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Department of
Communication, Computing, and Technology

MAXWELL'S DEMON

An Aid to Sorting Options for Study

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Maxwell's Demon, or Information versus Entropy

> One of the most famous paradoxes in physics is based on the fantasy that a gas in a state of maximum entropy could be provided with its own "librarian" to put it back in order. If an intelligent being small and agile enough could insinuate himself into the microworld of a vessel of gas, the being might be able to sort the molecules into fast and slow, just as a librarian sorts books. The system would then be able to do work. No matter that such a feat is impossible in practice. It is thinkable in principle, and might be a way of violating the law of increasing entropy.
>
> Jeremy Campbell, *Grammatical Man*, p. 48.

> He began then, bewilderingly, to talk about something called entropy. The word bothered him as much as "Trystero" bothered Oedipa. But it was too technical for her. She did gather that there were two distinct kinds of entropy. One having to do with heat-engines, the other to do with communication. The equation for one, back in the '30's, had looked very like the equation for the other. It was a coincidence. The two fields were entirely unconnected, except at one point: Maxwell's Demon. As the Demon sat and sorted his molecules into hot and cold, the system was said to lose entropy. But somehow the loss was offset by the information the Demon gained about what molecules were where.
>
> "Communication is the key," cried Nefastis. "The Demon passes his data on the sensitive, and the sensitive must reply in kind...."
>
> Thomas Pynchon, *The Crying of Lot 49*, p. 77.

We have designed this guide to communicate information, primarily to department majors to facilitate their long-term planning. We endeavor to keep the scheduling information up-to-date, but this document is only a planning aid and you should check the official bulletins and errata before registering for a course. *Maxwell's Demon* will be updated regularly. Ask Shirley Dunlap, the Departmental secretary, what the latest version is. Comments and suggestions are welcome! Give them to Robbie McClintock.

Terri Bush, Paula Schwartz, Marie Taylor, and Brad McCormick, among many, have helped generously in creating *Maxwell's Demon*.

Version 2.1 incorporates more up-to-date scheduling information than that found in version 2.0.

Contents

Communication, Computing, and Technology in Education

> The introduction of famous discoveries appears to hold by far the first place among human actions; and this was the judgment of the former ages. For to the authors of inventions they awarded divine honors, while to those who did good service in the state..., they decreed no higher honors than heroic.... Again, it is well to observe the force and virtue and consequences of discoveries and these are to be seen nowhere more conspicuously than in those three which were unknown to the ancients...; namely, printing, gunpowder, and the magnet. For these three have changed the whole face and state of things throughout the world; the first in literature, the second in warfare, the third in navigation; whence have followed innumerable changes, insomuch that no empire, no sect, no star seems to have exerted greater power and influence in human affairs than these mechanical discoveries.
>
> Francis Bacon

The Department and Its Programs

Seminal changes in communication shape history. Speech separated men from other animals. Writing, particularly alphabetic writing, stabilized thought, so making history a work of cumulative change. Printing with movable type provided a necessary condition for modernity, enabling people to communicate with speed, stability, precision, and scope. Rapid, dependable, exact, broad communication has been essential

for science and technology, for education and human development,

for industrial economies, national politics, and urban societies,

for the spread of mass literacy and the involvement of most everyone in continually reconstructing the human environment through action based on knowledge.

Advancing these possibilities has been the work of the past 500 years.

Since the mid-19th century, human ingenuity has contrived a sequence of radically new media. This sequence began with the telegraph and photography; it continued with the telephone and radio; it now culminates with the upsurge of film, television, computers, satellites, cable linkages, videodiscs, fiber optics, and much, much more. Such changes in communication have been shaping history anew in ways we cannot grasp firmly yet, and such technological transformations will continue to shape culture and education decisively for the future.

Broadly, these transforming forces comprise the information technologies; their fast further development ensues ineluctably, driven by powerful, complicated skills and dynamic industries. Energy to generate these changes in communication and culture derives primarily from innovations in computing and in video and telecommunications. These new media do more than merely move information to wider groups more rapidly than before; they begin to alter what and how we think, eliciting new measures of truth and knowledge, changing who can learn what, for which ends and how well. The interaction of culture and knowledge with the new media is the context of our work.

As an international school of graduate study in the educating, psychological, and health service professions, Teachers College has the task of participating, creatively and critically, in these historic developments as they bear on the broad human concerns that stand within its purview, taking its due measure of responsibility for the course these changes wreak. In seeking to fulfill this task, the Department of Communication, Computing, and Technology in Education is an essential resource. In origin, the Department grouped together three previously separate programs, Communication and Education, Computing and Education, and Instructional Technology and Media. Strong purpose and coherence have emerged as attributes of this combination, for the powerful changes working in contemporary history are changes wrought by the sum of these parts. We invite you to join us in further developing the potentials of these technical innovations for the improvement of education.

You will find that the Department draws its energies, as a whole, from concern and involvement with the two prime domains of information technology -- from the complex worlds of digital coding and of analog signals, of computing and of video. These twin sources energize with special power owing to their convergence. This convergence is, further, a balanced interaction, each form influencing the other: thus computing increasingly becomes a valuable means to manage video and telecommunications, and the addition of higher and higher resolution video monitors to the computer permits people to work on-line, supplanting monolithic batch processing with ever-more interactive styles of computing. Whatever your special concerns may prove to be, you should aim to develop skill with both of these energizing forces, for you should not separate one from the other.

With both video and computing, you will find that the question *How* drives their material development. As students in the Department, you need to join with faculty members to mobilize mastery of the requisite technical know-how and to pass it

through a reflective field, one generated by the study of communication and information theory, so that you can transform the powerful answers to the question *How* into meaningful, moving answers to the question *What* -- what can you and should you do with your know-how for the betterment of education and of culture?

With this effort to endow know-how with a responsible purposefulness, you can make the three programs in the Department interact and work productively together. The study of Communication can provide you with the reflective field within which you can harness the know-how at the base of the programs in Computing and in Instructional Technology and Media. Combining the three concerns in this way, you can form a purposeful sense of what can and should be done with technologies in the service of humane education. So proceeding, you will experience how our three programs represent, not separate concerns, but distinct emphases in our shared efforts to study, inform, and guide educative work within the swirls of cultural change that ever emerge in complex response to technical innovation.

The Program in Communication and Education

Through the program in Communication and Education, you can prepare for teaching and research positions in higher education, for work as communication specialists in business and government, for careers as innovators in the use of new media for educational purposes. Students can earn M.A., Ed.M., and Ed.D. degrees through it. The program is broadly humanistic in tone and interdisciplinary in intellectual orientation.

You will extract the most from the program by pursuing a three-fold intellectual goal, aiming

- to develop a sound understanding of the diverse forms of communication theory and information theory developed by scholars and reflective practitioners;

- to acquire creative skill in the use of basic media of communication, of the written word and one or more other forms, of computing, photography, film, video, theater, dance, music, sculpture, painting, mime;

- to gain thorough command of the formal analytical tools for generating knowledge about modern communication.

While completing a degree, you should expect to attend closely both technical artifact and to human activity, that is, to material

systems of communication, in which the contrived technologies are the matter of primary interest, and to interpersonal, direct communications dynamics, in which unmediated exchanges, face-to-face in human time, are the subject of inquiry. A major theme for your recurrent reflection should be the diverse ways in which the modes of communication condition the meanings actually and potentially communicated, whether in face-to-face conversation or through a global broadcast using satellite transmission.

The Program in Computing and Education

Potential employers, should you specialize in computing and education, include:

schools and colleges, which will employ graduates as faculty members or administrators;

computer hardware and software manufacturers and marketers, which will employ graduates in a variety of capacities, particularly to design, evaluate, develop, and market educationally oriented computer-based products;

corporations, which will employ graduates as instructors and designers of their own in-house computer-related training programs; and

state departments of education and large school systems, which will employ graduates in setting standards for, and in supervising, major programs involving computing and education.

Students can earn the M.A. degree through the Computing and Education Program and if you want to pursue the Ed.M. and the Ed.D. with a specialty in computing and education you can do so through the Program in Instructional Technology and Media. You should, however, pay primary attention to the course offerings listed under Computing and Education in what follows as these represent the major resource for your coursework in this area.

Within the general area of computing and education, faculty members and students study the interactions between computing and education, interactions that grow evermore powerful and diverse. One important effort aims to improve how computing, especially programming, is taught in schools, and in this area we make special efforts to address the need for appropriate software throughout education and the search for appropriate pedagogies for teaching computing at diverse levels, from early childhood through maturity. With attempting to

develop appropriate software, a second major effort seeks to develop and implement appropriate patterns of use for computers at various levels of formal education, paying due attention to matters of equity, pedagogical value, and the productive allocation of scarce educational resources. A third major effort centers on software development, not for the immediate computing environment, but for that which will emerge after consolidating the very rapid growth of the past few years and a new period of substantial advance is again upon us; here we engage in long-term efforts to bring the accomplishments of current computer science, particularly artificial intelligence, to bear on the creation of educative software and better configurations of computing resources for purposes of educating.

Should you specialize in the area, you should expect to develop a secure command of programming, FPL, a language developed in the Department, Pascal, C, Lisp, and Prolog, being the languages of greatest importance. Normally, your course work in the area should involve some introduction to artificial intelligence, including languages now used in that area; some introduction to expert systems and their role in tutorial and tool mode computing in education; some experience with the latest computer-based learning materials, to supplement routine experience with more traditional education software and hardware; and some work on a significant development project in computing and education.

The Program in Instructional Technology and Media

Students who have earned degrees in Instructional Technology and Media have found positions in education, government, and industry. Some continue to work within formal education, as principals, department chairpersons, special- setting librarians, or teachers on the elementary, secondary, or college level. Others work in training and development departments in business, medical schools, or government agencies. An increasing number work as independent professionals in a variety of settings -- educational service, production consulting, and publishing. Still others have established themselves as researchers, designers, and producers for innovative media projects.

In recent years, the strength of the program consisted in a systems outlook on instructional design, with three questions paramount:

> How should instructional materials be designed and produced?

How should learning systems involving instructional technology be arranged, managed, and evaluated?

How do education and other social systems change under the impact of new technologies?

These questions remain matters of basic concern within the Program, and within the Department as a whole.

In addition, the extensive development of video as a means of delivering instruction, and its rapid convergence with computing, making it a tool of learning that is more and more interactive and under the independent control of the student, results in new pedagogical situations that educators should explore. To do this well, you should join faculty members and instructors in trying to develop:

A reflective command, based on experience, of video development and production;

A critical concern for the implications of information technologies for aesthetics and social policy;

An abiding curiosity about the educational effects of information technologies in diverse pedagogical settings, formal and informal;

A developing capability to further the emerging linkages between video and computing as educative resources.

Besides qualities such as these, participants in the program share a basic conviction that good design in educative matters starts with careful attention to the needs and characteristics of the students that the design will serve. Thus to the qualities itemized, you should add the most important of them all, the skill to understand the learner, empirically and empathically, so that the design of instructional technology can be more than just technically proficient, but educationally valuable as well.

In all, these qualities summarize the technological humanism we seek through all components of the Department, a technological humanism that combines sophistication in the use of technical means with humane commitments for guiding purposes.

The Climate of Study

> Truth and reason are common to everyone and are no more his who spoke them first than his who speaks them later. It is no more according to Plato than according to me since both he and I equally see and understand it in the same manner. Bees pillage the flowers here and there, but they then make honey of them which is all their own; it is no longer thyme and marjoram; so the fragments borrowed from others he will transform and blend together to make a work that shall be absolutely his own; that is to say, his judgment. His education, labor, and study aim only at forming that.
>
> Michel de Montaigne

Whichever program you emphasize, whichever degree you pursue, do it in the spirit of active study. Graduate work entails creative effort. To exert that, your course of study cannot be planned merely by following instructions. Creative effort means that you create through your own effort, charting with it a path of inquiry and work that is unique to you. Formal requirements are minimal, not in the sense that they are necessarily small and insubstantial, but in the sense that they define minima that we expect you at the very least to meet as you go about mobilizing your creative effort in earning your degree. These minima arise from two sources, general stipulations by the Teachers College faculty and further stipulations by the Departmental faculty, and they will be explained below in the section on Degree Requirements. For now, however, these minima can be ignored in favor of a more important matter.

What counts most is the form or pattern into which you organize work towards any degree, particularly graduate work. Through this form, you will determine the spirit, or climate of study, in which you work. It has four components. The *foundation* of graduate study consists of a selection of courses through which you set for yourself an agenda of sustained inquiry, the scope and depth of which varies according to degree level. The *standards* of graduate study consist in the demonstrations of accomplishment that you make on diverse occasions, large and small, when you submit work for considered evaluation by others. The *resources* of graduate study consist of the faculty and staff with whom you can work and the material assets supporting your inquiries -- equipment, books, and other intellectual tools. The *contributions* of graduate study consist in the lasting works that you carry forward into your ensuing career in the form of studies and projects, proposed and performed, the fruits of your creative effort. With due care for the *foundation*, the *standards*, the *resources*, and the *contributions* of graduate work, your studies

will be well-formed and your ambitions for degrees realized as a matter of course.

We give below a full listing of the available courses for your planning, courses available through the Department, through the College, and through the University. How many courses you need depends on the degree for which you are working and the extent of prior graduate work that you can transfer toward your degree. Lets leave the numerology of point requirements for later and observe something here about the art of choosing courses.

