> We have arrived at a juncture, ladies and gentlemen, at which we have no other course than to invent, and to invent in every order of life. I could propose a task no more delightful. One must invent! Well, then, you the young, lads and lasses: Go to it!
>
> Jose Ortega y Gasset, 1951

## A STATEMENT

Safely pondered reports flow forth from safely selected commissions, with their pedagogical prescriptions based safely on an Alexandrian premise: our culture bequeaths us a completed past in the wisdom and beauty of which we should instruct the young.

Those bedazzled by imperial appearances may be tempted to proceed from this Alexandrian premise. In doing so, they mislead themselves and their followers: our culture bequeaths us, not a completed past, but a shattered heritage.

Meaning emerges through communication. Traditions of meaning remain stable only so long as systems of communication stay stable. With these we have been inventing, inventing, ever-so-rapidly inventing, the sum of which is the shattering of our heritage. What remains effectively educative among the broken pieces of our past?

We aim, in practice, to engage this question, to seek strategies for sifting, shaping, and remaking the heritage so that the still educative shards of it can work for an unfolding future. And in this effort to sift, shape, and remake the educative past, we shall hold to certain principles.

First among these, we will struggle to eschew wishful thinking, for it is the bane of wise action. To those seeking to nurse the remnants of a past, the wishful thinking that entices toward ineffectuality consists in denying the actualities of change. The conservative willfully hopes that if, steadfast, he pretends for the present that substantial changes are transient, mere appearances, fortuna will shift her favors and the tried and true traditions will recrudesce. Renovation of the educative heritage cannot be wistful in this way.

Our first principle, thus, will be to work actively with and through the changes that have jeopardized tradition, not to deny or bemoan them. Thus, in principle we seek to shape a developing future.

Futurists becomes futur<u>ists</u> when they herald a potpurri of prospects for reasons of ideological self-assertion or as expressions of wish fulfillment. Such forecasts are indeed pernicious when put forward as compelling grounds for action. But one cannot, as a principle of action, simply eschew prognosis, for the systematic avoidance of prognosis in the course of action would make folly the sure result. Prognosis must not ground action, providing the reasons for embarking on it; prognosis must, however, thoroughly inform and guide action,

providing that dialectic of expectation and event by which we become aware of incipient errors in time to adjust, to correct the course.

Our second principle, consequently, consists in accepting the distinction between facts and values. Values ground and motivate our efforts; facts guide and inform them. Values determine our interest in facts; facts determine our effects on values. Values attach preference to one domain of expectation relative to another; facts consist in observed discrepancies between expectations and results.

As a charted divergence between prospect and experience, a fact is integrally linked to a theory, for theory permits the postulation of expected results and thus generates facts in the light of experience: hence theory pertains to processes of guiding action, not grounding action, and theory thus should properly be held "value-free." Such distinctions we judge ~~these distinctions~~ to be sound and we will thus proceed in a Weberian manner with a vocation at once political and scientific, the two not synthesized, but held together in tension by virtue of our base humanity.

Our base humanity is our third principle, and we celebrate it as "base" in the sense of a starting point, not a moral judgment. Humans are base, the base, and that base is one of original good, not original sin, for insofar as there is good it originates in and through humanity. If progressives, humanists, following Rousseau, have at bottom held that man is good, conservatives have, however unwittingly, held that chance is good, that fortuna redeems, providence will deliver men from their sufferings. The conservative has too smugly disparaged the optimism of progressives as if he were free of such taint. Having to choose between some faith in fortuna in one form or another or a faith in man as the source originating good, we choose the latter faith as the more prudent and realistic.

This stand on the side of a sovereign, historical humanity is not merely a stance, for it is laden with significant pedagogical consequences. If man originates, not good, but sin, and if the good of the world is the work, not of human self-creation, but of a redeeming providence external to human agency, then the work of education is to chastize and channel, to limit, discipline, and prevent the willful outbreak of humane error, to mold the plastic person according to the form that fortuna favors. If, in contrast, man is the base originator of good, then the task of education is to empower that potency, to help humanity make itself in its own image, not in the image of some external mold. The task of education is to intensify and expand human potentialities for these potentialities are the source of the good.

From such considerations we derive the special, strong meaning to the preposition "for" in the Laboratory for Liberal Learning. A laboratory of liberal learning would suggest that liberal learning was some contingent outcome that had to be fomented through an artful alchemy, that the laboratory was one engaged in the development of liberal learning. Liberal learning is not some finished product, to be designed and developed as an end-in-view, with people then to be sold on acquiring this new wonder of technical artifice. People do not need to be manipulated into learning liberally; they will come to it spontaneously. What they need are resources to help sustain and give effect to their spontaneous efforts. The Laboratory will work for liberal learning by developing means that will sustain and give effect to the

spontaneous efforts that people will make to learn liberally in and through the most advanced communications environments of our time.

