Forging the Links: Computers and Dispersed Faculties

Miriam K. Mills

Abstract: This paper will deal with the potential impact of interactive technologies as an option for faculty development between dispersed areas. Among the topics considered are the ways in which the talents of the dispersed areas' faculty can be meshed to the end of producing more informed and engaged educators. Many institutions of higher learning concerned with maintaining the current skills and developing new talents of faculty will sometimes find themselves thwarted because of financial constraints which limit their ability to have faculty members travel to meet with their counterparts elsewhere. Technology provides a framework within which continued interaction can occur while still maintaining the continued presence of faculty within the classroom. More critical than the simple interchange between individuals is the building up of a network of peers transcending national boundaries. Developing countries can economically sustain and enrich the competence of their existing faculties. In addition, present obstacles to faculty recruitment and retention can be offset by facilitating professional interaction with distant colleagues.

INTRODUCTION

At the same time as society presses for productivity through the intelligent use of technology, there is a concomitant need for expanding human capacity. The ability to grasp, use and transmit information calls for the development of new skills. If further human progress is to keep pace with what production and information technology have wrought, greater efforts in intellectual technology are called for in order to "amplify man's learning, analytical and problem solving power" (Molnar, 1982, p. 7).

The development of human amplifiers may be an American construct, but it is reasonable to suppose that similar views would exist in many other countries. The communication forms which are conducive to human interaction and which are computer-mediated are genuinely active in the sense that they develop powerful new systems of interaction. Working groups create resonances and synergy through exposure to network interactions. What becomes transmitted is more "know how" than archival materials. Computers make it possible to efficiently organize and analyze data. The importance of this to higher education cannot be overstated.

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The key contribution of universities to society is to improve intellectual productivity. The traditional university functions must begin to respond ever more imaginatively to the "intellectual realities of the computer revolution" (Van Horn, 1986, p. 55).

> We are, whether fully conscious of it or not, already in an environment for higher education that represents the most drastic change since the founding of the University of Paris and Bologna . . . some eight or nine centuries ago. (Muller, 1983, p. 47)

> One can predict students will have access to what Philip Macedon's son, Alexander, enjoyed as a royal prerogative, the personal services of a tutor as well informed and responsive as Aristotle. (Suppes, 1966)

Many of those now in education were trained in the pre-computer era. Through seniority such individuals may readily assume leadership positions and have problems with the newer, younger, more technologically advanced colleagues. Not only is there the pressure from colleagues, there is in developed countries, an equal force for change emanating from students. In privileged communities, computers are well integrated into primary education. Those of the pre-computer era have, as a result of lack of exposure, less ability to bring the wonder of learning forward. Such faculty members can either withdraw from the spectre of a new technology, or hasten to catch up as best they can.

The author had been engaged in a project to overcome faculty resistance to change. The method was computer conferencing which had the virtue of being simple to learn and invisible to the outside world. The uneasy faculty member could efficiently deal with facts and feelings related to comprehending the boundaries of technology. Best of all, such views could be shared anonymously. One could ask very basic questions without fear of looking foolish or having too primitive an understanding.

In post-course evaluations, of the 15 professors representing 11 institutions, 13 expressed satisfaction that overcoming "fear of keyboard" had been accomplished. This program had been based at an east-coast university, with other east-coast institutions, concurrent to the discussion forum which the author moderated, there were a number of substance courses offered through computer conferencing, including such topics as integration of computers in music, mathematics and foreign languages. The project participants took such courses in conjunction with the discussion group on-line conference.

The issues of great consequence for higher education revolve on issues of information dissemination, shared access, and remote interaction. If we regard the mission of educational institutions as the creation, storage, and dissemination of information, communication networks are tools to be used in accomplishing these tasks more effectively as they facilitate fast, reliable information and resource sharing (Barden & Golden, 1986).

Yet there are differences in objectives between administrators and faculty. Speaking initially of developed countries, extensive use of computers enhances the image of the institution and thus the perception of competence of the leadership. There have been occasions when the commitment has been made, for example, to provide all incoming students with computers. Less attention has been given to how they will be utilized by entrenched faculty that may be disinterested or hostile to a new technology. Grudging acceptance of administrative goals does not lead to enthusiastic and creative teaching.