Choosing courses is an art that flourishes when you practice it in the same way that a good researcher pursues fundamental studies: always with an hypothesis actively in mind. Form substantive reasons for taking whatever courses you take; do it by hypothesizing how each will fit within your over-all plan of study. No one can do this hypothesizing for you and you can never be sure beforehand that your hypothesized reason for taking this or that course is correct. Your experience of the course may prove your hypothesis to have been wanting; it may even provoke you to rethink the over-all plan of study you hitherto have held. Be that as it may, by having hypothesized something about what you will get from a course and how you will fit those results into your general effort, you will find yourself with a standpoint that permits you to integrate the course, whether you find it a "good course" or a "bad course," into your unique intellectual enterprise. This guide is designed, not primarily to tell you what courses you *must* take, nor even to recommend what courses you should take; rather it is designed to indicate what courses you might take and to provoke you to form reasons for preferring these and not those as sound choices in your case.

In the course listings that follow the discussion of degree requirements, you will find first the full repertory of courses offered through the Department. Courses for all three programs are there mixed together. You will find them separated in the Teachers College *Bulletin*, should you prefer to consult them that way. We mix them here to encourage you to consider the many ways in which the programs overlap. You earn your degree *through* a program, but you should do it drawing on the full resources of the Department, College, and University. To encourage you further to reach out to the full potentialities available to you, we then include extensive listings of resource courses offered through other departments and components of the University. In important ways, these can provide intellectual supports for advanced work; they can deepen and broaden your command of fruitful methodologies; and they can provide significant insight into the contexts, internal or psychological, on

the one hand, and external or historical, socio-political, on the other.

In the discussion of requirements that follows, we will often refer to the concept of full-time study, yet most of you will be studying part-time by dint of worldly needs. Students often ask what full-time study is. Generally, a full course load, were you to have no other substantial demands on your time other than your studies, is 15 points per semester, usually in the form of five 3-point courses. Sometimes a student will manage to take 18 points in a semester, but usually that will entail your giving one or two courses rather perfunctory attention. Sometimes a full-time student will choose to work at the rate of 12 points per semester, which generally would allow you more opportunity to attend to the connections between courses, something that it is intellectually very fruitful to do.

Part-time study can involve as little as 2 or 3 points per semester. As the full-time student, however, can try too much, so the part-time student risks taking too little when working at a rate of one course a semester. At that rate you may feel you are able to hack it OK, remaining alert, solvent, and happy, but you may find after a while that you are not so much engaging in serious part-time study, as you are in a sort of edifying social recreation. Study should be something that you carry home with you, something that provokes you to break other routines to satisfy your curiosity about this or that, something that now and then leaves you sleepless. To get so involved, you need to take on enough work to create tensions, to insure variety and multiplicity: here you are thinking this and there you are reading that. Then the gap between them itself can become an occasion for reflecting on how the tensions might be reconciled. For this reason, part-time study, when economically feasible, should probably involve at least two courses per semester.

The Requirements for Degrees

> It is but a part of art that can be taught; the artist needs it all. Who knows it half, speaks much, and is always wrong; who knows it wholly, inclines to act, and speaks seldom or late. The former have no secrets and no force: the instruction they can can give is like baked bread, savory and satisfying for a single day; but flour cannot be sown, and seed-corn ought not to be ground. Words are good, but they are not the best. The best is not to be explained by words. The spirit in which we act is the highest matter. Action can be understood and again represented by the spirit alone. No one knows what he is doing while he acts aright; but of what is wrong we are always conscious. Whoever works with symbols only is a pedant, a hypocrite, or a bungler. There are many such, and they like to be together. Their babbling detains the scholar: their obstinate mediocrity vexes even the best. The instruction which the true artist gives opens the mind; for where words fail him, deeds speak. The true scholar learns from the known to unfold the unknown, and approaches more and more to being a master.
>
> Goethe

Statements of requirements evoke more anxiety than they should. Even when requirements mandate what courses you must take, they should not passively determine *your* reasons for taking those courses. The discussion that follows should help you form reasons for wanting to take what it is that you will take. It should should help structure the type and character of your choices. You will find the basic, official statement of requirements on pages 45 through 52 of the 1987/1988 Teachers College *Bulletin*, and for the Ed.D. you should consult the "Requirements for the Degree of Doctor of Education" available through the Office of Doctoral Studies. Consider the following descriptions of requirements, not simply as another statement of what they are, but as an aid for structuring your plans for study in such a way that you can meet requirements with minimal tribulation.

The Master of Arts Degree

Although many students take the M.A. part-time over several years, in original idea, students were to earn it through one academic year of undistracted, full-time course-work, followed by completing a sustained essay or project, taking a month or two for that (i.e. the summer). The M.A. has remained a degree, the requirements for which are primarily course-work, and in general practice an extra 2-point course combined with a special writing requirement has come to displace the formal Master's essay or project as the culminating experience unifying work toward this degree.

Summary of M.A. Requirements: 32 points, total, course credit, selected to meet certain minima:

23 points, minimum, in the Departmental Core and the Program Core;

3 courses, each for at least 2 points, taken outside your major department, amounting to a College Core (please note the official language: "three Teachers College courses outside the student's major department");

0 (zero) points permitted as transfer credit toward the degree.

Submit a Research Paper, either through TU5500, or by doing a sustained project under the direction of a faculty member.

In this Department, the M.A. degree serves two main functions: in part as a mark of entry level professional qualifications in the fields we cover, and in part as a grounding for further, more advanced specialization in the field. With respect to both these functions, it makes sense to lay out a required package of courses that students must take for the M.A. You may, of course, with permission from your advisor, substitute, in view of special circumstances, other courses for one or another of those that are required. Advisors should be, however, parsimonious in agreeing to such exceptions. Remember that requirements stand as minima, including total point requirements. That one *wants* to take this or that course of special interest is not sufficient reason to forego one or another course that is part of the general grounding for further work in the field. Unless you can show that you have, in other ways, mastered that required general grounding, your wanting to take the special course should be accommodated, not through exemption from the requirements, but in your taking it, in addition to the requirements.

In each program, the required courses for the M.A. are grouped under three headings, a Program core, a Departmental core, and a College core. In assigning courses to each category, we do not assert that what we list for each are the only reasonable selections possible, but rather that these are sound selections for each and that it is of substantial importance that everyone working in one or another program and in the Department as a whole share such a common set of intellectual references.

Courses required for the M.A. Programs

College core:	**TK4029.**	**Theories of human cognition and learning (3). Professors Black and Rothkopf.**
	TF4000.	**Education and public policy (3). Professors Cremin and Lagemann.**
	TI4122.	**Probability and statistical inference (3). Professor Monroe or Corter.**
Department core:	**TU5000.**	**Proseminar in communication, computing, and technology (3). Professor Taylor.**
	TU5500.	**Research paper (2 – 1 point each term). Professor White**
	TU4018.	**Design and communication in contemporary culture (3). Professor McClintock.**
	TU4032.	**Cognition and computers (3). Professor Black.**
	TU4083.	**Instructional design of educational technology (3). Professor Seal-Wanner.**
Program core:		
Communication:	**TU4006.**	**Formal analysis of media (3). Professor McClintock.**
	TU4008.	**Telecommunications and education (3). Professor Rothkopf.**
	TU4017.	**Theories of communication and technology (2). Ms. Skupien.**
Computing:	**TU4031.**	**Programming I (3). Professor Taylor and Staff.**
	TU4035.	**Computers as an instructional aid (3). Mr. Budin.**
	TU5031.	**Programming II (4). Professor Taylor and Staff.**
Instructional technology and media:	**TU4008.**	**Telecommunications and education (3). Professor Rothkopf.**
	TU4085.	**New technologies for learning (3). Dr. Nix.**
	TU5186.	**Design of educational video (3). Professor Seal-Wanner.**

Within the requirements structuring what courses will be taken for the M.A., different students will find different ways to give a final, personal coherence to their particular program. Some will look at their M.A. program as a way to deepen and extend their undergraduate work; some will look at it as a grounding for a shift in career orientation; some will look at it as a foundation for more advanced work for the Ed.M. and Ed.D. Whichever way you look at it (and there are others in addition to these), you should remember that an M.A. program is relatively limited and concentrated. Hence, you should form goals for study through it that you feel confident you could complete well in one year were you able to work at it full-time, free of any other commitments. The courses selected for the M.A. are selected with such a concentrated commitment in mind.

The Master of Education Degree

Basically, the Ed.M. program assumes two years of full-time study. In comparison to the M.A., this program permits

considerably more thorough mastery of a specialized area of study and a great deal more autonomy of choice with respect to it. You should select your courses with close attention to defining your emerging area of special mastery. The Ed.M. degree should signal, relative to the M.A., a considerable advance toward professional maturity. As a professional credential, it should indicate your readiness, when combined with appropriate experience, to assume positions of responsibility in corporate practice. As an academic credential, it should reflect your ability, not only to mobilize the basic findings of the field on any given topic, but your emerging capacity to contribute creatively to extending those basic findings in the areas of your special interest.

Summary of Ed.M. Requirements: 60 points, total, course credit, selected to meet certain minima:

34 points, minimum, constituting your major, of which 23 points, minimum, should be in the Departmental Core and the Program Core as defined for the M.A. (can be met by appropriate transfer credit);

3 courses, each for at least 2 points, taken outside your major department, amounting to a College Core (please note the official language: "three Teachers College courses outside the student's major department");

30 points, maximum, permitted as transfer credit toward the degree.

Submit a Research Paper, either through TU5500, or by doing a sustained project under the direction of a faculty member.

Pass the Departmental Certification Examination.

Submit a Colloquium Paper, either through TU6600, or by doing a sustained project under the direction of a faculty member.

To earn the Ed.M. degree, you need a minimum of 60 points of credit with at most 30 of those points being transferred from other graduate institutions, provided, of course, they are in substance appropriate components of your degree work. In spirit, the course work for the Ed.M. should consist of 28 points of study beyond the 32 points required for the M.A. Assuming you have completed one of the Departmental M.A. degrees, the main matters to be attended to through your course work for the Ed.M. should be completing your preparation for the Certification Examination and laying a foundation for advanced, specialized research and development activity. If you have not completed

one of the Departmental M.A. degrees, but are instead transferring in with graduate credit from elsewhere, you will need to evaluate the substance of the courses taken elsewhere in relation to the content of the courses prescribed for the M.A. here. Transfer credit can be used to meet the core requirements associated with the M.A. only when there is a substantial overlap in the content covered by the courses required for the M.A. and your courses from other institutions. Insofar as the overlap does not exist, you will need to take the uncovered courses required for the M.A. as part of your work for the Ed.M. If, further, your potential transfer credits are not appropriate grounding for the Certification Examination and for advanced research and development in the field, only a part of what you have taken elsewhere may actually be transferred to your program here. (See *Appendix A: Transfer Credit Worksheets* for a useful aid in making these calculations. Syllabuses for the Teachers College courses are available, most easily through the network on F:\PUBLIC\COURSES, with each syllabus accessible for reading with Microsoft *Word*, calling it up by the course number as the file name and .DOC as the file extension.)

You will find the Certification Examination described more fully below, along with an indication of readings and courses useful in preparing for it. In addition to the Certification Examination, to complete the Ed.M. you should submit a Colloquium Project, which is also discussed below. Both these requirements entail your beginning to de-emphasize courses as the main locus of your degree work and to begin stressing independent projects and the ability to synthesize skills and ideas, bringing what you learn in diverse courses to bear on the particular goals within the field that you want to make central to your professional involvement. On the surface, work for the Ed.M. does not appear to entail much more than the M.A., but in substance, it marks an important transition toward professional autonomy and the level of professional and academic maturity required to excel in completing the Ed.M. is much higher than that required for the M.A.

The Doctor of Education Degree

A doctorate is the highest degree one can earn, the top of the academic ladder. In aspiring to it, one is aspiring to become the peer of the best practitioners of one's field, perhaps at first a bit less experienced than they are, but as fully trained and as fully capable of independent professional self-direction as anyone. To arrive at this condition of full development, one cannot simply fulfill requirements, although various requirements do need to be fulfilled. In addition to that, one needs to develop a center, a

focus, a record, a set of achievements that can be distinctively recognized as one's own.

Summary of Ed.D. Requirements: 90 points, total, course credit, selected to meet certain minima:

54 points, minimum, constituting your major, of which 23 points, minimum, should be in the Departmental Core and the Program Core as defined for the M.A. (can be met by appropriate transfer credit);

3 courses, each for at least 2 points, taken outside your major department, amounting to a College Core (please note the official language: "three Teachers College courses outside the student's major department");

45 points, maximum, permitted as transfer credit toward the degree.

Submit a Research Paper, either through TU5500, or by doing a sustained project under the direction of a faculty member.

Pass the Departmental Certification Examination at the level required for certification as a doctoral candidate (B+ or better).

Submit a Colloquium Paper, either through TU6600, or by doing a sustained project under the direction of a faculty member.

File a Program Plan and Statement of Total Program with the Office of Doctoral Studies.

Design and formally propose through TU7500 a Dissertation Project.

Maintain continuous registration through TU8900.

Complete and defend the Dissertation.