Learning, we recognize, does not exist by its own agency, for learning is a gerund the active agent of which is the human learner, and the adjectives that qualify learning -- here "liberal" -- refer to qualities of the active agent, the learner, and not merely to those of the activity. Learning, thus, can be called liberal because the humans who learn can be called liberal, and people can be described as liberal because they are free, autonomous. Liberal learning is learning that people engage in, not because it will make them free, but because they are free and, recognizing themselves as free, autonomous actors responsible to themselves, they engage in learning as expressions of their freedom aimed at fulfilling and perfecting that dimension of themselves.

People are not exclusively free, autonomous creatures, of course. From this limitation on the liberality of the learner, there results the limitation that liberal learning can never be the exclusive form of learning. We are all material creatures who must provide for our sustenance. Hence much of learning is vocational learning, again a term that describes the learner, not the matters learned, meaning that the learning is engaged in because the learner is aware that he or she must develop capacities to provide for self-maintenance in a world of constraint.

Freedom cannot be conceived coherently as a quality that requires the exclusion of constraint. We are free by virtue of our powers of self-determination; we are constrained by virtue of the limits, always different but always definite, that bound our possibilities for self-determination. Sometimes people learn in recognition of the constraints that bind them as a result of the imperatives of self-maintenance, and such learning is vocational. Sometimes people learn as an expression of their powers of self-determination, and such learning is liberal. People need not be motivated to learn in such manner, for it is learning to which they, by definition, motivate themselves. They do need, however, resources so that, when so motivated to so learn, their efforts will have full effect. The Laboratory for Liberal Learning aims to develop such resources.

Annenberg Grant

PURPOSE FOR WHICH FUNDING IS SOUGHT

To carry out two developmental projects proposed by the Teachers College Laboratory for Liberal Learning: THE READER'S RESOURCE and THE VISUAL COMMUNICATOR.

THE LABORATORY FOR LIBERAL LEARNING sponsors development projects to facilitate effective access to traditional liberal culture through the emerging electronic media, particularly computing.

A growing number of people will conduct their intellectual lives almost exclusively in electronic environments. They will feel at ease gaining access to information and ideas through computers and related media but awkward with books, other printed media, and the traditional libraries associated with them. If the heritage of liberal learning is to be functionally accessible to such people, it will need to be transmuted so that people can participate in it as effectively through the electronic media as they can through the printed. So far, the electronic media have been developed as useful means for storing and retrieving information, but they are almost entirely undeveloped as means for pursuing and developing reflective ideas and values. Until they are so developed, the heritage of liberal learning will not find a robust place in the electronic environment. The mission of the Laboratory for Liberal Learning is to develop better ways by which people who rely on electronic media can absorb and extend the humane accomplishments of our culture while working with text and images with computers.

Currently, the Laboratory seeks funding for two developmental projects:

> THE READER'S RESOURCE. a program to facilitate the reflective reading of large texts on-line and electronic publication of major sources in the liberal tradition so that students may so read them, and
>
> THE VISUAL COMMUNICATOR, a consolidation of visual sources of historical knowledge onto videodiscs and a program for retrieving selected illustrations according to the viewer's interests.

Funding sought for these projects totals $233,000 over a five year period. Work will proceed in two stages, a two year design and development stage, followed by a three year implementation stage. Funding needs for the first stage (1985-86) amount to $83,000 and those for the second (1987-1989) will be $150,000.

DESCRIPTION OF THE PROJECT

THE READER'S RESOURCE

Most applications of computing to text have been designed to make writing and producing typed or printed copy both more efficient and more effective. Such

efforts are analogous to the earliest uses of printing to produce texts that appeared to readers indistinguishable from the then familiar, well-crafted manuscripts. In time the conventions of the printed book came to be differentiated from those of the manuscript, and so too will the way text appears on monitors become very different from the way it appears on pages. The object with THE READER'S RESOURCE will be to so differentiate electronic text from its printed forebears and thus do for reading what word processors have done for writing.

For this purpose, a program for presenting texts of large scope and significant substance, making full use of the capacities of the microcomputer, will need to be developed, and a selection of texts, each exemplifying such large scope and significant substance, will need to be edited and published for reading with this program.

Preliminary work on this program has been done and will be continued by the principal investigator through the academic year 1984-85. As a result of this work, the functional specification of the program will be well developed and the coding of an alpha test version will be done during the Fall of 1985. Such a version should allow a reader to work at any time with about 10 megabytes of text (the equivalent of about five large books of 500 pages each). The reader should be able to switch with a keyboard command to any one of five reading modes: a structural mode, a scanning mode, a paragraph mode, a sentence mode, and an index mode. In addition, the program should offer for each text at least four standard types of study aids, a glossary and pronunciation module, a module providing a scholarly apparatus of notes, commentary, and bibliography, a module permitting the reader to graph, to sketch, and to statistically manipulate quantitative information and formal relations presented in the text, and a module the reader can use to take notes electronically keyed to the current location in the text. Such modes and modules will not be difficult to create separately; linking them into an effective whole that will function without undue delays on very large amounts of text will require, however, artful organization in the program and an astute file-structure for the texts.