When the author was in Africa recently, she was exposed to programs using computers for union steward education. In Kenya, the Central Organization of Trade Unions (COTU) was eager to have their extension level courses become accredited. The skills that union leaders and trainers had were not necessarily consistent with what a university would accept. In discussions in 1986 with COTU officials, there was considerable enthusiasm for computer conferencing which would make it possible to have an academic participate in what had thus far been training programs. Once greater consideration was given to underlying academic principles which helped shape episodic experiences, COTU believed it would be possible to give students college credit for what they learned through extension programs. A significant factor was cost. The University of Nairobi could not stretch its resources to encompass education in the field. Since phone lines and terminals were readily accessible, COTU leadership reasoned, there should not be overwhelming resistance.

At a graduate program offered at the air force base of Panama, officers had a difficult time coming for the concentrated program which earned them three graduate credits. Military manoeuvres, off-base assignments, and frequent schedule changes made attendance difficult. Many more would have been eager to participate if they had felt that a one or two session absence would not be disastrous. The peril of scheduling could so easily be overcome by a combination of videotaping of lectures coupled with computer conferencing for discussion with faculty beyond regular class hours.

It is now possible to store information in any form (audio, visual, digital, or any combination of these), retrieve it whenever we want and send it instantaneously anywhere in the world. The fact that it is not being done on a more widespread basis speaks less to our ability than to fiscal, political, and cultural constraints (Winn, 1985). These constraints are as evident in universities as they are in countries. Fiscal constraints can sometimes be overcome with judicious trade-offs or exchanges. If the institution is committed to advancing technological competence, then the finances can follow.

Political constraints also exist in terms of departmental competition, administration-faculty conflict, and intradepartmental disagreement. The knowers versus the yet-to-know can sometimes jeopardize their future if change is introduced too abruptly and the learning gaps of more senior faculty are made self-evident.

It is the cultural constraint that may be at the core of the issue. Does the society recognize the possibility of balance between reverence for established values and commitment to modern technology? It has been said that in Iran, the power of the Ayatollah was vastly enhanced through transistors and cassette players. While deploring the "scourge" of western culture, the presence of the Ayatollah was spread broadly by access to western technology.

For those institutions concerned with installing dispersed learning programs, interactive technology makes possible multi-campus sections, special structure, electronic learning and continuing education at the work place. It may be instructive to comment on some of the advantages. In addition to reduced turn-around time, there is more certainty of text content, reduced cost of communication and above all, electronic transferability. Costs can also be traded off with other communication media and alternatives.

Clearly, the lack of effective communication systems is an impediment to industrial collaboration, research cooperation and resource sharing in many countries of the third world. The process of building a traditional communication infrastructure is slow and expensive. There is the need to enable scientists within a developing country to communicate with each other and their colleagues in other countries, both industrialized and developing (IDRC, 1981).

Yet this sense of urgency may not be common to all countries. While all may support in theory the ready exchange of knowledge, such participatory sharing may diminish the "lead" that one country has obtained. In implementing such programs, only shared values will make possible shared knowledge. Some countries may fear the potential of interactions that transcend the boundaries of specific topics. The very candor and forthrightness made possible by, for example, computer conferencing may well serve as an object lesson of a different form of learning and interaction. Yet the steady growth in computer use is attributed to sharply rising travel costs, increase in labour, and an 11% decline in communication costs (Ehrenberg, 1984).

Through computerized conferencing, the potential exists for participants worldwide to engage in many on-line conferences simultaneously as well as to maintain informal liaison with colleagues, similar to conversations over lunch. Not only can participants enter conferences from any location, but they can still attend to all on-site local responsibilities. Thus, the power of the individual to act, interact, and react is reinforced by this technology. Yet it is this very notion of power that can thwart its utilization.

There is also software support for significant educational roles. User consultants serve as a vital resource for both new and experienced users. Group coordinators help to focus task attention. The conference moderator provides access and direction to conference participants. By permitting outsiders to have access to one's individual notebook, either as a full participant or as observer, much necessary information can be transmitted.