As with the Ed.M., students transferring into the Ed.D. program with a significant number of credits from elsewhere need to assess whether those in substance fulfill the requirements of the M.A. degree, and if they do not, one should include the courses required for the M.A. among those one takes for the Ed.D. (See *Appendix A: Transfer Credit Worksheets* for a useful aid in making these calculations.) Otherwise, formal course work for the Ed.D. should be highly individualized as you, in consultation with your advisor, see your needs best served. Key considerations in making sound choices, of course, involve substantive preparation for the Certification Examination and building up the base of knowledge and the repertory of research and development skills you will need to write an excellent dissertation.

Rather than follow requirements in deciding what your courses for the Ed.D. should be, we expect you to consult with faculty members and other students, to reflect on your strengths and interests, to assess the resources of the University, and from all that to put together a program that reflects your concerns and meets your needs. To structure such a process, there are several College requirements, specifically filing a Program Plan and a Statement of Total Program. The formalities of these are described in the "Requirements for the Degree of Doctor of Education," a booklet that is updated annually available from the Office of Doctoral Studies. You should get the forms, with instructions, that you need to conform with this step also from the Office of Doctoral Studies. Here we will simply say a word or two about the intent embodied in these requirements.

The Program Plan is essentially a tracking instrument, useful to the institution, to your advisers, and to you, as a means of assuring relatively early on, that the plan of studies you have mapped out with your advisor will indeed meet the formal requirements of the degree. No one wants at the very last moment, as you expectantly await the degree, to have to say that you forgot this or that and until its done we can't legally award the degree. The Program Plan establishes a tracking process through which it can be determined well ahead of time that if you do what you propose doing at the time of filing the plan, indeed you will complete the letter of the requirements. You can later change what you planned to do by filing a relatively simple change of program plan form, which will be checked to make sure you remain within the letter of the formal requirements.

If the Program Plan is a means of ensuring formal compliance with the letter of the requirements, the Statement of Total Program, usually done at the same time, should be viewed as your opportunity to articulate the spirit of the unique program you are developing for yourself. How does your work hang together? What provisions are you making to immerse yourself in your field of study in a way that behooves someone aspiring to a doctorate in it? How are you using the resources of the Department, the College, the University, to go beyond minimal requirements, to engage yourself fully in your work? In spirit, the doctorate cannot be earned in small increments that are encapsulated in the interstices of your life. With the Statement of Total Program, you should be able to show how you are concentrating all your activities, or a very large portion of them, and how you are bringing those energies in some coherent fashion to bear upon your doctoral work.

All in all, study leading to the Ed.D. degree, starting without any graduate credits beyond a bachelor's degree, should entail three

years *full-time* work devoted primarily to courses and the certification process, followed by one to two years full-time work on the dissertation. In reality, it almost always takes longer to complete the doctorate because it is difficult to mobilize sufficient resources to support genuine full-time study for such a sustained period.

Other Program Options

Learning Technology and Instructive Communications

In conjunction with the Department of Developmental and Educational Psychology, we now offer a new area of concentration for those students who are interested in human learning, cognition, and the scientific application of psychology to educational programs. The new area is sufficiently flexible to allow either basic or applied focus. Students are trained in human learning, cognition, and quantitative experimental methods as well as in research-based applications of modern information processing technology for instructive purposes. Determination to build bridges between laboratory and application, and rich practical experience in the effort, are strengths of the program.

Faculty advisors for the Learning Technology and Instructive Communications concentration are John Black, Ernst Rothkopf, and Joanna Williams. The educational psychology faculty, in addition, includes Lois Bloom, Ann Boehm, John Broughton, Lyn Corno, Antoinette Gentile, Herbert Ginsburg, Ursula Kirk, Deanna Kuhn, and Stephen Peverly. Communication, computing, and technology faculty includes Robert McClintock, Carla Seal-Wanner, Robert P. Taylor, and Mary Alice White, as well as distinguished adjunct faculty from local high technology industries. There are two ways to enter the Learning Technology and Instructive Communications program. One is to apply directly to the Ph.D. program in Educational Psychology. The second is to enter the M.A. program in Educational Psychology or the Ed.M. program in this Department. Whichever way one enters the program, it culminates for those who complete it successfully, in a Ph.D. in Educational Psychology and an Ed.M. in Instructional Technology and Media.

The Rites of Passage through Advance Study

> Art is long, life short, judgment difficult, opportunity transient. To act is easy, to think is hard; to act according to our thought is troublesome. Every beginning is cheerful; the threshold is the place of expectation. The boy stands astonished, his impressions guide him; he learns sportfully, seriousness comes on him by surprise. Imitation is born with us; what should be imitated is not easy to discover. The excellent is rarely found, more rarely valued. The height charms us, the steps to it do not; with the summit in our eye, we love to walk along the plain.
>
> Goethe

Since the Department's programs prepare students for a wide range of professional activities, the program of courses you decide upon should take into account your prior background and experience as well as your personal career goals. Ideally, graduate work bears best fruit when you manage to concentrate your effort in a sustained way without arbitrarily narrowing your horizon of interest. In selecting courses, you should try to provide for several necessary attainments:

- mastering a set of tools for intellectual production, tools such as effective writing common to all specialties, and tools such as computer programming or video production specific to the particular specialty you are studying;

- mastering the core of ideas and information shared in common by all the programs in this Department to the point where, on the one hand, you can bring those ideas and information to bear on more specialized work and where, on the other, you can turn your more specialized work into a resource by means of which you can contribute new ideas and information creatively to the common core;

- mastering a substantive specialty, one that will be broad enough that you can have reasonable confidence that by keeping current with it you will continue to possess skills relevant to the world of action, one that is sufficiently well defined that you can aspire, through serious study, to develop the capacity to make genuinely creative contributions to it;

Such intents should inform your selection of course work, a selection you should make in consultation with your major advisor. In addition to course work, students for both the Ed.M. and the Ed.D. degrees should complete the certification process, and those working on the Ed.D. will then need to propose,

develop, and defend a dissertation. Each year the Office of Doctoral Studies makes available a statement of "Requirements for the Degree of Doctor of Education," which you should follow in planning your program. In practice, these requirements resolve into a series of steps or passages, some unfolding over a prolonged period, others happening through a single occasion. The following remarks, describe what we expect of you as you follow these steps in our programs.

Summary of Steps for Completing Degrees

Research paper:	**Required of M.A. candidates. Evaluated by a jury of two. Submit to Shirley Dunlap by Tuesday, October 27, 1987 or Thursday, March 10, 1988, with your name only on the cover page.**
Departmental Colloquium:	**Open to all; required participation by Ed.M. and Ed.D. candidates. Students may register repeatedly for it for 0 points.**
Certification Examination:	**Required of Ed.M. and Ed.D. candidates. Evaluated by a jury of two. Applications to take it, signed by an advisor, are due in the Office of Doctoral Studies by Friday, September 18, 1987; Friday, January 15, 1988; or Friday, June 24, 1988. Examination held October 9&12, 1987; February 5&8, 1988; July 15&18, 1988. Examination has four parts: one on a basic area of knowledge; one on policy issues; one on a domain of application; and one on essential skills in video, computing, and instructional design.**
Colloquium Project:	**Required of Ed.M. and Ed.D. candidates. Evaluated by a jury of two. Submit to Shirley Dunlap by Tuesday, October 27, 1987 or Thursday, March 10, 1988, with your name only on the cover page.**
Program Plan and Statement of Total Program:	**Required of Ed.D. candidates. To be filed with the Office of Doctoral Studies after candidate's advisor has signed forms. To be submitted prior to being certified as a Doctoral Candidate.**
Dissertation Prospectus:	**Required of Ed.D. candidates. Formally presented through TU7500 to a dissertation sponsoring committee of at least two faculty members. Time to be set during a regular academic term by the candidate on consultation with the faculty participants.**
Dissertation Advisement:	**TU8900, required for Ed.D. candidates each regular academic term subsequent to the term in which a prospectus was submitted through TU7500, unless an exemption has been obtained.**
Dissertation Defense:	**Required of Ed.D. candidates. Scheduled during a regular academic term after consultation between candidate and his or her sponsor and other dissertation committee members. The defense committee should have two members, at least one from a different department, in addition to the dissertation committee.**

The Research Paper:

In effect, the Research Paper challenges you to display your ability to write expository prose, really as part of completing your admission to work toward an advanced degree. Submission of the Research Paper is the culminating experience of work for the M.A. and students transferring into the Department working for more advanced degrees should meet this requirement in their first year of work with us.

The Research Paper is a tool-building exercise. If you are confident that you have mastered the tools already, well and good: go off and write the paper, submit it, and put the requirement behind you. But do not be over-confident about your prior mastery of the tools. These are of three sorts:

> Knowing how to use standard tools of reference to map, efficiently and thoroughly, what has been written about a particular topic, to identify what the key points of agreement and disagreement about it are, to perceive who are the most important authorities with respect to it and to understand why they have such importance;
>
> Comprehending how to summarize the various contributions to the matter, giving appropriate weight to all positions of significance with respect to it, independent of your own convictions, and then how to assess those contributions, cogently presenting your reasons for those judgments, making clear your convictions while doing justice to other views;
>
> Mastering how to present your work in clear, efficient prose that conforms to one or another recognized editorial style sheet.

Some students, usually those that enter a program at the M.A. level knowing that the doctorate is their goal and already working closely with a particular faculty member, may want to submit a project write-up as their Research Paper. To do this, you need the permission of a faculty member willing to direct the work, and you need to submit with it a brief description of the context of the work to help in evaluating it appropriately. Students completing the research in this manner will generally take TU4900, Independent study, for 2 points in lieu of TU5500.

If you want to do the Research Paper in the context of a course, you should take TU5500. Starting with the academic year 1987/88, it will meet as a year-long course giving 2 points of credit, one each term, with class sessions meeting five or six

times a term according to the schedule that participants and the instructor agree would be most useful. This course is designed as a helpful context for doing the Research Paper and it is required of M.A. candidates in all programs.

Generally, in writing the Research Paper, you should not try to break novel ground. Instead, you should take a topic of interest, inform yourself fully about it, and then write a critical review of the major contributions to it in clear, coherent prose. In the typical case, in writing the Research Paper, you are called upon to write a review article as that is described in the *Publication Manual of the American Psychological Association*:

> **Review articles** are critical evaluations of material that has already been published. By organizing, integrating, ad evaluating previously published material, the author of a review article considers the progress of current research toward clarifying a problem. In a sense, a review article is tutorial in that the author
>
> * defines and clarifies the problem;
>
> * summarizes previous investigations in order to inform the reader of the state of current research;
>
> * identifies relations, contradictions, gaps, and inconsistencies in the literature; and
>
> * suggests the next step or steps in solving the problem.

Such a literature review is not the required subject of the Research Paper, but it is a safe option should you be uncertain about what to make the Research Paper into.

In the course of doing the Research Paper, you should show that you have mastered the conventions of academic writing. To a certain degree, being at ease in academe is like being at ease in high society -- it comes down simply to knowing where to reach for the coffee cup, what the various forks are for, and what sort of wine goes in what sort of cup to be served with what sort of food. At least with respect to the conventions of academic writing, all of it is not mere convention and prejudice, in the bad sense of the word. The conventions of correct presentation have reasons for being; the prejudices of diction and syntax facilitate intelligent communication between serious researchers. But they do you no good if you have not internalized them. Here are a few helpful sources to guide you while you internalize the techniques of research and the conventions of academic discourse.

Students often ask for sample research papers. The best source of samples is the *Review of Educational Research*, a quarterly publication of the American Educational Research Association, which

> publishes critical, integrative reviews of literature bearing on education. It includes reviews and interpretations of substantive and methodological issues. It encourages the submission of research relevant to education from any discipline, such as reviews of research in anthropology, biology, psychology, economics, evaluation, history, humanities, political science, sociology, etc. *RER* does not publish original empirical research unless it extends or provides closure to a broader integrative review. (*RER*, Summer, 1986, Vol. 56, No. 2, p. 263.)

In addition to looking at a broad range of examples, you should start thinking critically about the factors that make some empirical research efforts better than others. For that purpose, reading Part One, Six, and Seven in Fred N. Kerlinger's *Foundations of Behavioral Research* (3rd edition, New York: Hold, Rinehart and Winston, 1986, 3-41, 279-388) should be helpful. As a stimulus to the synthesis of diverse research findings, consult Richard J. Light & David B. Pillemer, *Summing up: The Science of Reviewing Research*. (Cambridge: Harvard University Press, 1984).

With respect to information gathering, a most useful handbook is *Library Use: A Handbook for Psychology* by Jeffrey G. Reed and Pam M. Baxter (Washington: American Psychological Association, 1983). If you are in the least uncertain about knowing how to find your way to through the various repositories of information that may be relevant to your interests, exploit this guide to extracting information from the library. In addition, the Teachers College library has good orientations classes on making full use of its collections, which you should find helpful, not only as a guide to the library, but further as a good introduction to the art of finding the information that you seek. Another somewhat similar aid, one that stresses more the why of various research strategies than the how of information retrieval, is *The Modern Researcher by Jacques Barzun and Henry F. Graff (4th edition, New York: Harcourt Brace Jovanovich, 1985). This* guide will be especially helpful to those whose methods draw more from history and the humanities than from psychology and the social sciences.