During the Fall of 1985, editing and entry of texts should also begin. THE READER'S RESOURCE should work with any type of text, from the literary to the technical. We propose to begin, however, with a selection of the seminal works of liberal learning in the Western tradition -- Plato, Aristotle, Cicero, Augustine, Dante, Machiavelli, Galileo, Bacon, Hobbes, Locke, Rousseau, Hume, Kant, Hegel, Marx, Mill, Nietzsche, Freud, Weber. The works of such thinkers are the works that the LABORATORY FOR LIBERAL LEARNING aims to make vital parts of the world of electronic communication and the list could be much expanded. At first, however, it must be much narrowed.

Physical entry of the text into machine readable form can be accomplished easily with a text scanner. Physical entry by itself will not suffice, however, for THE READER'S RESOURCE. Each text will need to be carefully edited for electronic presentation, much the same way that a book manuscript must be edited in preparation for its being printed. Many current conventions make sense with respect to reading text on printed pages folded into signatures and sown into books. The basic page layout, running heads, lines of standard width, footnotes, indexing by pages all exist because they have proven functional for printed text. The repertory of punctuation marks

and even the standardization of spelling have been largely conditioned by the constraints and potentials of producing, marketing, and using printed books. New conventions, appropriate to the electronic book, need to be developed and integrated into texts chosen for electronic publication. In mpelenting THE READER'S RESOURCE, design of such new conventions will take place in the course of readying the selected texts for computer-assisted reading and the basic effort will be to devise strategies that will facilitate and empower the student's efforts to read and interpret the text.

At first the main use of THE READER'S RESOURCE may be as a teaching aid in traditional liberal arts courses. If computing is really a powerful general-purpose machine suitable for improving human performance in diverse forms of endeavor, one longstanding form of endeavor that it should improve is the lecture, literally a "reading", and a good means of working with text on the screen will do much to disclose new potentialities in lecturing. The preliminary version of THE READER'S RESOURCE has already been used in such classes with a large-screen monitor, for it allows a group to work with texts in class with an unusually productive pattern of interaction. Overhead projectors are comparatively inflexible. Individual monitors or even individual handouts of reproduced passages tend, on being consulted, to turn each student away from the common dialogue toward an idiosyncratic experience of his or her sheet or screen. The sequence of implementation will be to display first in classes the usefulness of THE READER'S RESOURCE as a means of working with text, which will lead to a demand for its availability as a means for doing assigned and recommended reading, and if it proves successful in that, it will ripple into ever-widening use much as word-processing has before it done.

## THE VISUAL COMMUNICATOR

Conceptually, computer assisted instruction has been designed from sequential presentations linked together with branching paths -- one goes from 1 to 2 to 3 and at 3 can choose between A, B, and C, each of which heads a new sequence that leads to new branches and so on. Videodisc applications, which are usually viewed as a new, peculiarly effective means for delivering televised instruction, generally accentuate this sequentiality combined with branching options. Videodisc, like most disk storage media, has begun as a curious hybrid -- video is sequential, depending on the rapid display of consecutive images in their proper order, but the disc is a random-access artefact in which any one of a large collection of images can follow after a very brief delay the presentation of any other. THE VISUAL COMMUNICATOR will be a system designed to maximize the potentials unique to videodisc as a random access means for presenting pictorial information.

Whether a means of communication becomes an enlightening route to knowledge depends in large part on the logistics of its use. The heritage of art in Western culture is a case in point. Its uses as a great repository of esthetic value have been well realized; but its potential uses as a repository of historical insight have been far less fully developed. Thus one can better study the history of art than study history through art, and the reasons for this are largely logistical: it has been physically most difficult to assemble and assimilate the full array of visual information

about the past available through art. Pick any topic and one can most likely develop from a good reference collection a quite comprehensive inventory of texts that treat of it but one would be hard put to extract a similarly complete inventory of pictures that depict it. For the fact has been that even as the artistic past has been consolidated into endless folios of reproductions, it has been daunting to index, sift, and sort the informational content of the whole collection.

Videodisc should in time make it possible for our artistic heritage to serve, not only as a repository of esthetic value, but also as a powerful source of systematic knowledge. THE VISUAL COMMUNICATOR will be an effort to realize this potential. Easy random access in a vast collection of pictures is essential to the logistics of making accessible its informational content. If one has 200,000 reproductions of paintings spanning say five centuries of Western art, bound 200 to a volume in a thousand volumes, each indexed for subject matter of the works within it, and if one wishes to compare the depictions of children in this collection, one will have a physically very difficult task to perform. Were the same collection on four videodiscs, with the subject matter indexes consolidated, the comparison of conceptions of childhood reflected in the art would be relatively simple, in a logistical sense, to make.

