administrators can propagate the notion of the university as an "end"-institution serving these ends rather than as a "means"-institution training people for often non-existent jobs in undesirable material-growth industries, then great advances in the quality of life can be expected. This will be possible only if many people have the opportunity to participate vicariously in the work and life of universities. Educational technology can provide these opportunities.

IV

In summary, the argument of this paper is that educational technology in the universities should be used to implement the overall system goals of promoting research and cultural productivity, rather than as a placebo to allay public doubts concerning our misconceived institutions clogged with non-students and staffed by frustrated researchers. Attempts to turn universities into schools and faculty into teachers can lead only to widespread misery. The appropriate application of educational technology in the universities is to transform universities systematically into organizations which will provide research and study opportunities much nearer to the desires of both faculty and students, and nearer to the long term needs of society. The balkanized and self-conflicting institutions which today call themselves universities cannot meet these needs and should not be merely patched up by educational technologists in futile attempts to do so. Rather they should be re-created as "transparent" universities.

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