For the conventions of clear discourse and clean manuscript preparation, the key help is the American Psychological Association's *Publication Manual* (3rd edition, Washington:

American Psychological Association, 1983). This is an intelligent, usable manual in which the prescribed practices are explained well. You would be wise to get this manual, to read it, and to make the forms and standards of exposition recommended in it second nature in your writing. The other main style manual, in some ways **the** style manual, is *A Manual of Style* by the University of Chicago Press (13th edition, Chicago: The University of Chicago Press, 1982). It will answer most any question that can arise in the preparation of book manuscripts for the printer but it is not very useful for papers, or even theses. Kate L. Turabian's *A Manual for Writers of Term Papers, Theses, and Dissertations* (4th edition, Chicago: The University of Chicago Press, 1973) derives from the 12th edition of the Chicago *Manual of Style* and translates its prescriptions well into forms you can follow in writing papers. It is oriented, however, to the humanities, and it is full with prescriptions but short on explanations. Finally, the Modern Language Association's *MLA Handbook for Writers of Research Papers* (2nd edition, New York: Modern Language Association, 1984) is useful. Pick one of these three -- the APA *Publication Manual*, Turabian, or the *MLA Handbook* -- and master the conventions it sets forth; and unless you have good reason for wanting one of the other two, most students in communication, computing, and technology in education will find it easiest to write most of the time according to the APA *Publication Manual*. If you have good reason for using style specifications other than those of the APA, you should include a brief note indicating what style specifications you are following and why you have chosen these.

A jury of two faculty members will read your Research Paper. The deadline for submission is the official midterm date for each term in the College calendar, Tuesday, October 20, 1987 and Thursday, March 3, 1988, which will allow the papers to be evaluated, with feedback coming to you, by the end of the term. You should turn your paper in to Shirley Dunlap, the Departmental secretary, no later than the day specified, with the paper prepared for blind review with your name appearing only on the title page. Ms. Dunlap will assign numbers to the papers and keep a record of which paper is by whom and then turn the papers over to the jury members, with evaluation sheets, for their assessment of the papers. After all the papers have been read and evaluated by each member of the jury, they will meet and discuss their evaluations, coming to an agreed upon grade for each. A grade of C, "fair achievement, but only minimally acceptable level," or better is required on the Research Paper to complete the M.A. degree. In order to be permitted to pursue work for the Ed.M. or Ed.D. degrees, however, you must earn a B+, "very good, solid achievement expected of most graduate students," or better, on the Research Paper. On having

submitted a Research Paper and being dissatisfied by the grade it earned, you can revise and resubmit the paper once for reevaluation, but not in the same term as it was originally submitted.

The Departmental Colloquium:

A major locus for your advanced work toward certification and beyond should be TU6600, the Departmental Colloquium. Before arranging to take the Certification Examination or to submit a Colloquium Project, you should request permission to begin your participation in the Colloquium. It is of sufficient importance to repeat its write-up.

> Continuous participation required of certified doctoral students; permission required for others. Discussion of critical issues, reading of key works, informal proposal of dissertation topics, presentation of work in progress, conversations with leaders in the field.

This Colloquium should serve as a structure through which advisement can be an ongoing, reciprocal process in which all are involved with ample occasion for interaction with various faculty members about the ways of crafting good dissertations of diverse types, as well as with frequent occasion for learning from your peers in the doctoral process and for passing on to others the fruits of your own intellectual experience. By advisement here, we do not mean the giving of prescriptive answers to queries of procedure, but rather an indirect, exemplified advisement as the knowledge and methods that are the stuff of our learning and interests are put to public use so that others may copy, challenge, or confirm them. What is the style and ethos of the Department to be? This fundamental question will be answered in practice through our mutual capacity to question, criticize, and draw out the ideas and convictions of one another, largely through the Colloquium. There we will collectively set the standards of questioning, the scope of reference, the criteria for judgment that will characterize our common work.

Further, with the coming and going of courses, term by term, one can develop the deceptive feeling that academic work unfolds in endeavors of fifteen weeks or so duration. The actual rhythms of intellectual development are very different, sometimes compressed into a sudden, unexpected insight, and sometimes extended over many months of slow, cumulative effort. Continuous participation in the Colloquium should counter the impression that successful study is a term-by-term happening. Through continuous participation, one can have a stable context against which to measure the moments of sudden insight, and

one can also witness and engage in the longer-term development of work, seeing styles, questions, and concerns surface and take shape over a span of one, two, even more years. Good study needs often to be treated like good wine: a vintage to be aged the right amount of time under favorable conditions.

One last point about the Colloquium should be faced: it is essential. Intellect and innovation draw strength from disagreement, criticism, doubt. Yet these conditions cause discomfort and one can easily get into habits of avoiding risk and insulating oneself from criticism. When such habits of self-protection become dominant, institutions of higher learning can become involuted havens from criticism and risk in which rewards accrue to those who avoid evident error. It is tragically too easy to find departments in every university populated with professors and students of immense capacity who have lapsed into such habits of self-protectiveness, withdrawing from debate and criticism, becoming in the process systematically ineffectual. The Colloquium should be our guard and defense against such excessive self-coddling. We have with it a strenuous mutual responsibility: to see that the critical field that each upholds for all is as invigorating as possible.

A committee of advanced students in the Department will run the Colloquium, with the members being invited, from among volunteers, to serve for a year by the faculty, with the new committee taking over during the interim period between Fall and Spring terms. About once every four weeks, perhaps more frequently at times, outside speakers who are doing prominent work in our areas will present and discuss their ideas with the members of the Colloquium. Also every fours weeks or so we should all debate the importance of ambitious new publications or classic works, having identified them far enough ahead of time to read or view them in preparation. Such sessions should usually lead off with three or four brief verbal critiques to be followed by a general discussion of the work. In addition, roughly on the same frequency, advanced doctoral students whose work is drawing to fulfillment, should present it for comment and scrutiny to the group. Finally, from time to time, the Colloquium should function as a kind of plenary Department meeting at which faculty, instructors, and students can join to examine issues of common concern.

The Certification Examination:

If you began work on the Ed.M. since the end of the Spring term 1986, you must complete the Certification Examination, receiving a passing grade, as part of the culminating experience for that degree. Regardless of when you began work for the Ed.D., you

must take the Certification Examination and receive a B+ or better as an overall grade on it in order to be recommended for certification as a doctoral candidate. The examination is given three times a year, July 10, 1987, October 9, 1987, and February 5, 1988. If you want to take the examination using a word processor, you should indicate that to the Departmental Secretary, Ms. Shirley Dunlap, at the time that you formally apply to take the examination. Deadlines for applying are: June 19th, September 18th, and January 15th. You will be asked to identify your examination responses only by an assigned number so that the jury of faculty members assessing the responses can read them without knowing who wrote which answers.

You will be asked to complete four sections of the examination, with at least one and one half hours allotted to each, drawing on the basic literature of Communication, Computing. and Technology in Education, as well as on your general reading, in developing your responses. We will expect your answers to show that you have read broadly in preparing for the examination and that you can synthesize your learning to develop and defend original views in response to general, open-ended questions. Where words like "discuss", "evaluate", "assess", "explain" occur, these mean that we expect your response to integrate thoughtful reflection on the major ideas implicit in the readings, discussion, and other preparation you have undertaken. In addition to developed capacities of synthesis, we will also expect you to demonstrate command of fundamental skills with respect to computing, visual expression, and instructional design. Here is a description of the main parts of the examination, along with suggestions and aids for preparing to take it.

The main day of the examination will be divided into a morning and afternoon session, each lasting three hours. In the morning session, you will have two parts, which will be the same for all students regardless of their program. In essence these require you to show a command of intellectual method and of broad public policy issues. Our aim in these questions especially, although it is true of the other parts of the test as well, is not to establish what you do not know, but to make sure that you have addressed the fundamentals. During the afternoon session you will have up to three hours for the third part, which will involve a question of application in communication, computing, or instructional media, depending on your specialization. The fourth part will take place the following Monday. In it, you will have up to three hours to complete three sections designed to test for a basic understanding of the techniques used in programming, video production, and instructional design.

Question 1: **Part One** of the morning session will be an essay question asking you to review the current literature in a basic intellectual area of your choice, an area such as cognitive science and the psychology of learning, or esthetics and formal criticism, or historical interpretation and hermeneutic critique. These areas and the readings suggested for them are examples. You may, in consultation with your advisor, define your own basic intellectual area through which you want to ground your practical work. As part of your formal application to take the Certification Examination, you should submit a statement in which you identify the area you want to offer and list no more than six basic or representative works that you intend to master in preparing for this question. The specific question will be phrased to elicit a review of the main lines of work in the field, with special attention to weighing the strengths and weaknesses of it for research in communication, computing, or educational technology. Evaluation of this response should assess your mastery of the scholarly literature in question and your insight in estimating its value for a domain of application.

In preparing for this part of the examination, you should first state clearly to yourself what basic intellectual area you want to draw on in your advanced work. Don't vaguely do a bit of this and some of that and expect it to be a good grounding for a strong answer to this question. Once you have decided what area you will use, concentrate your preparation by mastering a few, well-recognized sources. By an intellectual area, we mean a grounding in an identifiable body of scholarship in which there are discernible, characteristic questions that generate inquiry, a repertory of effective methods that people working in the area characteristically use, and a body of theory or favored interpretations that has been generated by applying these methods to the characteristic questions.

In speaking *to* the question, we want you to speak *from* the well-established sources. For example, should you be preparing to review the literature in cognitive science and the psychology of learning, you might seek to map the whole domain with a work such as John R. Anderson, *Cognitive Psychology & Its Implications*. LC 80-14354. (Psychology Ser. Illus. 503p. 08/1980. Hardcover text edition. $22.95. ISBN 0-7167-1197-4. Freeman, W. H., & Company). From there you should go to major contributions that define the field, not in a survey, but in substance. For that, studies such as these are most useful.

> John R. Anderson, *The Architecture of Cognition.* (Cognitive Science Ser.: No. 5. 360p. 03/1986. Paperback text edition. $9.95x. ISBN 0-674-04426-6. Harvard University Press).

Galambos, James A.; Abelson, Robert P. & Black, John B., editors. *Knowledge Structures*. (240p. 09/1986. Hardcover text edition. $36.00. ISBN 0-89859-816-8. Erlbaum, Lawrence, Associates, Incorporated).

Stephen M. Kosslyn, *Image & Mind*. (520p. 03/1986. Paperback text edition. $10.95x. ISBN 0-674-44366-7. Harvard University Press).

Or, were you preparing to review the literature representing historical interpretation and hermeneutic critique, you might begin with Richard E. Palmer's *Hermeneutics: Interpretation Theory in Schleiermacher, Dilthey, Heidegger, & Gadamer*. (LC 68-54885. Studies in Phenomenology & Existential Philosophy. 01/15/1969. $22.95. (ISBN 0-8101-0027-4); Paperback trade edition. $9.95. ISBN 0-8101-0459-8. Northwestern University Press). But, once again, rather than concentrate on surveys, you should then turn to major examples of the form of inquiry in action, to works such as these:

Francis A. Yates, *The Art of Memory*. (LC 66-22770. xvi, 400p. 12/10/1974. Repr. of 1966 ed. Paperback trade edition. $15.00x. ISBN 0-226-95001-8, P615, Phoenix; $30.00x. ISBN 0-226-94999-0. University of Chicago Press).

Elizabeth Eisenstein, *The Printing Press As an Agent of Change*, (2 vols. in 1. LC 77-91083. 852p. 09/1980. Paperback trade edition. $23.95. ISBN 0-521-29955-1. Cambridge University Press).

James R. Beniger, *The Control Revolution: Technological and Economic Origins of the Information Society*. (Illus. 512p. 09/1986. Hardcover text edition. $25.00x. ISBN 0-674-16985-9. Harvard University Press).

Finally, those who, for instance, might intend to base their intellectual method on esthetics and formal criticism might start their preparations with Susanne Langer, *Feeling & Form*. (431p. 01/1977. Paperback text edition. write for info. ISBN 0-02-367500-4, Scribner. Macmillan Publishing Company, Incorporated). This work is not exactly a survey of the area, for such a survey does not currently exist, but it is a good, general statement of the goal of formal criticism. From there, one should consider how various masters and critics use formal criticism in assessing a domain of creation. Good sources for such study include the following:

Sergei Eisenstein, *Film Form*. (LC 49-8349. 279p. 03/19/1969. Repr. of 1949 ed. Paperback trade edition. $8.95. ISBN 0-15-630920-3, Harvester. Harcourt Brace Jovanovich, Incorporated).

Sergei Eisenstein, *The Film Sense*. (LC 47-6064. 288p. 03/19/1969. Repr. of 1947 ed. Paperback trade edition. $6.95. ISBN 0-15-630935-1, Harvester. Harcourt Brace Jovanovich, Incorporated).

Lee R. Bobker, *Elements of Film*. (3rd ed. 302p. 1979. Paperback text edition. $16.95. ISBN 0-15-522096-9, HC. Harcourt Brace Jovanovich, Incorporated).

Arlene Croce, *Going to the Dance*. (LC 81-48110. 07/1982. $20.00. ISBN 0-394-52441-1; Paperback trade edition. $8.95. ISBN 0-394-70826-1. Knopf, Alfred A., Incorporated).