With THE VISUAL COMMUNICATOR the Laboratory for Liberal Learning will seek to develop this emerging use of our artistic heritage as a means for imparting knowledge and understanding of the human past. We propose to develop through the Laboratory two videodiscs, one devoted to the evolving ideas of childhood and youth in Western culture since the high middle ages and another dedicated to illuminating the changing rationalized organization of the everyday world during the same period. These discs would each consist of some 50,000 reproductions, each dated, captioned, and carefully indexed. In addition, a database management program would be designed, treating each reproduction as a record, so that students can navigate through the whole collection according to the diverse items in the index and the innumerable permutations and combinations of these items.

Two main uses for THE VISUAL COMMUNICATOR are probable, one as a tool of scholarly research and the other as a teaching aid....

TEACHERS COLLEGE COLUMBIA UNIVERSITY

NEW YORK, NEW YORK 10027

DIVISION OF PHILOSOPHY,
THE SOCIAL SCIENCES, AND EDUCATION

February 14, 1984

P. Michael Timpane, Dean
Teachers College, Columbia University

Dear Mike:

The chance last Wednesday to explore intersecting interests with Mr. Roberts of IBM was a welcome experience. I want to develop a bit further how I would see the goals of the Laboratory for Liberal Education conducing to the interests of IBM, and the College as well, and then I will propose a concrete, limited request that we might make to IBM on behalf of the College that, if filled, would greatly facilitate the projects I am conducting through the Laboratory. I realize, of course, that the College's response to Mr. Roberts cannot simply reflect the needs of the Laboratory, but I think the needs of the Laboratory are for facilities that the College as a whole also needs and I hope these will be considered in following up Wednesday's meeting.

Assuming of course that we do not blow up everything on the way, we are rapidly creating, with IBM in the vanguard, a human environment in which means of immense sophistication for cultural creation and enjoyment will become available at remarkably low costs to those who can use them. Further, this environment will be one in which most people will have a remarkable independence from constrained work through much of life. Relative to valuations formed under an aegis of material scarcity, such a world will seem in prospect like a promised land, but it will, in the experience of it, be one beset by sufficient plights and predicaments. Imagine a mass society in which millions enjoy the prerogatives of the nobility of the ancien regime -- what will be the distribution in human sensibility along the spectrum bounded, say, by the Marquis de Condorcet and the Marquis de Sade?

We all share, IBM very much with the rest of us, two fundamental, long-range educational interests. First, we have an interest in raising, by significant orders of magnitude, the level of intellectual achievement attainable by each, across all walks of the world and in all domains of achievement, so that the accelerating move from manufacture to mentefacture can be sustained and equilibrated. Second, we have a stake in reempowering, by significant orders of magnitude, the qualitative, humanizing capacities of educators, so that the activities of mentefacture, which will be directed by desire, not need, will best be a fulfillment of genuinely human potentials and not a craven

perversion of them. Those are my educational interests; they are interests consistent, I think, with those of the College; they are, I would assert, the basic, enduring educational interests of IBM, along with who knows who else; and they are, finally, interests that IBM can help us pursue in tangible, limited, yet significant ways.

We cannot develop the environment of mentefacture simply by doing a little bit better what we have traditionally done in education -- empower a few to think for themselves and initiate the rest to perform one or another function. Somehow, we have arrived at a juncture at which educators are called upon to discover how to do precisely that which we could not do up to now in the double sense of inability -- in the sense first that up to now we have been simply unable to do it and then in the second sense that even had we been able to do it we still could not have done it for fear of excessively destabilizing the socioeconomic order of things. Now, however, we are called to discover how to universalize an education that empowers people to think for themselves, to judge of questions for themselves, whatever the substance of those questions might be, to generate their purposes from within their own resources without authoritative direction from priests, pedagogues, pundits, or patrons. The way to universalize such an education should be sought, intelligently and intentionally, just as much as ways to achieve ever greater densities of circuitry in silicon should be sought, intelligently and intentionally. Towards a strategy of sound and purposeful search for pedagogical transformation, I offer a few further thoughts.

Repeatedly in the history of technology, sequences of innovation have first appeared to have created certain bottlenecks that threatened to impede the process of change, but then they have proved to have generated simultaneously the very resources with which the bottlenecks could be broken in ways unpredictable from past patterns. I think a strategy for achieving the educational transformation that looms so important in the shift to mentefacture may be found by seeking such a relationship with respect to the new technologies of computing and communications. The bottleneck they create is an increase in relative ignorance, as mentefacture supplants manufacture, a relative ignorance that will entail more than incremental improvements in existing educational arrangements if it is to be surmounted. This relative ignorance consists in the excess demand for informed intelligence that mentefacture places on us relative to the supply and the way the bottleneck will be broken will at bottom use the high level of demand as a way to force an accelerated provision of the supply.

Mentefacture is possible because the new technologies greatly increase the range of information and the quality of reflective stimulus that can be effectively mobilized in intelligent activity. When deployed outside educative environments on people educated without such stimulus, relative ignorance results, but the same stimuli, deployed within educative environments, will greatly increase the effective power of those surroundings, for there relative ignorance sets the potentiality of the pedagogical relationship. Relative ignorance in the marketplace portends incompetence; relative ignorance in the educational place is the occasion for study and learning. Hence the basic strategy: use the

new technologies to maximize the cultural pressure pushing in upon students for that is the basic force, the one making for relative ignorance in the world and the one that can make for order of magnitude changes in the effectiveness of education.