Computerized conferencing has specific educational applications which are supportive of traditional course design or newer learning systems. Traditional courses are supported through such features as: elec-

tronic office hours, coordination of large courses, curriculum design, electronic grade books, thesis advisement, and specialized tutorials. These benefits, however, are only likely to be valued by more established institutions. It is a method that facilitates academic administration rather than learning. Paradoxically, however, it may be the administrative aspects that will be easier to promote in third world countries because it is relatively less controversial. The benefits are clearly visible. The time of faculty can be used in the classroom rather than in the office.

However, in ideal terms, the use of interactive technology for learning can serve a number of needs. The first is the exchange of messages whereby a dialogue is set up between contributors of selective, fragmentary, and occasional information about the conduct of their own particular activities and having no meaning outside the context of these activities. The second level would be one wherein the opportunity is presented for more detached discussion in which the study groups would be formed to exchange ideas, to work out analyses, arrive at assessments, and make decisions. This cumulative process permits the establishment of a collective memory to which the individuals can refer as frequently as needed. Because of the ease with which materials can be inserted and extracted, newcomers to an institution can readily join in the system and benefit from the accumulated wisdom already incorporated within the memory drawn from that particular group.

NEGATIVE ASPECTS OF INTERACTIVE TECHNOLOGY

Yet such interaction is not an unmixed blessing. Some of the possible reasons for the limits of technology in education include: resistance by teachers, high costs, and the absence of demonstrable gains in student achievement (Bok, 1985).

Does the technology actually contribute to the effectiveness of education? Many widely used technological innovations seem principally designed to save time or eliminate drudgery. The undue attention given to the convenience of dispersed learning may tend to give too low a weight to the other benefits of interaction at a viable campus.

> There is no room in this format for challenging students to define the problem for themselves, explore a new hypothesis of their own, or speculate about the material under study. Because of these limitations, computer assisted instruction is chiefly used to help learn facts, basic routines … computer programs simulate a patient and permit medical students to ask questions and order tests in an effort to diagnose the illness. With such programs, the role of the machine is entirely different. In making use of these devices however, educators must remember that they are reiving on a still unproven theory of how to teach problem solving. (Bok, 1985, p. 4)

There can be objections raised to video conferencing. In its early attempts, much of video conferencing depended on a TV-oriented style of presen-

tation. The result was ". . . the 'Hollywood' syndrome, a formal visually complex-broadcast, that left a lot of executives feeling pressured and nervous about 'performance' " (Ehrenburg, 1984, p. 7).

Today more of the "performance" has been reduced. The end result is more likely to be a real life face to face situation. The quality of education received at a distance may be reduced rather than enhanced by technology. "It is only through the sound application of basic principles of communication and instruction, not through bigger and fancier gadgets, that we will be able to enhance distance education through technology" (Winn, 1985, p. 112). When applied to a university setting, however, there are interesting benefits. The faculty/performer sees the selection as being recognition of special competence. Despite the onerous task of developing an appropriate lecture and providing effective normal uses, the device itself represents the designation of competence.

Administratively, such video-teaching represents a boon to university structure. Outstanding educators can be in effect frozen in time. Their presence and competence remains enduring and transportable.

The integration of educator and practitioner is an especially provocative one for developing nations. Because of many vital needs within developing countries, methods must be found to fully utilize national talents. The history of emerging countries is still alive and throbbing. A link of academic and new government leadership provides the basis for a vivid compilation of national development.

Van Horn has argued that educators must identify where students spend most of their time as this will give a clearer picture of the learning environment. The places he identified are the library as a knowledge base and through interaction with other students. What should be observed is how students control the learning process with regard to the computer. Institutions tend not to heed the process and are instead trying to impose levels of faculty and administrator involvement in the use of computers. This approach overlooks an effective and necessary way to involve students with computers.

> Universities should not require courses about computers and programming as part of the curriculum. Rather, we ought to provide computing environments where students can learn all they need from each other. Faculty members can learn about general tool; they don't need six months off to prepare course-specific material. (Van Horn, 1986, p. 18)

PROS AND CONS OF COMPUTERS FOR PROFESSIONAL DEVELOPMENT

One of the most immediate potential applications of interactive technology is to dispersed educational development. The instructor and participants can remain stationary with information itself travelling. Although efforts in this area are only now beginning to emerge, there is potential for transforming some already existing educational efforts. The delivery of

vocational education in Alaska through different media is instructive. Thirty such strategies were described by Johnson to overcome problems of delivering vocational programs in rural schools. The study was designed to provide easy adaption to local use. Strategies of cooperative schools, flexible scheduling, use of television and radio, learning systems, correspondence studies, mini-courses, learning on athletic trips, teacher exchanges, conference calls, computer-assisted instruction, independent study, and programmed activities were all used (Johnson, 1981).