Ada L. Huxtable, *The Tall Building Artistically Reconsidered: The Search for a Skyscraper Style*. (LC 84-42665. 128p. 10/1986. $21.95. ISBN 0-394-53773-4; Paperback trade edition. $12.95. ISBN 0-394-74154-4. Pantheon Books).

This particular list might go on at great length as the field, curiously, exists less in formal doctrines than it does in particular examples. A good summation of the agenda for it will be found, of course, in Marshall McLuhan's *Understanding Media: The Extensions of Man*. (320p. 07/1973. Paperback trade edition. $4.95. ISBN 0-451-62496-3, ME2170, Mentor. New American Library).

Question 2: **Part two** of the morning session will also be required of everyone. It will consist of an essay question asking you to form and explain a reasoned position with respect to a major issue of public policy and technology. The issues will be issues you will need, in the course of your careers, to form intelligent views about. Such questions include these:

How should first amendment guarantees be applied to electronic data?

How should intellectual property rights be protected as the technologies of intellectual activity rapidly change?

How can due attention to public interests be best provided for in television programming?

How can equity of access be achieved in high-tech education?

Evaluation of your response will not assess whether the evaluators agree or disagree with the position you take; rather readers will assess the clarity with which you explain your position and they will weigh the effectiveness with which you marshal reasons and evidence to support that position.

To prepare for this question, there are many sources that you might draw from yet few that are really right on the mark. This is especially true with respect to equity issues surrounding

educational technology. These are often mentioned as matters of great importance, but there is no really thorough, thoughtful study of them. Until this deficiency in the literature is remedied, you will not be asked to write on equity of access to high-tech education. Something in effect similar holds with respect to questions of regulation and the quality of culture and programming. Here the specialized sources are numerous and diverse and the more general sources tend to be tendentious attacks on typical practice or stiff differences of the status quo. This question, also, therefore, will not be asked until the quality of materials for preparing it improves. That does not mean, however, that it is a question that one should ignore in thinking through what one stands for and why one stands for it.

With respect to first amendment questions, the situation is considerably better. The late Ithiel de Sola Pool's *Technologies of Freedom*. (312p. 09/1984. Paperback trade edition. $8.95. ISBN 0-674-87233-9, Belknap Pr. Harvard University Press) is an excellent work, covering a wide range of modern media. Warren Freedman, *The Right of Privacy in the Computer Age* (LC 86-9362. 01/1987. $35.00. ISBN 0-89930-187-8, FRT/, Quorum Books. Greenwood Press) puts more emphasis on the other side of the issue, not the protection of free speech, but that of keeping information about oneself private from those who might use it to control one's behavior.

Likewise, on the issue of intellectual property, one of great importance for education and academic creativity, there is one very good source: the U.S. Congress, Office of Technology Assessment, *Intellectual Property Rights in an Age of Electronics & Information* (LC 86-600522. OTA-CIT-302. Illus.. 316p. Orig.. 04/1986. Paperback trade edition. $15.00. ISBN 0-318-20408-8, S/N 052-003-01036-4. U. S. Government Printing Office). A very interesting case study of the sort of issue that is arising in this area is a two-part article on "Annals of Law: The Betamax Case" by James Lardner in the *New Yorker* (Vol. LXIII, No. 7, April 6, 1987, pp. 45-71, and Vol. LXIII, No. 8, April 13, 1987, pp/ 60-81).

Question 3: **Part three**, which will occupy the afternoon session, will consist of an essay question, on which you can have up to three hours to write, that will differ somewhat according to which program you are majoring in.

If you are a student of communication you will be asked to write a survey of a leading domain of communication theory, assessing especially the value of it for clarifying the dynamics of education.

If you are a student of educational technology, you will be asked to write a survey of a leading school of instructional

design, assessing especially its value in the design process for guiding practical efforts to create useful educational technologies.

If you are a computing student, you will be asked to write a survey of an important theoretical development in computer science, assessing especially the promise that this line of development in the field has for substantially influencing education.

In preparing to answer this question, it is important to go to the basic issues and to concentrate your effort. For instance, for communication, you might start with a good general work such as that edited by Raymond Williams, *Contact: Human Communication & Its History* (Illus.. 11/1981. $29.95. ISBN 0-500-01239-3. Thames & Hudson), or the text by Louis Forsdale, *Perspectives on Communication* (Illus.. 320p. 03/1981. Paperback text edition. $13.75. ISBN 0-394-34975-X, RanC. Random House, Incorporated). From there, concentrate on key works like Gregory Bateson's *Steps to an Ecology of Mind* (500p. 12/1986. Repr. of 1972 ed. $25.00x. ISBN 0-87668-950-0. Aronson, Jason, Incorporated) and Marshall McLuhan's *Understanding Media: The Extensions of Man.* (320p. 07/1973. Paperback trade edition. $4.95. ISBN 0-451-62496-3, ME2170, Mentor. New American Library). You might conclude with a synthesis of recent developments in the field like Jeremy Campbell's *Grammatical Man: Information, Entropy, Language & Life* (320p. 09/1983. Paperback trade edition. $8.95. ISBN 0-671-44062-4, Touchstone. Simon & Schuster, Incorporated).

For computing and education, you should study first the basic treatments of how computing relates to education through works such as Robert Taylor's *The Computer in the School: Tutor, Tutee, Tool* (LC 80-36803. 280p. Orig.. 11/1980. Paperback text edition. $15.95x. ISBN 0-8077-2611-7. Columbia University, Teachers College, Teachers College Press) and D. Sleeman & J. S. Brown, editors, *Intelligent Tutoring Systems* (Computers & People Ser.. 11/1985. Paperback trade edition. $19.95. ISBN 0-12-648681-6. Academic Press, Incorporated). From there, go to solid introductory treatments of matters of importance to the future development of computing applications to education with works such as:

Eugene Charniak & Drew McDermott's *Introduction to Artificial Intelligence* (1985. Hardcover text edition. $36.95. ISBN 0-201-11945-5. Addison-Wesley Publishing Company, Incorporated);

Donald A. Norman & Stephen Draper's *User Centered System Design* (New Perspectives on Human-Computer Interaction Ser.. 02/1986. Hardcover text edition. $39.95. ISBN 0-89859-781-1;

Paperback trade edition. $19.95. ISBN 0-89859-872-9. Erlbaum, Lawrence, Associates, Incorporated);

Carroll, John M., editor. *Interfacing Thought: Cognitive Aspects of Human-Computer Interaction.* (Illus.. 320p. 07/1987. $30.00x. ISBN 0-262-03125-6. M I T Press).

C. J. Date's *Database: A User's Guide* (Illus.. 320p. 11/1983. Paperback trade edition. $14.95. ISBN 0-201-11358-9. Addison-Wesley Publishing Company, Incorporated).

J. D. Foley & A. Van Dam, *Fundamentals of Interactive Computer Graphics.* (1982. $43.95. ISBN 0-201-14468-9. Addison-Wesley Publishing Company, Incorporated).

Greg P. Kearsley, ed., *Artificial Intelligence and Instruction: Applications and Methods.* (Illus.. 365p. 1987. ISBN 0-201-11654-5. Addison-Wesley Publishing Company, Incorporated).

Important, basic sources for this question if you are specializing in instructional technology would start with Charles M. Reigeluth, *Instructional Design Theories & Models: An Overview of Their Current Status* (Intro. by Krathwohl, David R. 512p. 1983. Hardcover text edition. $29.95x. ISBN 0-89859-275-5. Erlbaum, Lawrence, Associates, Incorporated) or his more recent, edited volume, *Instructional Theories in Action: Lessons Illustrating Selected Theories* (300p. 04/1987. $27.50. ISBN 0-89859-825-7. Erlbaum, Lawrence, Associates, Incorporated). You should also be well acquainted with the standard works in the area, A. J. Romiszowski's two treatises, *Designing Instructional Systems: Decision-Making in Course Planning & Curriculum Design* (450p. 01/1984. Paperback trade edition. $17.50. ISBN 0-89397-181-2. Nichols Publishing Company) and *Producing Instructional Systems* (286p. 01/1986. Paperback trade edition. $17.95. ISBN 0-89397-244-4. Nichols Publishing Company). Finally, the theory of instructional design should be studied through the work of Robert Gagne, especially his new work, *Instructional Technology: Foundations* (560p. 09/1986. Hardcover text edition. $49.95. ISBN 0-89859-626-2; Paperback trade edition. $24.95. ISBN 0-89859-878-8. Erlbaum, Lawrence, Associates, Incorporated), as well as through his established standards, *Conditions of Learning* (4th ed. 362p. 1985. Hardcover text edition. $28.95. ISBN 0-03-063688-4, HoltC. Holt, Rinehart & Winston, Incorporated) and the basic text with Leslie J. Briggs, *Principles of Instructional Design* (2nd ed. LC 78-27628. 02/1979. Hardcover text edition. $28.95. ISBN 0-03-040806-7, HoltC. Holt, Henry, & Company). In addition, students concentrating on educational technology should be familiar with the learning theories upon which these works are based.

Question 4: **Part four** essentially covers basic skills and it will be given the Monday following the main parts of the test. It will be required of all students and consists of three short components for which you will have about half an hour each.

Through this part, we want to test that you possess the elements of programming, video composition, and instructional design. We are not seeking to establish your virtuosity with any one of these areas. That is something we will discover that you possess, not through a test, but through your performance at concrete projects and tasks. Rather our purpose here is to make sure that you have an elementary, practical knowledge of the production tools used generally in the Department and its programs.

4.1: In the **first** subdivision, you will be given part of an uncommented program written in Pascal (or, upon request, BASIC, LISP, Prolog, C, or Logo) and you will be required to read it, explaining what the program does over-all and commenting on how it works. The aim of this brief question will be to ensure that all our graduates have an elementary practical command of programming concepts. Students who have satisfactorily completed TU4031, **Programming I** should have no difficulty performing adequately on this question. Should you wish to prepare for the questions without specifically taking a course for that purpose, we suggest that working your way through any one of the following should prepare you sufficiently. First off, the text for TU4031 is a text that, with application, you can master alone: R. P. Taylor, *Programming Primer: A Graphic Introduction to Computer Programming with BASIC & Pascal* (LC 81-2209. 1982. $21.95. ISBN 0-201-07400-1. Addison-Wesley Publishing Company, Incorporated). Secondly, one of the most popular microcomputer languages *Turbo Pascal* has a good tutorial volume and disk, *Turbo Tutor*, version 2.0, available from Borland International. LOGO is also a language that one can pick up well, and a useful guide for that is *LOGOWorlds* by Rachelle S. Heller, C. Dianne Martin, & June Wright (LC 84-20002. Computers in Education Ser.. 100p. 02/1985. Paperback trade edition. $19.95. ISBN 0-88175-031-X. Computer Science Press, Incorporated).

4.2: In the **second** subdivision, candidates will view a selected segment of video and asked to answer, in short responses of one to two paragraphs each, a set of questions about the design and production techniques evident in the segment. The aim will be to ensure that all our graduates have a elementary command of the language used for talking about and directing work with video and other visual media. To prepare for this question you should consult one of the basic texts on film or video production, works such as Herbert Zettl's *Television Production Handbook* (4th ed. 624p. 1984. $39.95. Knowledge Industry Publications, Incorporated) or *Today's Video: Equipment, Setup & Production* by Peter Utz (Illus.. 1216p. 01/1987. $49.95. ISBN 0-13-924499-9. Prentice-Hall, Incorporated).

4.3: In the **third** subdivision, candidates will read a section of an instructional manual and then they will be asked to explain what instructional strategies are being followed and to comment on the effectiveness of the presentation. The aim will be to ensure that our graduates can perceive and criticize the instructional design principles embodied in specific applications. To prepare for this question, in addition to the sources that would be used for the instructional technology component of the previous question, you should find a study by Derek Rowntree, *Educational Technology in Curriculum Development* (2nd ed. 296p. 10/1985. Paperback text edition. $16.95x. ISBN 0-8077-2803-9, Dist. Harper & Row. Columbia University, Teachers College, Teachers College Press) and a collection edited by David R. Olson, *Media & Symbols: The Forms of Expression, Communication, & Education* (LC 06-16938. NSSE 73rd Yearbook: Part 1. 560p. 05/1974. Library binding - adult. $10.00x. ISBN 0-226-60114-5. University of Chicago Press) to be very helpful.

The Colloquium Project:

In order to complete requirements for the Ed.M., and to finish requirements for certification as a candidate for the Ed.D., you should present a project through TU6600, **Colloquium in communication, computing, and technology in education.** This project should be on a topic of your choosing, one that represents your interests well, one that allows you to display the specialized skills you have developed. Assume that credentials had never been discovered and people had to rely instead on a compact work, presentable to others in reasonably short time, to evidence the character and level of their intellectual attainments. The Colloquium Project should be the sort of work you would like to be able to present to others, were that assumption true. The Project should be submitted roughly when you have accumulated 60 points toward an Ed.M. or Ed.D. As with the Research Paper and the Certification Examination, a jury of two faculty members will assess the project. You should turn the project in to Shirley

Dunlap by the mid-term date of the Fall or Spring term, with the document clearly identified as a Colloquium Project. Your name should appear only on the title page. The Project will be assessed on a Pass/Fail basis and returned with feedback from the jury.