Up and down the educational levels, the presentational power of the instructional environment has traditionally been rather weak and remarkably fixed. Since time immemorial the size of satchels that children can carry has varied little, and since about 1500 the quantity of information and the quality of reflection per book-pound that might be carried in those satchels has scarcely been more flexible. Consider a comparison. For a time, large-scale steel production and the bigger applications of steam power were limited by an analogous problem of presentational scale when the only feasible way to feed the furnaces was by stokers shovelling coal into the fires. The textbook has been to education what the shovel was to industrial furnaces, with the concomitant that the curriculum has consisted, up and down the levels, in a sharply narrowing, exclusionary choice, sized for the tyrannous text, which has controlled the work of both student and teacher alike.

In such ways, the scope and intensity of educating environments has long been limited and it has become especially limited when it is measured relative to the total stock of learning. Let us form the hypothesis implicit in the above comparison: the curriculum, the components of the educational program and their sequences, has held its seemingly necessary position in instruction, not owing to its intellectual or pedagogical necessity, but rather to its mere physical necessity. The curriculum has represented the maximal cultural selection that could be physically deployed, given the constraints embodied in children, teachers, school buildings, textbooks, and the means of movement.

Constrained to using usable books, educators have packed into the curriculum about as much cultural stimulus as could be packed into it. By thinking of it in this way we can see that the curriculum has been a very long-lived historical accident. It is now becoming possible to pack far more educative stimulus into a unit of pedagogic time: that is mentefacture and the key to an order-of-magnitude transformation of education. Following this thought, a basic strategy for integrating computing and education emerges.

Most applications so far seek more efficient ways to impart the given curriculum -- drill and practice programs are the most obvious example, but the range of such applications really goes much further than drill and practice. Such applications, when good, are highly desirable, and I do not speak against them, but aggregated together their effects will still be marginal and incremental, so we need to speak, in addition, for a further strategy aimed at creating a real alternative to the given curriculum. Instantaneous retrieval, unlimited reproducibility, vast sorting power, untiring interactivity, all these are capacities that can utterly transform the range and quality of cultural stimuli that can be brought to bear day in, day out, on all those engaged in education, whatever the level. The basic strategy should be, not to increase the efficiency with which the given curriculum can be learned, but to develop ways in which an ever widening range of information and ideas

can be made effectively accessible at each step along the educative path.

During the next decade or two a great deal of expirementation will be going on in places such as Teachers College, the upshot of which will be to disclose the ways in which the new technologies can expand the range and quality of cultural stimuli effectively deployable in education. The work I am pursuing through the Laboratory for Liberal Education will attempt to follow out such a strategy, and I am particularly concerned to explore the ways two basic activities of learning can be further empowered through computing -- lecturing and reading. I will say a little about the former of these concerns, using computers to transform the limits of lecturing, as it is in that area, for now, that I hope we might make an important, but limited request to IBM for help with needed resources. Such help, however, would also be useful for the ~~deading~~ reading project, to which I have alluded without discussing, for the technology and programing requisite for both overlap considerably. For now, however, as an example of a developmental initiative aimed to break the limits of established pedagogic form, I will concentrate on lecturing with computers.

What a lecturer might do with a well developed computerized setup illustrates the order of magnitude changes in the presentational power that are setting in with the new technologies. With a computer, the lecturer does not necessarily know more than before or can think with more acumen, but rather more of what he or she knows can be deployed in the lecture performance, eventually with less drain on conscious attention than the deployment of knowledge now takes, freeing time and energy for thinking aloud about the matters at hand. I think that a developed facility for lecturing with computers will consist of two large, good-resolution projection monitors, one for presenting graphics and stills from a laser disk and the other for presenting textual information from a data-base, both controlled by the speaker through a personal computer of high power and extensive storage capacity. Through the graphics and stills, the lecturer would <u>show</u> things; through the data-base the lecturer would <u>state</u> things; and through the spoken voice, the lecturer would <u>reflect</u> on things. Such showing, stating, and reflecting can now go on in lectures without computers, but a vast enhancement becomes possible -- instantaneous selection from thousands of pictures and a change in referencing from 'see Plato's <u>Republic</u>, book 9 if I remember correctly' to 'here's a relevant passage from Plato and you'll see the full citation in the heading'. With a fully developed computerized system, an adept lecturer should find it feasible to show, state, and reflect on any aspect of the field at any moment in a vivid, highly apprehendable manner, and alert students, who would no longer quite properly be called "auditors", would take in significant stimuli on many levels of awareness and attention.