Beginning in 1971, the International Education System Plan was undertaken in Nepal to modernize education. Emphasized most strongly was vocational education to meet the country's technical manpower needs. The attempt was undertaken to make education more relevant to the needs and aspirations of Nepal by linking education with productive enterprise and egalitarian principles. The result was reorganized school programs including work programs integral to the school curricula, character building, pre-vocational training integrated with school curriculum. The earning while learning program and the plan to involve vocational education students in local development projects could easily have been planned and coordinated through computerized conferencing. Given the sometimes limited numbers of skilled professionals available for instruction, the use of on-line conferences would permit the broader dissemination of knowledge at reduced cost.

To date, little formal adult education exists in Nepal, but government agencies, cottage industries, private agencies and national youth programs provide a small percent of the out-of-school population with crafts, religion, agriculture and literacy training. Centered in the schools and youth organizations are several projects including the education for rural transformation and the Badikhel drinking water project (Nepal National Education, 1978).

Another example of the use of tele-education was summarized by Hammond (1978) in considering the activities at the British Open University. Large numbers of students at the Open University of England are prevented from having any higher education by factors such as geographic remoteness, physical disability and financial or family obligations. Most are full-time employees and or raising a family.

The Open University communicates via mail, radio or television. Students may attend tutorial regional study centers once or twice monthly or attend summer school. Telephone teaching provided the first opportunity for involving students in tutorials, discussions and self-help programs. Equipment allowed up to eight students and tutor per discussion out of their homes.

The major reason for taking part in conference calls was that leaving home or meeting new people at the study center was difficult when evening or shift work clashed with normal tutorial time. The overall structure of the conference call was dependent upon the leadership or teaching style of the tutor. Some calls followed a pattern of lecture and discussion, while others were more informal. Individuals were asked to identify themselves when asking a

question. Tutors invited named individuals to respond. Due to structured conversation, more individual participation was encouraged.

It was more difficult to describe via conference calls such subject matter as the sciences. Some felt telephone contact was restricting; some felt that the tutorial group was threatening at the center and felt more at ease with conference calls. Some who did not readily use telephones were unhappy with having to rely on the phone. More tutors felt that the main advantage was bringing study centers via phones to those who would otherwise not have been reached (Hammond, 1978).

Even when total systems cannot be embraced, incremental changes can be made which will permit greater interaction. If computer conferencing, for example, is unwieldy or impractical, perhaps videotapes can be used with telephone calls to course participants. In developing countries where resources are frequently stretched thin, classes may be quite large limiting faculty/student interaction. Any mechanism that personalizes the process benefits both faculty and student.

In order to satisfy the need for distance education, the Hungarian Ministry of Industry established the Bureau of Industrial Distance Education in 1984 which was reorganized to the Centre of Educational Technology, Ministry of Industry in 1987. Its principal objectives are:

1) to process and demonstrate techno-economic information with the help of educational technology to cover the entire industry as well as its specialized industrial branches;

2) to prepare information and educational materials to improve the standards of enterprise management, leadership, and organization;

3) to elaborate new educational forms (for instance, distance education) to assist the restructuring and modernization of the industrial structure; and

4) to supplement the products and technologies earmarked for export with educational packages, both as a reference and to provide information for operation and maintenance. (Forgacs, 1987, p. 5)

The Cranfield School of Management in England has provided graduate students with personal computers to enhance their communication ability despite part-time attendance. "While computers assigned for full time and part time MBA students is not new, the combination of providing PCs to par-time students in an MBA course for communication purpose is thought to be novel" (Kakabadse & Edwards, 1987, p. 3).

Fundamental questions addressed in the Cranfield experience were: a) who the students needed to contact and why; b) with whom greater contact is required and why; and c) the value of electronic mail to each individual.

This third point revolved around the communication lines of student to student, student to study group, student to study group leader, student to faculty, and student to administration.