This project is a major step in the Department's certification process, and a word about what certification means may be worth a great deal of description of the procedures controlling it. In a strict sense, most of the work towards the doctorate is an extended application process, which ends with certification, at which point one becomes a certified candidate for the degree of Doctor of Education. Your work as a certified Ed.D. candidate will consist essentially in proposing, writing, and defending your dissertation. In this sense, certification means that the College has judged you to be fully prepared to initiate and complete a doctoral dissertation. Hence, with the Colloquium Project, a major stage toward certification, you should aim to demonstrate something essential about your readiness to do a dissertation.

A dissertation is a sustained, independent project, based on one or another mix of research and development skills. The Colloquium Project should point toward the dissertation, using those skills in a smaller version, a trial effort, a preliminary essay at the task. The Colloquium Project should demonstrate your readiness to do a dissertation, not by showing that you have a topic all packaged and ready to go, but by showing that you are in productive control of the techniques and styles of work that you will need to use in doing a dissertation of one or another type. To do this, you should consider the types of skills that may be drawn on in developing a dissertation, reflecting on what combination of those will best fit your personal combination of interests, skills, and training. The task you have in choosing a Colloquium Project topic turns on finding the way to display to best advantage, in preliminary microcosm, that combination that suits you.

In carrying out the Colloquium Project, you should do it within certain formal constraints.

> You should prepare a preliminary, one-paragraph statement of your project and secure approval of it from your advisor. You should file the approved topic with the Departmental Secretary by the end of the term prior to the term in which you expect to submit your Project. In preparing this statement of the topic, you should consult with interested students and faculty members so that their suggestions can be incorporated into it.

Whatever research and production skills you draw on in the project, be they video, graphic, controlled experiment, or what have you, central to the paper should be a written text that must not exceed 6000 words in length. It should be presented according to one or another recognized style format, whichever is most appropriate to its tone and spirit, and, in default of a clear choice on this ground, use APA Guidelines.

With all materials supplementary to the written text -- video tapes or computer discs or whatever -- you should explain clearly how you want them used so that the jury can do justice to your work in your absence. A famous thinker once said that in philosophy clarity is courtesy, and this holds equally for those who would use multiple media for presenting their ideas.

You should submit completed projects by the midterm date of each term (October 20, 1987 and March 3, 1988). We require two copies of each, with your name on the cover page only. The work will be returned by the end of the term. If we return your paper with the stipulation that you must make revisions in it, these will be due at the next deadline for submitting Colloquium Projects.

These formal requirements, however, simply provide a structure. The heart of the matter rests with certification, the judgment that you are ready to do a doctoral dissertation. To make this assessment soundly, we need to make positive judgments that your conceptual capacities and technical facilities are sufficient to carry out the sort of work you aim to carry out. The Colloquium Project will not be the sole ground informing our judgment about the sufficiencies of these, but it will be a major occasion by which you can provide us with strong grounds for recommending certification.

The Dissertation Topic:

Certification, our saying in effect that we think you are ready to do a dissertation, leads naturally to the next step, your formal proposing of the dissertation that you will seek to do. You should begin to think about a topic for your dissertation early in your program. A good dissertation topic, whether for a development project or a work of analytical research, should draw from and contribute to an indentifiable literature; it should have a point that can be argued or demonstrated; most of all, it should be at once feasible and demanding, a fit challenge to your capacities. Whatever the topic, you should be sure you have a method, a way of proceeding, the soundness of which you can explain with

reference to the work of recognized authorities and examples. The topic should be something that can hold your interest through trial and tribulation and it should be something that you expect to be able to look back upon with pride from the vantage point of later accomplishments.

Dissertations can be of diverse types and styles. Some options you may want to consider include:

A research study on human cognition, on electronic communication, on the effects selected computer programs can be shown to have on learning, on the results of video guided role-playing on training programs, on the dynamics of non-verbal communication between animals and humans, and the like.

A case study of the development, installation, and implementation of a particular educational or instructional technology, of a system of communication, of a program of computer-assisted learning or interactive video or the like.

An evaluation study of a particular program or set of programs, the development of appropriate evaluation methods, and the testing and validation of their results.

The development of an instructional product such as a textbook for teaching programming, a training video based on reasoned principles of design and an explicit educational strategy, a significant program of computer-assisted instruction or a newly developed item of computer hardware useful in the processes of education, submitted with documentation detailing its development and field testing.

An historical study of the development of a particular program, set of materials, or approach in the field of instructional technology; an historical assessment of how the introduction of new communications systems affected culture or social relations or educational practice or what-have-you.

An esthetic critique of the worth that a genre of film or other form of programming may have in education or training.

A critical analysis of how various capacities are being used in education; in computing, say, electronic mail, drill and practice, or databases; or in instructional technology, say videotex, interactive videodisc, or traditional textbooks.

A content analysis of the materials being generated as a result of the application of technology to education.

A theoretical or philosophical synthesis or analysis dedicated to illuminating the ethical or cultural implications of the ways in which advanced technologies and communication capacities should be implemented in the service of education.

Probably the most important part of writing the dissertation consists in choosing the right topic, one that is within your capacities, one that is worth you effort, one that others will find significant.

The Dissertation Prospectus:

In the Department's parlance, the Colloquium Project, as a part of the certification process, has been uniquely associated with the Colloquium. Increasingly, however, the dissertation prospectus should belong equally in the Colloquium. In it, you should find opportunity to test out preliminary ideas for your dissertation, to float preliminary versions, and most importantly, have the occasion to interact with others about your proposed topic.

Students often ask that one or two dissertations be recommended as models. You should be careful in adopting models, as it can limit your imagination and aspiration. You should use *Dissertation Abstracts* to identify what dissertations have been done in area that interest you and you should get, through the Library or through University Microfilms, those dissertations that seem particularly interesting or important to you. As you study these, try to form a sense of what distinguishes excellent dissertations from average ones in your field. With such distinctions in mind, you will be able to plan what you want to accomplish through your dissertation work.

In addition to reading dissertations of use to you, you should use thesis manuals critically but actively. You should approach your dissertation with *method* in two senses. The first sense is obvious: your work should be grounded with a strong sense of intellectual method, a confident posing of basic questions and the use of sound strategies for answering them. The second sense may not be as obvious, but it is no less important: you should proceed with your work methodically, having thought out what you need to do in order to complete the project, having worked out a plan for performing the various steps, and having provided yourself with the conditions needed for following through with the plan. Thus your dissertation work should be both *methodologically* sound and *methodically* pursued.

To help lay methodical plans in this second sense, you will find aids such as the following helpful.

> Gordon B. Davis & Clyde A. Parker, *Writing the Doctoral Dissertation*. (LC 78-7598. 02/1979. Paperback trade edition. $5.95. ISBN 0-8120-0997-5. Barron's Educational Series, Incorporated).
>
> Joel R. Davitz & Lois L. Davitz, *Evaluating Research Plans in the Behavioral Sciences: A Guide*. (LC 77-20296. 11/1977. Paperback trade edition. $4.95x. ISBN 0-8077-2544-7. Columbia University, Teachers College, Teachers College Press).
>
> David R. Krathwohl, *Social & Behavioral Science Research: A New Framework for Conceptualizing, Implementing, & Evaluating Research Studies*. (LC 84-43028. Social & Behavioral Science Ser.. 05/1985. Hardcover text edition. $28.95x. ISBN 0-87589-637-5. Jossey-Bass, Incorporated, Publishers).

Do not, however, rely passively on such guides. Every genuine problem for research or development has its unique characteristics: to tackle those you cannot slavishly follow a model or prescription, but you must rather create your own strategy that fits the problem, not any problem, but *your* problem.

Dissertation topics should be developed and proposed in accordance with general practices at Teachers College. The essential step in this process is writing your prospectus, defining a precise and manageable topic and explaining your proposed methods for treating it. The prospectus should include:

> A clear statement of the problem.
>
> An explanation of the theoretical grounding for what you seek to accomplish.
>
> A review of previous studies relevant to the problem.
>
> A discussion of the methodology to be used.
>
> An indication of the implications for further research or practice to be generated by the study.
>
> A statement of the limitations of the study.
>
> A definition of essential terms.
>
> A tentative outline of the prospective work.

A tentative schedule for its completion.

A working bibliography.

A statement, if needed, of how the rights of human subjects will be protected.

To get formal approval for your prospectus, you should present it to a committee of two faculty members, one of whom should have agreed to serve as your dissertation sponsor (who may have been but does not need to have been your major advisor). Your sponsor is the person most directly responsible for discussing the nature of the dissertation with you, for assuring that you satisfy all requirements as you are completing it, and for making sure that the dissertation meets the high standards of quality and integrity that Teachers College expects from each student. Once the prospectus is formally approved, then you are largely on your own with the responsibility to conduct and complete your study, consulting with your dissertation committee as you and they see fit.

The Dissertation Defense:

Once completed, you must defend the dissertation before a committee of at least four faculty members, including the two members of your dissertation committee and two outside readers. One member must be from outside the Department of Communication, Computing, and Technology in Education. Your sponsor should ask the additional faculty members to serve on the defense, but once that is done, you are responsible for scheduling a time for the defense when all can serve. You are also responsible for distributing copies of the dissertation to the members of the defense in ample time for them to read it, usually three weeks in advance. Defenses in the Department should be considered public occasions with the time and place posted and a standing invitation to all interested faculty members, instructors, and students to attend. The cumulative content of dissertations done within the Department should become part of the continuing intellectual context of our work.

In preparing for the defense, you may find two booklets useful. The first derives from the Teachers College Committee on the Ed.D. and is available through the Office of Doctoral Studies. It provides the official description of how the defense works and why it is designed to work that way. The same document provides useful instructions on preparing final copies of the work for deposit after the defense and the like, matters which are basically routine if you attend to them early enough yet troublesome if you try to wish them away. You can also get the

second booklet from the Office of Doctoral Studies, a description of procedures pertaining to the defense and submission of Ph.D. dissertation. The regulations set forth in it *do not pertain to the Ed.D.* Nevertheless, the document gives an illuminating explanation of responsibilities and rationales.

A dissertation defense, of course, culminates a long, cumulative process. The anxiety of the moment associated with the defense will inevitably be significant, yet if you have done well with each step leading up to it, the defense should be an interesting experience that you approach with confidence. You will be asked to begin the defense with a short presentation, no more than ten minutes. Don't just summarize your work in this presentation: those listening will have read it. Your opening remarks are your opportunity to set the tone and to steer somewhat the discourse that will follow toward those matters you consider to be most important, interesting, illuminating. There will follow a round of questioning, usually starting with your sponsor.

Each member of the defense committee will have his or her turn to question, but it is not strictly first one then the other, as one or another may interject into the questioning, asking you to elaborate or speak to a related point. In effect, thus, the defense should be a five-way conversation with the initiative in it passing one by one around the table as the chairperson of the defense directs. That process usually takes an hour and a half or so and then you will be asked to leave the room while the committee deliberates, which usually takes five minutes, plus or minus a bit. Then you will be invited back in and you will be informed of the results. No matter how well you do, expect some suggestions about possible improvements.

In preparing for the defense, it is hard to predict what questions will arise and it is not necessarily your best strategy then to try to do so. Anticipating challenging questions is something you should have been doing throughout in developing the dissertation, not simply at the last minute in preparing for the defense. In the defense, the best responses are those in which you think well, in the heat of the occasion, responding clearly, intelligently, to the matters raised. At the end of the defense, what the committee judges is less your performance in the defense, than their assessment of the dissertation as a work. *You prepare the defense in doing the work.* Your sponsor and second dissertation committee member should not let you defend the work if they do not think it is of sufficient quality to be judged acceptable at the conclusion of the defense. If you have chosen a good topic and done the work well, the defense should be an occasion in which you win public recognition for those accomplishments. Work for it now; savor it then.

In sum, you should look at these various steps to advanced study, not as bureaucratic requirements that intrude on the real substance of your work, but as an organizing structure that can help you take full control of your studies. One can take courses endlessly, one, two, three a term with little really significant development taking place. The aim is to become an autonomous professional, one in independent command of a field. One achieves this by pushing oneself through a series of steps, first this and then that, finally to culminate here, each of these steps being accompanied by the anxiety integral to your venturing into new undertakings. If you get too comfortable, confident that the process is old hat, you have probably settled in on a given step too long. Constraints of the workaday world can slow your graduate studies: be careful that they do not stop its movement, especially in the later stages when it is all too easy to postpone getting started on the dissertation until you have "enough" time. Keep moving.

Department Courses

Here is a complete list of Department courses you can expect to be given in the near future and most are slated to be offered during the 1987/1988 academic year. For diverse reasons, last-minute changes occur and you should consult the Department's supplementary listing at registration time. Rooms locations for courses are assigned centrally very shortly before the start of each term and they are posted on a bulletin board on the first floor of Main Hall.

TU4006 **Formal analysis of media** (2-3) Professor McClintock. Introduction to strategies of discerning the infrastructure of various media through descriptive analysis of formal elements and conventions used in shaping those elements into works. Special fee: $25. Spring: Tuesdays, 7:20-9:00 p.m.

TU4008 **Telecommunications and education** (3) Professor Rothkopf. An analytic overview of the use of telecommunications technology for broad educational purposes and for specific instructional applications. Special fee: $25. Fall: Wednesdays, 5:10-6:50 p.m.