For such a system to become operational, a lot of developmental work is necessary, however. Through the Laboratory for Liberal Education, using largely my own funds, I have made a very meager beginning towards what would be a worthwhile demonstration system. Thus this Spring I have started lecturing with a computer, using a very buggy prototype program, one small projection monitor of inadequate resolution, and a database

that I have not had time to fill out with more than a minimal set of entries. From this very preliminary experience, two things seem to me clear -- first, using computers in this way promises to be a very powerful enhancement of the lecture form, yet second, much developmental work will have to go on before many are likely to try teaching in such a way. It certainly does not promise to make such teaching or study easier; it does promise to make it more powerful and expansive. Should it be developed, I do not think lecturing with computers will prove merely to be an incremental extension of overhead projectors or the use of slides at an outrageous comparative cost, but rather an much more basic transformation of the medium. For now, however, the pros and cons of that claim are moot -- my concern here (finally) is more mundane. Without some outside help, it will be difficult to progress further.

Presently, the aggregate cost of the equipment I am using is about $6,000. It works adequately as a simple single-monitor, black-and-white system with some forty students or fewer, although there are problems with the monitor resolution that make it more difficult for viewers in even small numbers to adapt easily to the experience. A second monitor of similar quality with a videodisk player could be added with the investment of about $3,000 or so, and this I shall probably do at some time in the future failing any more significant improvements. What I have provided through the Laboratory is equivalent, or perhaps marginally better since it uses a high-gain screen, to analogous equipment available in the College. The problem with both sets of equipment, however, is one of quality and scale. The quality is too marginal to try some of the more sophisticated possibilities and the scale is such that applications get accidentally limited, an untoward situation now happening to me -- I must put a cap on enrollment in my courses, or desist from the effort to use computers in them, or get equipment that will work with a larger group. Such a step upward in the quality of equipment, however, puts things in a range where I can no longer ensure my own access to the necessary equipment, it would require monitors that cost some $6,000 and that really need fixed installation rather than ones that are semi-portable and about $2,000.

Hence, the proposal I would like to see put to IBM, namely that they fund the equipping of one of our mid-sized lecture halls with a good setup for lecturing with a computer -- two ceiling mounted high-resolution RGB projection monitors with a minimum of six and a half foot screens, an industrial grade videodisk player, and an IBM XT to control both the videodisk and the display of specially designed data-base materials on the other. Such equipment would cost about $20,000, and it should be complemented by a parallel program development system, which would consist of a second IBM XT and a second videodisk player, linked to regular color monitors, which would amount to another $10,000 to $12,000. With such a system, I think the College could become a center for initiatives to expand the limits of one ubiquitous teaching form, and I think the real order-of-magnitude transformations in the effectiveness of education will emerge as such concrete initiatives actually do expand the limits of basic forms of instruction.

For such reasons, I hope that the College can quickly install good equipment, by next Fall at the latest, from whatever source it may be

funded. I would specially hope, however, that such funding might be closely associated with the Laboratory for Liberal Education as it is integral to the line of applied developmental work going on through the Laboratory. Were such equipment provided I would be eager to oversee the development of high-quality software to optimize its use and to provide others with help in getting started at using the system in their courses, should they be interested in doing so. With such help, the capacities that I have been discussing are ones that can be brought to practical fruition through the Laboratory within Teachers College over the coming decade.

I began this discussion by suggesting very broad educational interests, indicating that they are ones we have very much in common with IBM. In keeping with these general interests, efforts to expand the presentational capacity of established educative forms should not be confined within a single institution. To some degree -- that institution being Teachers College -- it is itself an opening to the wider world. But in addition to working on these goals through courses in the College, both existing courses and courses to be developed, I anticipate being able to link the work of the Laboratory with that of other institutions.

As instances, I have discussed such developments at length with Dr. Frank Moretti, Assistant Headmaster for Curriculum at the Dalton School, and we will be jointly developing a course on using classical culture as an educative resource within a high-technology teaching milieu and we plan to develop demonstration projects on the secondary and primary levels of ways in which computing and communications technologies can significantly shift the presentational limits that have traditionally constrained the school curriculum. In addition, I have long been associated with the effort by David Mathews of the Kettering Foundation to develop more effective agenda for the education of the public, particularly as it might engender wider and deeper public participation in those subtle dilemmas of the civic weal that unfold slowly over time. With respect to these concrete considerations of informal education, I have begun discussions with him about developing ways to use computing to make the broad base of concern and network of people that he has built up over the years more effective as an educative influence. The effort outlined above to expand the presentational possibilities of traditional means of education, and the related concern to improve the ways that computing can be used as an effective tool in reading, will be essential resources in implementing these efforts.

In sum then, I propose that we request from IBM modest funding on the order of $40,000 to provide a quality prototype for lecturing with computers and a related development facility to ease creation of the requisite software and appropriate databases. Although the proposal itself is small and specific, I have indicated that it promises to be strategic with respect to the basic interests IBM shared with us in the fundamental improvement of educational achievement, particularly with respect to reempowering humanistic tradition as it prepares the average person to achieve fulfillment in a life increasingly characterized by "constrained leisure", however paradoxical that term may appear.