> Does Cranfield have any choice to universally applying electronic mailing to long course programmes and, in the near future, to short course executive programmes? The answer is, no — there *is* no choice! From the customers' point of view, communication concerning academic and administrative matters is likely to be considerably enhanced through the use of electronic mailing. From the faculty point of view, despite initial feelings of greater intrusion, such a system will highlight which of the lecturing staff are both interested and committed to each programme, and pressurize others to either become more interested or drop the programme. (Kakabadse & Edwards, 1987, p. 9)

Computerized conferencing has been applied to executive development and continuing eduction. The Western Behavioral Science Institute based in La Jolla, California, uses computerized conferencing through the Electronic Information Exchange System (EIES) network to run multi-disciplinary development courses for high level industrial and government leaders. They are able to draw upon an international faculty as well as an international student body to participate jointly in a learning experience. A special benefit is that the entire range of transmissions remains intact for review and modification at will.

The implication of this for educational transmission is most provocative. One can begin to envision an international university of the future that transcends national boundaries. Computerized conferencing can be of benefit to education on a number of levels. It can be used for teacher training and development, for conventional course transmission, for management development as well as for continuing education. These courses can run as short or as long as is necessary which may have special value for short range projects of skill training.

In remote areas of the world where travel is time-consuming and expensive, as well as where there may be shortages of trained manpower, this would permit continued interaction for developmental purposes, and stretch the talent over broader terrains. The experience and insight of various locales can be helpful in providing examples of case studies to be generated for review and analysis by new neighbours and as yet unknown allies. This can well become the body of text for future sessions.

This is not a case of intellectual invasion but rather a new mode of collaboration. The representatives of developed countries have much to learn from the insights and experiences of their colleagues. Students of international affairs need to tap into the mainstream of contemporary experiences in developing countries.

With the increasing speed of research and development and the dissemination of knowledge, the person with a college degree no longer stays educated unless he/she continues the educational process. It is no longer the

unusually motivated individual who for intellectual satisfaction takes occasional courses in topics of interest to him/herself. No more is it the exceptional professor who feels the need to remain current in his or her discipline.

In an earlier era the learned monk in the confines of his cell could follow purposeful independent study. So too independent study was feasible for the Heidelberg student. Today, however, the rapid rise of technology and worldwide demand for current knowledge mandates interaction between scholars.

FACULTY RECRUITMENT AND RETENTION

Let us assume a university which had limited resources for the faculty in terms of library materials, data base searches, graduate assistants and few colleagues in the designated field. There would be difficulty in recruitment for faculty from more developed countries. The institution might also examine the option of providing more development for existing faculty. In this latter circumstance they might well benefit from participation in an interaction system of education between countries.

What interactive technology permits is the development of faculty within their own locale. Individuals within isolated schools or within specialized disciplines hunger not only for access to new data, but also for interaction with those who have had similar training in their discipline. Those who have had similar academic preparation tend to have a common underpinning and world view that can be shared without too much explication. There is a common lingo, a readily grasped jargon which lies beyond interpretation. Preliminary concepts do not need to be made explicit but can be simply referred to. Even in circumstances where no specific information is transferred, there is a special pleasure in the sharing of views between individuals who come from the same discipline.

In considering mechanisms for faculty retention there are two approaches possible. The first is to provide specific skills in a relatively cost-effective manner such as discussed above. They can be rich in content and provide for interaction. The second approach is to use conferencing for administrative purposes such as deliberating on issues of organization and planning on line. In both instances there is a subliminal purpose served of establishing a social network. This provides a ready inducement for new faculty to join and existing faculty to remain longer.

One must also reexamine the view of longevity in organizations. In many instances, there needs to be a saving remnant of those who continue the history of the university and know its traditions. In the case of the developing country, there need to be rewards and incentives even for those whose connection to the university is of short duration. It may indeed be well advised to bring in individuals on very short contracts to serve as bridge builders or catalysts for continued interaction. In such cases, even after the visiting professor has left, relationships that have been forged can still continue to the benefit of both.