TU4010 **The nature of communication** (2-3) Instructor to be announced. A broad, multi-disciplinary survey of contemporary perspectives on communication. Topics include: definitions, models, history of media change, media effects, face-to-face interaction, codification processes, systems theory; intercultural, animal communication; McLuhan. Special fee: $25. Not given 1987/1988.

TU4012 **Film as art: introductory** (2-3) Instructor to be announced. Film as 20th century art, emphasizing form and style. Analysis of feature-length and short films of different nations, styles, themes, and genres. No previous experience of film analysis needed. Special fee: $50. Not given 1987/1988.

TU4016 **The history of communication** (3) Professors McClintock and Moretti. A comprehensive survey of the history of communication, tracing the development of the dominant modes of transmitting knowledge, from speaking to writing, from printing to the electronic media. Special fee: $50. Spring: Mondays, 7:20-9:00 p.m.

Summary of course program -- Fall 1987

Mondays	TU5037.	Human/computer interactions: problems and approaches (3). Professor Black. 3:00-4:40 p.m.
	TU5183.	Designing educational video (3). Professor Seal-Wanner. 3:10-6:50 p.m.
	TK4029.	Theories of human cognition and learning (3). Professors Black and Rothkopf. 5:10-6:50 p.m.
	TU4035.	The computer as an instructional aid (3). Mr. Budin. 5:10-6:50.
	TU4091.	Producing graphic materials in education (2-3). Ms. Heebner. 5:10-6:50 p.m.
	TU5033.	Teaching computing (3). Professor Taylor. 5:10-6:50 p.m.
	TU6031.	Software development (3). Professor Taylor. 5:10-6:50 p.m.
	TU5034.	Teaching programming to children through LOGO (3-4). Ms. Cunniff. 6:00-9:00 p.m.
	TU4018.	Design and communication in modern culture (3). Professor McClintock. 7:20-9:00 p.m.
	TU4030.	Computer applications in education (2-3). Mr. Budin. 7:20-9:00 p.m.
Tuesdays	TU6532.	Seminar in cognitive science (1-3). Professors Black and Corter. 1:00-3:00 p.m.
	TU4031.	Programming I (4). Mr. Casey. 4:40-7:10 p.m.
	TU4032.	Cognition and computers (4). Professor Black. 5:10-6:50 p.m.
	TU5191.	Educational video production I (3-4). Mr. Strange. 5:10-8:00 p.m.
	TU5500.	Research paper (1). Professor White. 5:10-6:50 p.m.
	TU4180.	Computer graphics in education (3). Mr. Carlin. 7:20-9:00 p.m.
Wednesdays	TU4030.	Computer applications in education (2-3). Mr. Budin. 3:00-4:40 p.m.
	TU4031.	Programming I (4). Ms. Follensbee. 4:40 - 7:10 p.m.
	TU5000.	Proseminar in communication, computing, and technology (3). Professor Taylor. 5:10-6:50 p.m.
	TU4008.	Telecommunications and education (3). Professor Rothkopf. 5:10-6:50 p.m.
	TU4083.	Instructional design of educational technology (3). Professor Seal-Wanner. 5:10-6:50.
	TU5018.	Communication in face-to-face interaction (2-3). Ms. Skupien. 7:20-9:00 p.m.
	TU5031.	Programming II (3-4). Ms. Cunniff. 7:20-9:00 p.m.
Thursdays	TU6600.	Colloquium in communication, computing, and technology (0-3). Faculty and staff. 5:10-6:50 p.m.
Saturdays	TU4030.	Computer applications in education (2-3). Professor McClintock. 9:10-10:50 a.m.
Monday/Wednesday	TM4122.	Probability and statistical inference (3). Professor Corter. 5:10-6:50 p.m.
Tuesday/Thursday	TM4122.	Probability and statistical inference (3). Professor Monroe. 11:00-12:40 p.m.
Times to be arranged	TU4900.	Research and independent study (1-6). Faculty and Staff.
	J5200.	Fieldword (1-4). Faculty and Staff.
	TU6200.	Advanced fieldwork (1-6). Faculty and Staff.
	TU6400.	Internship (1-6). Faculty and Staff.
	TU6900.	Research and independent study (1-6). Faculty and Staff.
	TU7500.	Dissertation seminar (1). Faculty and Staff.

TU4017 **Theories of communication and technology** (2-3) Ms. Skupien. An examination of classical and contemporary theories of communication and technology, with special attention to the work of Gregory Bateson and the critical theorists. The impact of information theory and cybernetics on notions of communication and technology. Special fee: $25 Spring: Wednesdays, 7:20-9:00 p.m.

TU4018 **Design and communication in modern culture** (3) Professor McClintock. How have practices of abstract reasoning, the pursuit of formalism, conceptualizing the structure of complex phenomena, affected modern design and communication? That is the question at issue in this course. Readings and class presentations will deal with examples drawn from architecture, fine art, graphics, typography, photography, advertising, industrial design, formal organization, process control, transportation, information theory and management, and major media of communication. Special fee: $25. Fall: Mondays, 7:20-9:00 p.m.

TU4030 **Computer applications in education** (2-3) Three sections each term. Professor McClintock and Mr. Budin. Demonstrations, readings, and hands-on participation introduce students to how computers work, to types of hardware and software, to computing operating systems, and to a range of applications. Students work primarily on the IBM PC. Monday and Wednesday sections stress applications as used in schools; Saturday section stresses applications as used in offices and higher education. Assumes no computing experience. Special fee: $75. Fall and Spring: Mondays, 7:20-9:00 p.m.; Wednesdays, 3:00-4:40 p.m.; Saturdays, 9:10-10:50 a.m.

TU4031 **Programming I** (4) One to two sections each term. Ms. Follansbee and Mr. Casey. Communicating with computers and humans through programs. Uses FPL, a new language designed to clearly introduce fundamental programming concepts, and either BASIC or Pascal or both. Pascal recommended for those continuing on to Programming II. For beginners or experienced programmers. Special fee: $75. Fall: Tuesdays, 4:40-7:10 p.m.; Wednesdays, 4:40-7:10 p.m.; Spring: Mondays, 4:40-7:10 p.m.

Workshops offered -- Fall 1987

TU4805. **Introduction to MS-DOS for educators (0 or 1). Mr. Pino. Saturdays, October 10 and 17, 9:30-3:30 p.m.**

TU4806. **C programming for educators (0 or 1). Mr. Brooks. Saturdays, November 7 and 14, 9:30-3:30 p.m.**

TU4807. **Local area networks for educators (0 or 1). Mr. Pino. Saturdays, November 21 and December 5, 9:30-3:30 p.m.**

TU4821. **Using the computer as a classroom tool (0 or 1). Ms. Cunniff and Mr. Budin. Saturdays, November 7 and 14, 9:30-3:30 p.m.**

TU4824. **Computer coordinator seminar (0 or 1). Professor Taylor, Mr. Budin, and Ms. Cunniff. Fridays, October 9 and 30, November 20, and December 11, 9:00-12:00 a.m.**

TU4032 **Cognition and computers** (4) Professor Black. Ideas about cognition and knowledge representation and how they relate to the use of computers in instruction. The student will select a subject area and learn to represent knowledge from it so that it can be implemented in a computerized instructional system, and will also use knowledge representation to characterize the cognitive prerequisites and consequences of learning to use computers. Section 1. Class (3). Special fee: $25. Fall: Tuesdays, 5:10-6:50 p.m. Section 2. Lab (1). Special fee: $75. Fall: Days and times to be scheduled.

TU4035 **The computer as an instructional aid** (3) Mr. Budin. A presentation of research and issues surrounding the use of computing in schooling. Cognitive and social effects of computers on students investigated and strategies developed for integrating computing into the curriculum. Special fee: $50. Fall: Mondays, 5:10-6:50 p.m.

TU4080 **Video applications in education** (3) Instructor to be announced. Demonstrations, readings, and hands-on participation introduce students to the educational uses of video in a wide variety of learning environments and for a broad range of subject areas. Special fee: $75. Spring: Thursdays, 5:10-6:50 p.m.

TU4083 **Instructional design of educational technology** (3) Professor Seal-Wanner. The nature of instructional technology, systems approaches to planning, managing, and evaluating instructional processes and materials. Emphasis is on instructional deign. Special fee: $75. Fall: Wednesdays, 5:10-6:50 p.m.

TU4085 **New technologies for learning** (2-3) Dr. Nix. A survey of related technologies (microprocessors, videotex, videodisc, print), brief historical review of context, demonstrations, critical discussions of issues in technological transfer, rate, and direction of change in education and training, and differences between potential and probable uses in education and training. Third point includes labs. Special fee: $50. Spring: Wednesdays, 5:10-6:50 p.m.

TU4086 **Text understanding and design** (3) Professor Black. Covers idea about how people understand textual materials and learn from them, then applies these idea to the design of instructional text. Students will design instructional materials for topics of interest to them. Special fee: $25. Spring: Thursdays, 3:00-4:40 p.m.

TU4091 **Producing graphic materials in education** (2-3) Ms. Heebner. Limited enrollment. Production of display and presentation boards, overhead transparencies, filmstrips, slides, audio recordings, synchronized tape/slide presentations. Planning, developing, and producing multi-media instructional packages. No previous graphic experience required. Lab fee: $75. Fall: Mondays, 5:10-6:50 p.m.

TU4180 **Computer graphics in education** (3) Mr. Carlin. Prerequisite: TU4030, TU4031, or the equivalent. Introduces basic types and applications of computer graphics, particularly but not exclusively, in education. Explores various hardware and software systems, provides hands-on experience, and an introduction to graphics programming. Special fee: $75. Fall: Tuesdays, 7:20-9:00 p.m.

TU4181 **Producing multimedia systems** (3) Mr. Carlin. Limited enrollment. Prerequisite: TU4180 or the equivalent. Practical experience developing computer-based, multi-media applications for education. Individual projects required. Special fee: $75. Spring: Tuesdays, 7:20-9:00 p.m.

TU4810 **Conference on human interaction** (0,1) Ms. Skupien. Specialists present current research findings on interaction in institutional and professional settings, using conversation analysis, discourse analysis, and other microanalytic techniques. Non-credit fee: $95.

Summary of course program -- Spring 1988

Mondays	TU5193.	Design and evaluation of experimental educational video (2-3). Professor Seal-Wanner. 3:00-6:50 p.m.
	TU6031.	Seminar on software development (3). Professor Taylor. 5:10-6:50 p.m.
	TU4031.	Programming I (4). Mr. Taylor. 5:10-8:00 p.m.
	TU4016.	The history of communication (3). Professor McClintock and Dr. Moretti. 5:10-6:50 p.m.
	TU5034.	Teaching programming to children through LOGO (3-4). Ms. Cunniff. 6:00-9:00 p.m.
	TF4000.	Education and public policy (3). Professors Cremin and Lageman. 7:20-9:00 p.m.
	TU4030.	Computer applications in education (2-3). Mr. Budin. 7:20-9:00 p.m.
Tuesdays	TU6032.	Seminar in cognitive science (3). Professors Black and Corter. 1:00-3:00 p.m.
	TU5190.	Pre-production of educational video programs (3). Instructors to be announced. 5:10-6:50 p.m.
	TU5192.	Educational video production II (3-4). Mr. Strange. 5:10-8:00 p.m.
	TU5510.	Research paper (1). Professor White. 5:10-6:50 p.m.
	TU4006.	Formal analysis of media (2-3). Professor McClintock. 7:20-9:00.
	TU4181.	Producing multimedia systems (3). Mr. Carlin. 7:20-9:00 p.m.
Wednesdays	TU4030.	Computer applications in education (2-3). Mr. Budin. 3:00-4:40 p.m.
	TU5194.	Models of interactive learning (3-4). Professor Seal-Wanner. 3:00-4:40 p.m.
	TU4085.	New technologies for learning (2-3). Dr. Nix. 5:10-6:50 p.m.
	TU4017.	Theories of communication and technology (2-3). Ms. Skupien. 7:20-9:00 p.m.
	TU5031.	Programming II (3-4). Ms. Cunniff. 7:20-9:00 p.m.
Thursdays	TU4086.	Text understanding and design (3). Professor Black. 3:00-4:40 p.m.
	TU4080.	Video applications in education (3). Instructor to be announced. 5:10-6:50 p.m.
	TU6600.	Colloquium in communication, computing, and technology (0-3). Faculty and staff. 5:10-6:50 p.m.
Saturdays	TU4030.	Computer applications in education (2-3). Professor McClintock. 9:10-10:50 a.m.
Times to be arranged	TU4900.	Research and independent study (1-6). Faculty and Staff.
	TU5200.	Fieldword (1-4). Faculty and Staff.
	TU6200.	Advanced fieldwork (1-6). Faculty and Staff.
	TU6400.	Internship (1-6). Faculty and Staff.
	TU6900.	Research and independent study (1-6). Faculty and Staff.
	TU7500.	Dissertation seminar (1). Faculty and Staff.

TU4900 **Research and independent study** (1-6) Faculty and Staff. Permission required. For Master's students. The participating student will propose a program of independent research or project development to a faculty member. Students in their first term of study are generally not accepted. Conference hours to be arranged.

TU5000 **Proseminar in Communication, Computing, and Technology** (3) Professor Taylor and the Department Faculty. An introduction to the problems and methods of inquiry used by members of the Department. All incoming students must take this course as early in their program as possible. Special fee: $25. Fall: Wednesdays, 5:10-6:50.