Finally, I have indicated reason to expect that such small, specific initiatives pursued through TC's Laboratory for Liberal Education can nevertheless have effects of wide, rippling significance.

Thanks for the opportunity to meet with Mr. Roberts and the chance to draw these thoughts together.

Sincerely yours,

Robbie

Robert McClintock
Professor of History and Education

cc. Professor Stephen T. Kerr
Dr. Frank A. Moretti

In reflecting on our meeting Thursday afternoon, I have begun to wonder whether we are trying to deal with two quite different questions through one proposal. I had thought that IBM's concern might be summarized as follows:

> We at IBM don't know much about how teachers are educated, yet we suspect that for the potential uses of information technologies to develop fully in education it will be essential to perfect the use of information technologies in the education of teachers. We are seeking you out at Teachers College because you are engaged in educating teachers and if you can draw together a group among you interested in perfecting the use of information technologies in the education of teachers, we would like to assist their efforts.

I am beginning to infer from the direction in which the draft proposal seems to keep moving that IBM's concern was somewhat different. I'd put a capsule statement of this inferred concern thus:

> We at IBM don't know much about the uses of information technologies in educational settings and thus we can't provide the kind of user support to schools that we customarily do to businesses. We are seeking you out at Teachers College because you are experienced in providing support to schools in implementing innovations and we want you to assist us in developing model user-support strategies for schools and we expect you might be interested in doing this because it would provide a valuable setting for researching the dynamics of change in education and would strengthen your networks with practioners.

To me the main difference between these concerns is that we can carry out the latter well without significantly straining or expanding our own substantive command of the educational uses of information technologies. Rather we would be acting as technical consultants, expert in managing the introduction of new ways, be they X, Y, or Z, in educational settings, without our substantive mastery of the new ways being introduced, in this case information technologies, being much at issue. In short, the locus of the change would be the schools, not the programs of Teachers College.

If the task at hand is to develop a response to something like the second concern, I have serious doubts about what I can contribute to it. Such a concern would seem to me to be something that IBM might possibly have and it would seem to me very appropriate for a group within Teachers College to develop a response as such a response would quite naturally extend what is now going on within various programs. Personally, however, I am not particularly interested in such a project. I simply do not think that the information technologies are transparent, neutral innovations which merely promise greater efficiency and effectiveness in the performance of well established functions. These technologies, for better or for worse, will transform educational functions. I thought IBM was offering us an opportunity to take some responsibility for the ways in which the information technologies may be made to transform the processes and functions of teacher education. I don't think we have yet begun to respond to such an offer in our draft proposal.

In the general discussion with Mr. Roberts last Spring, he said two things that forcefully stuck in my mind. First, in response to a rather practical

proposal by Bob Holloway, Roberts put it very memorably: through its grant programs IBM seeks to assist, not the priests, but the prophets. He also made unmistakably clear that IBM acts positively only on those things it recognizes as serving its self-interests. I take him to have been serious on both points and assume therefore that he did not withdraw the comment about priests and prophets with his stipulation that proposals must be recognizably in the self-interst of IBM. Rather, the real strength of the two statements is in the way they fit together: it is easy enough to propose activities helpful to IBM's self-intersts, but one is likely to become priestly in the process; it is also easy enough to propose prophetic iniatives, but these are likely to be so vague that no one, certainly not IBM, can be sure what interests, if any, they will serve.

Now the draft we have developed since that discussion seems to me to have become very priestly in an effort to make sure that IBM will recognize our intentions as responsive to its self-interests. Priestly work seeks to diffuse observance of teachings, both doctrines and practices, among a populace without significantly transforming its complex forms of worldly activity. Prophetic effort, in contrast, aims precisely at fundamentaly reforming a people's worldly way of life; it opposes to the given the vision of a possible alternative and offers reasons why people should actively prefer that possiblitiy to the present actuality. Our proposal, as it stands, promises to train lay-priests of the information technologies to work within various school-parishes in our region. Functionally, I do not see how it differs from a fleshing out of the idea that Harold Noah floated during our meeting with Roberts, an idea which Roberts unequivocally discouraged. I think we need to develop a more prophetic proposal or our efforts are likely to be as decisively put down in the end.

As I understand the evolution of discussions since the meeting with Roberts, IBM has made clear that it will be most responsive to a proposal dealing with teacher education. It may seem paradoxical, relative to the priestly-prophetic polarity, that IBM should want a proposal centering on teacher education, for teacher education might be characterized as the most priestly of our activities. But that might be precisely why IBM would perceive a prophetic proposal relative to teacher education to be something very much in IBM's self-interest. The more comprehensive that a worldly domain becomes, the more resistant it becomes to transformation by prophetic effort. Relative to education as a whole, teacher education is a highly circumscribed domain, yet it is one strategically situated so that the prophetic restructuring of teacher education might well promise a considerable multiplication of effects through the priestly work of the teachers newly educated. Such reasoning might well make a prophetic proposal aimed at the restructuring of teacher education by full, advanced use of information technologies very attractive to IBM.