POLITICAL IMPLICATIONS

> Data is [sic] not merely an intellectual commodity but a political resource whose distribution through new information systems affects the interests of particular groups... The system designer seeks to ask who owns the data, who will share it, what will be the perceived impact on redistribution, on evaluation, influence and authority. (Keen, 1981, p. 23)

There are those who see education as a neutral good and those who see it as a powerful tool for the transmission of societal values. The truth lies between these views. What is here proposed is a schema that adds to the transmission of information, the overlay of a communications network. This can lead not only to the sharing of a knowledge base that is discipline grounded, but to a potentially rich level of interaction. If permitted to thrive, there can indeed be cross-fertilization of values and aspirations. Computers for educational purposes are indeed "powerful tools of a thousand faces" and those who see them only as drillmasters are as narrow as those who value only the computational aspects (Keen, 1981, p. 22).

More than a replacement for the telephone, mail or face to face meetings, computerized conferencing provides a medium for expanding human resources. There is constant and convenient access. Yet in the worst case communications technology may become a tool of the elite. Those who are already advantaged could become yet more isolated from the disadvantaged (Hiltz & Turoff, 1978).

It may be feasible to concentrate on building from the most innocuous connection to the most complex. To link individuals within the same region who share common concerns on curriculum design may be broached without too much hostility. Once one begins to consider crossing regions or venturing beyond a single discipline, the resultant "untidy" interaction may be seen as setting the groundwork for uncontrolled discussion. It is essential that the direction for interaction be established by the individual entities concerned (i.e., the region, the town) the discipline, etc. Again, where outsiders are invited to participate as consultants or advisers or facilitators, they need to make explicit the gains they anticipate receiving from such interaction. The reference to gains implies knowledge sought, field data, exchange of views, network building and so forth. Communication via interactive technology will become substantive and persuasive only if all participants put a value on such joint ventures.

If one examines a collaborative activity between two countries, a number of problems present themselves which could be daunting to the participants. There is a fourfold interaction of difficult planning schedules, tight financial controls, political pressure and cultural differences. Then, too, there are technical management problems presented by the new technology involved. Many are unable to fully use the wide range of sophisticated new techniques and organizational development now available. Many of the techniques were originally developed in situations where the social envi-

ronment was much less hostile to new ideas in human resource development (Greig, 1987).

> Particularly in the countries with less economic potential, an unambiguous and positive correlation can be recognized between trends of R&D activity and the increase of competition. Such relation is specifically strong between the level of imported technologies and their inseparable "partner", i.e., the working capital and the improvement of competitiveness. On the one hand, more intensive progress in technical-economic cooperation can be recognized, while on the other hand, temporary or lasting polarization of people despite the general trend of cooperation. (Reininger, 1987, p. 4)

New development in international settings calls for societal flexibility and agility in the face of rapid change. These societies unable to develop or improve internal self-development would inevitably lag behind other nations.

Thus it is evermore incumbent on universities through intense and prolonged interaction to maintain the dialogue with dispersed colleagues. While one can speak of broad societal trends as being somewhat intransigent, there is much potential for the efficacy of individual linkages. And it is fitting that the university become the prime focus for cross-national development and growth.

While there are costs to this technology it should still be feasible even for countries with limited financial resources to participate.

> Observers, including tenured professors, are rarely indifferent to the fortunes of the organization where they find themselves. The strength of one's identification with organizational goals depends on a variety of factors such as position, career objectives, expectation of promotion, etc. Political identification and patriotic sentiment also affect intellectual outlook.... Changes in the distribution of power induced by computer use has been a favourite theme of pluralists at least since Downs predicted that urban information systems would result in power shifts from lower- to higher-ranking participants in urban politics and government. (Mowshowitz, 1981, p. 118)

The term, modernization, has been subjected to numerous definitions. In the political context, it embraces the social mobilization process which involves a change in the attitudes, values and expectations of people from those associated with the traditional world to those common to the modern world. In other words, the term denotes the consequence of literacy, education, increased communications, mass media exposure and urbanization (Huntington, 1968). We should not be misled, however, that it is in the interests of all nations to foster collaboration. Literacy and mass media may too often fuel the fire of discontent and dissatisfaction. Further, if there is wide governmental reaction and resistance to information sharing and knowledge transfer, the risks for participation become too great unless great care is given to sacrifice some degree of confidentiality. Broadly

agreed upon categories can be transmitted without too much difficulty. Interpretation, however, becomes subject to considerably greater scrutiny and limitations.