IBM is a huge organization whose revenues exceed ours by over a thousand-fold. It is important to keep in mind what part of IBM we are addressing, namely those in it who are responsible for granting, in ways conducive to the self-interests of the company, that small but very substantial increment of its annual revenues set aside for the support of education. IBM does not need to allocate those monies for funding short-range development and implementation activities. Other parts of IBM might be interested in funding something like our draft on a contract basis as part of an effort at regional

support for educational marketing. IBM has made it clear that their educational grants in the past have gone primarily to support activities in engineering and the hard sciences. Would the grants they made, say, to MIT have been for the purpose of providing basic training to engineers on applications of computing technology to selected problems, those engineers to be primarily ones employed by selected firms in the greater Boston area? I am sure that IBM offers a great deal of such training to such engineers, but not through its educational support grants to MIT -- although such training may serve the self-interest of IBM, it would not be in the self-interest of IBM to use its monies set aside for the support of scientific and technical education in that manner.

In search of a way out of my discontent, I have gone back to the various documents that we have so far generated and my attention has fixed on a proposition in the June proposal to IBM, a proposition reiterated in the memo of October 16th convening our working group:

> The history of education as a social institution suggests that it has been remarkably flexible in absorbing, digesting and then eliminating with little trace "innovations" that were thought at the time to offer great educational promise.

I suspect it would behoove us to rethink that proposition, for it may point us in a fundamentally skewed direction. The more I have reflected on the pertinent history, the more I am convinced that the warranted proposition is somewhat more complex:

> The history of education as a social instutition began with a technical innovation, namely the invention of writing, and there has been one instance since in which the thorough-going restructuring of education as a social institution has been triggered by a further innovation, namely with the invention of printing and with its systemmatic adoption as the basis for storing and retrieving knowledge in our culture. Since then, the established system of education has absorbed, digested, and eliminated with little trace other innovations, despite exaggerated expectations about their probable effects.

The burden of the first formulation is that the inertia of education as a social institution is so great that it is nearly impervious to innovation unless extreme astuteness is achieved in efforts to implement change. The burden of the second formulation is that education is foremost an intellectual, not a social, institution, with the result that innovations that change the basic organization and structure of knowledge will powerfully change education as a social institution, despite its immense inertia, whereas innovations that do not affect the basic procedures for deploying and preserving knowledge will have little effect on education for they are at most cosmetic relative to its activating purposes.

I think the second formulation is a better reading of the relevant history, one that takes into account a wider range of documentable developments and one that provides sounder perspective on the present juncture. Will the innovations occurring in the information technologies change the basic organization and structure of knowledge? I think they are powerfully,

ineluctably doing so in a transformation that is rapid in the sweep of historical time however slow it may appear according to the clocks of our own careers. The problem will not be one of sustaining innovations in the face of the social inertia of organized education, but of finding ways to sustain and perfect basic educational purposes in a setting in which, over coming decades, wave after wave of innovation will break, sweeping away much that now seems securely solid.

Such change does not come as one single, discrete innovation, which can be either adopted or not as preference would have it. Rather such change will be experienced as a series of waves, one following after an interval upon another, with the cumulative effect of transforming the intellectual basis of education. One such wave broke over us in the early 1980's, comprised of the personal computer and its generic applications programs -- word processors, database managers, and spreadsheets. A second wave is just beginning to build and it will crest at a much higher level of sophistication, consisting of massive storage capacities, effective computer communications, and general access to expert systems -- the importance of applications programs will be supplanted by generative, transformational programs. Between the two waves a trough of some duration, say four to seven years or more, will intervene, with many thinking that the arrival of computers in education can now properly be spoken of in the past tense, with the conclusion drawn that it wasn't all that it was cracked up to be, and others developing the systems and software the effects of which will begin to build into the second wave.

It is important, I think, to reflect on the character of the software and implementations that mediate the real linkages between people and the computing systems they use. In the first wave broadening the use of microcomputers, <u>applications</u> programs mediated the linkage between people and machines, and this type of program is properly called that for it consists of programs useful when applied to common functions -- typing, planning, accounting, cataloguing, organizing and keeping records. These programs are priestly programs -- they do not change the worldly ways of people but they can be applied to doing a bit more easily all manner of familiar tasks. Word processing programs do not change the nature of reading and writing in the intellectual economy of our culture; database management programs do not alter the function of information storage and retrieval in sustaining our civilization; spreadsheets do not transform the place of statistics and quantitative projections in our lives: all in contrast have proved themselves to be powerful applications in doing what have been, for generations, the staple activities of workaday life. All these applications are to computing what the applications of the fist printing presses to the improved production of illuminated manuscripts were to printing: the applications that introduce into use the novel technology. Such an introducation into use is a precondition, but little more, for the transformations that can then result as people learn to make novel, unexpected use of the potentialities unique to the new tools.