In order to respond to the anxieties of certain countries or political regimes to the too rapid imposition of technology or perhaps improper connections with outside forces, one would have to stress first the equalization of comparable departments within a country. This should pose fewer problems since it is assumed that unanimity might more easily be achieved within a particular discipline within a designated region. One may, however, be overly optimistic. When cutting across various disciplines, there is likely to be more resistance from governmental bodies regulating access to telecommunications. And the ultimate configuration of linking individuals beyond parochial borders may be altogether too great a leap to expect at preliminary stages of a country's redevelopment. There is a difference between the goal of improving national learning or international knowledge. Perhaps one has to work sequentially here to develop the capabilities of the institution and region before further extension.

The examples from colonial education are instructive. One may assume that there are still local leaders, who while maintaining lip service to ideas of broad interactive learning, still recoil from the implications of an educated citizenry. The imprisonment of academics, and the relegation of scholars to years of agricultural service, do not bode well for broad peer interaction across boundaries. The technology exists that can foster and nurture scholarly interaction. It is not yet clear whether either developing or developed countries are prepared to embrace the concept today.

FUTURE CONCERNS

Although the values of interactive technology are legion, the computer cannot "contribute much to the learning of open-ended subjects like moral philosophy, religion, or historical interpretation, the fields of knowledge that cannot be reduced to formal rules and procedures" (Bok, 1985, p. 14).

Computer technology can serve several significant functions for education, research, and public service. Yet those who argue that certain topics do not lend themselves to technology have overlooked the larger issue of scholarly interaction. It is precisely these fields that are less quantitative and more abstract that can benefit more effectively from this heightened interplay. There has been a continuing anxiety that because technology permits exquisite precision, that it is antithetical to more abstract discussion. It is exactly such abstract fields that stand to grow more vitally because of a more prolonged exposure to the discourse of dispersed scholars.

> New technologies give us far more than added margin of flexibility in teaching and research. Taken together they represent one of the greatest opportunities for change in history of higher education.

> Similarly, the possibility that the new technologies will draw the international community of learning closer together depends in part on political and social forces... Universities can help remove such barriers by insisting on as free an interchange among scholars and institutions as they require within their own academic communities. (Barden & Golden, 1986, p. 15)

The role of the educator is likely to change in a fundamental way. He or she will be called upon to guide rather than command, to persuade rather than coerce, to participate more than compel, and to verify as much after the fact as before.

> These modes should revolve round concepts such as: capacity for extreme sensitivity to the slightest signs from outside or inside the enterprise; ability to anticipate in open systems (formation of project groups...); ability to integrate the speed of response as a strategic datum. (Ripoli, 1987, p. 21)

The role of the university is a pivotal one in providing the impetus for greater intellectual interaction. A community of international scholars can potentially disrupt the narrow confines of region and institution. While many agree in principle to such an intellectual expansion, it is equally necessary to recognize that a self-evident goal to some remains an unwelcome enigma to others.

The examples of business and industry can be instructive to universities as far as the technology as such. The experience of the university, however, must forge the link between the dimensions of technology as contrasted with the constraints placed on existing faculty. There is more of a social context within universities wherein the customary demands of scholarship do not always coincide with the needs of teaching to bring technology competence forward. The reward systems within universities must be flexible enough to consider the time invested by faculty members using the technology for pedagogical purposes rather than for research.

One recourse has been to develop journals and books which permit a scholarly discussion of such topics as teaching approaches, integration of equipment, and measurement of efficacy. Within developing countries there is a strong need to provide rewards to those "mavericks" who are willing to experiment with new technology. As noted earlier, it may be more advisable to concentrate on neutral activities such as administrative functions, rather than on those mechanisms that promote or provoke engagement with distant colleagues. It is easier to build incrementally onto an existing system which has proved its worth rather than to start anew with both new equipment and novel uses.

The possibility of computer-linked educational alliances holds significant promise for developed as well as developing countries. Yet there must always be an awareness of the social context in which such innovation takes place. This paper has constituted an initial assessment of the promise and peril of such exploration.

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AUTHOR

Miriam K. Mills is a Professor of Organizational Science at the New Jersey Institute of Technology, Newark, NJ 07102. She is also a labor arbitrator and mediator.