TU5018 **Communication in face-to-face interaction** (2-3) Ms. Skupien. An exploration of the complex structure of relatedness among people in interaction and its biological, social, and cultural bases. Special attention paid to methods of analyzing communication behavior. Special fee: $25. Fall: Wednesdays, 7:20-9:00 p.m.

TU5030 **Intelligent computer-assisted instruction** (3) Professor Black. Prerequisite: TU4032. Participants will study ideas about the representation of knowledge, models of the learner and teaching strategies that have been developed in artificial intelligence and cognitive psychology, and they will develop and test intelligent computer-assisted instruction materials for topics of interest to them. Special fee: $75.

TU5031 **Programming II** (3-4) Ms. Cunniff. Prerequisite: TU4031 and beginning knowledge of Pascal. Extension of Programming I. Applies programming to significant problems through team programming projects. Special fee: $75. Fall and Spring: Wednesdays, 7:20-9:00 p.m.

TU5033 **Teaching computing** (3) Professor Taylor. Prerequisite: TU5031. Explores and practices pedagogically sound ways of teaching computing and especially programming to a range of students, including those outside of math and science. Includes limited teaching activities. Special fee: $50. Fall: Mondays, 5:10-6:50 p.m.

TU5034 **Teaching programming to children through LOGO** (3-4) Ms. Cunniff. Permission required. Enrollment limited. Explores alternative methods of helping children learn programming, using the language LOGO as a vehicle for presenting concepts and techniques. Special attention to innovative aspects of teacher/pupil relationship and curricular change associated with a LOGO computing environment. Special fee: $75. Fall and Spring: Mondays, 6:00-9:00 p.m.

TU5037 **Human/computer interactions: problems and approaches** (3) Professor Black. Prerequisite: TU4032. Reviews research on problems that people have interacting with computers. Applications of the research to system design and training in the school, workplace, and home. Special fee: $50. Fall: Mondays, 3:00-4:50 p.m.

TU5161 **Electronic imagery** (2-3) Professor White. Exploration of how imagery and information interact in such media as television, videodisc, videotex, computers, and other graphic media. Examination of the language of imagery in these technologies. Special fee: $50. Not given 1987/1988.

TU5183 **Designing educational video** (3) Professor Seal-Wanner. A practical project course on designing educational video with special attention to how research can be used to make video presentations more effective in the education of children. Special fee: $50. Fall: Mondays, 3:10-6:50.

TU5184 **Instructional design** (3) Professor Seal-Wanner. Development of designs for all types of instructional products. Application of learning theory and heuristics of instructional development at macro level. Special fee: $50.

TU5190 **Pre-Production of Educational Video Programs** (3) Instructor to be announced. Permission required. Prerequisite: TU4006. Concepts and methods for producing, directing, scripting, casting, staging, and designing the sound and lighting for video programs for educational purposes. This course will be taught by four working professional NYC producers/directors. Drawing upon the state-of-the-art experience of these directors in dramatic, documentary, industrial and education production, the course is designed to assist those wishing to produce visual media. Special fee: $50. Spring: Tuesdays, 5:10-6:50 p.m.

TU5191-TU5192 **Educational video production I and II** (3-4) Mr. Strange. Permission required. Prerequisites: TU4006 and TU5190. Practical studio and field production experience of educational video programs, with special concern for realizing educational purposes through directing, scripting, staging, camera operation, lighting, and sound design. Special fee: $100. Fall and Spring: Tuesdays, 5:10-8:00 p.m.

TU5193 **Design and evaluation of experimental educational video** (2-3) Professor Seal-Wanner. Prerequisite: TU5183 or by special permission. For those with some production background who are interested in creating prototype educational video projects to test various teaching strategies. Each year productions focus on a different content area. Students produce experimental video segments and develop formative research instruments to evaluate the effectiveness of their pedagogical approaches. Special fee: $75. Spring: Mondays, 3:00-6:50 p.m.

TU5194 **Models of interactive learning** (3-4) Professor Seal-Wanner. This course will explore the psychological and educational literature on interactivity and learning. What is the role of interactivity in learning and teaching with new educational technologies? What are the key formats and attributes of interactivity with electronic media? These and other questions will be studied by discussing current theory and research and by evaluating state-of-the-art media projects. Special fee: $50. Spring: Wednesdays, 3:00-4:40 p.m.

TU5200 **Fieldwork** (1-4) Faculty and Staff. Permission required. An opportunity for qualified students, individually or in small groups, to develop and pursue projects in schools, community agencies, business organizations, or communication facilities. Students in their first term of study are generally not accepted. Conference hours to be arranged.

TU5500 **Research paper** (2) Professor White. Basic introduction to writing systematic research reviews. Designed to facilitate submission of the Departmental Research Paper. A year-long course that meets for one point each term. Fall and Spring: every third Tuesday, 5:10-6:50 p.m.

TU5510 **Topical seminar** (3) Faculty and Staff. Permission required. Periodically under this number various faculty and staff members will offer courses on important topics in communication, computing, or instructional technology and media, which will be announced at least one semester in advance. Fall and Spring: Topics, Sections, Days, and Times to be announced.

TU5814 **Work conference** (0-2) Faculty and Staff. Permission required. Occasional brief conferences convened from time to time by the department on subjects of special interest.

TU6030 **Software evaluation** (3) Ms. Vollmer. Limited enrollment. Introduces a range of evaluative instruments and techniques and applies them, through student teams, to a number of representative, commercially available instructional software packages. Special fee: $50. Spring: Thursdays, 7:20-9:00 p.m.

TU6031 **Seminar on software development** (3-6) Professor Taylor. Permission required. Team approach to developing computer-based educational software in a variety of academic subjects. Complete modules and systems of software are designed, programmed, tested, and documented. Special fee: $75. Fall and Spring: Mondays, 5:10-6:50 p.m.

TU6532 **Seminar in cognitive science** (1-3) Professors Black and Corter. Permission required. In-depth discussion and critique of research proposed and conducted by others and by students in the class. The topics discussed will vary from term to term. This course is for advanced students who are designing and conducting their own research projects, and these students may take the course as many times as they like. Special fee: $25. Fall and Spring: Tuesdays, 1:00-3:00 p.m.

TU6200 **Advanced fieldwork** (1-6) Faculty and Staff. Permission required. Extended opportunities for students who have completed TU5200.

TU6400 **Internship** (1-6) Faculty and Staff. Permission required. Prerequisite: basic courses in the student's specialization, evidence of competence in internship area, and prior arrangement with cooperating institution. Internship in schools, colleges, Teachers College facilities such as the Microcomputer Resource Center, community agencies, business organizations, communication facilities. Students in their first term of study generally not accepted.

TU6600 **Colloquium in communication, computing, and technology in education** (0-3) Faculty and Staff. Continuous participation required of certified doctoral students; permission required for others. Discussion of critical issues, reading of key works, formal proposal of dissertation topics, presentation of work in progress, conversations with leaders in the field. Special fee: $25. Fall and Spring: Thursdays, 5:10-6:50 p.m.

TU6900 **Research and independent study in communication, computing, and technology in education** (1-6) Faculty and Staff. Permission required. For doctoral students. The participating student will propose a program of independent research or project development to a faculty member. Students in their first term of study are generally not accepted. Conference hours to be arranged.

TU7500 **Dissertation seminar** (1) Faculty. Permission required. Presentation of dissertation proposal for approval by a sponsoring committee. Student arranges one two-hour meeting with his or her sponsoring committee.

TU8900 **Dissertation advisement** (0) Faculty and Staff. Advisement on doctoral dissertations. Fee: equal to 3 points at current tuition rate for each academic year term or summer enrollment. After registering for TU7500, students must register for TU8900 in subsequent terms. Meets with TU6600.

Other Teachers College Courses

All programs in Teachers College have a breadth requirement, which generally entails that you take three courses outside of your department. To meet this requirement we strongly recommend that you take three *particular* courses, not because these are the only possible ones that would be appropriate, but because we think the quality of shared discourse within the Department will gain if all have such courses as common background. This College Core consists of the following:

TK4029 **Theories of human cognition and learning** (3) Professors Rothkopf and Black. Cognitive and information-processing approaches to attention, learning, language, memory, and reasoning. Fall: Mondays, 5:10-6:50 p.m.

TF4000 **Education and public policy** (3) Professors Cremin and Lagemann. Current issues in American educational policy. Spring: Mondays, 7:20-9:00

TM4122 **Probability and statistical inference** (3) Professor Corter or Professor Monroe. Elementary probability theory; random variables and probability distributions; sampling distributions, estimation theory and hypothesis testing using binomial, normal, t, chi square, and F distributions. Fall: Mondays and Wednesdays, 5:10-6:50 p.m. (Corter); Tuesdays and Thursdays, 11:00-12:40 p.m. (Monroe).

In addition to these three courses, many other courses of importance for work within communication, computing, and educational technology are given in diverse departments within Teachers College and diverse schools within the University as a whole. A sample of faculty interests of importance to our programs follows:

In *Developmental and Educational Psychology*, several faculty members have special interests of importance to all

our programs. Lois Bloom does important work using video as a tool of psychological research. Ann E. Boehm has extensive experience participating in the development of computer-based and video-based reading programs. John M. Broughton has conducted imaginative studies of how adults incorporate film and video resources, as well as computers, into their everyday lives. Herbert P. Ginsburg uses video extensively as a research tool and has developed pioneering teacher education tapes from such research resources. Steven T. Peverly specializes in the study of memory, a topic of considerable importance in the design of educational technology. Ernst Z. Rothkopf is Dodge Professor of Telecommunications and most all his courses bear on determining the effectiveness of different instructional means available to educators in schools and industry. Joanna P. Williams studies the psychology of reading with a concern, among other things, to evaluate the relative effectiveness of different media.

In *Social, Organizational, and Counseling Psychology*, Winthrop R. Adkins has done extensive work developing video-based counseling programs and his courses are highly pertinent to understanding the design process in educational technology. R. Gary Bridge teaches research methods courses in which information technologies receive extensive attention. Morton Deutsch is an authority on the psychology of conflict resolution, a problem of great importance in the study of communication.

In *Educational Administration*, Thomas H. Foote teaches courses dealing with management systems with substantial attention to information technologies. In *Higher and Adult Education*, Cynthia S. Johnson studies how organizations, especially educational organizations, can best implement new information systems. In *Special Education*, Jeannette E. Fleischner manages a special program on technology in the education of the handicapped. In *Curriculum and Teaching*, Dorothy S. Strickland has conducted important evaluations of computers in reading instruction. Patrick C. Lee teaches courses devoted to television and children. In *Family and Community Education*, Hope Jensen Leichter has a long-standing research interest in the effects of television on the family. Raymond P. McDermott is a close student of communication dynamics, an authority on the ethno-methodological study of conversational interaction.

In *Mathematics and Science Education*, Bruce R. Vogeli teaches a number of courses on computers, including ones on data structures and fundamental algorithms. Warren E.

Yasso teaches a course on computers in secondary school science. In *The Arts in Education*, Harold F. Abeles teaches a general course on computers and the arts. Both Robert Pace and Lenore M. Pogonowski are developing the use of computers in music education. In *Languages, Literature, and Social Studies in Education*, Jo Anne Kleifgen teaches courses on the use of computers in language instruction and as tools for teaching writing.

With these indications of interests, you should be able to mine the Teachers College course announcements to find courses to enrich virtually any program imaginable within the Department.

As a corporate entity, Teachers College is a separate institution from Columbia University, but academically it is very much a part of the academic whole. As a result, you can treat many courses given elsewhere in the University as part of your major program, should you and your advisor find them appropriate. Many students will find the course offerings of the Department and the College quite sufficiently relevant and more extensive than they can exhaust. Even so, it may prove worth your while to investigate what is being given elsewhere in the University that might whet your interest. Doing that requires a bit of gumption, for Columbia is a highly decentralized institution, and as a result, the big picture is distributed through many separate *Bulletins*, among them the following:

Graduate School of Arts and Sciences: General Announcement;

Columbia Business School;

School of The Arts;

Graduate Program in Public Policy and Administration;

School of Engineering and Applied Science;

School of Library Service;

Graduate School of Journalism.

To get these *Bulletins*, one needs to trek to the admissions offices of the various schools and programs. To make that somewhat less necessary, we include an Appendix which gives a generous selection of what you would find on such a trek.

Faculty and Staff of the Department

It is all persons that make up mankind; all powers taken together that make up the world. These are frequently at variance: as they endeavor to destroy each other, nature holds them together, and again produces them. From the first animal tendency to handicraft attempts, up to the highest practicing of intellectual art; from the inarticulate crowings of the happy infant, up to the polished utterance of the orator and singer; from the first bickerings of boys, up to the vast equipments by which countries are conquered and retained: from the slightest kindliness and the most transitory love, up to the fiercest passion, and the most earnest covenant; from the merest perception of sensible presence, up to the faintest presentiments and hopes of the remotest spiritual future; all this, and much more, also, lies in man, and must be cultivated; yet not in one, but in many. Every potentiality is important and needs its nurture.

Goethe

Winthrop R. Adkins	678-3183	328 Horace Mann
John Black	678-4007	334 Hoarace Mann
James Corter	678-3843	351 Macy
Robert McClintock	678-3734	332 Horace Mann
Ernst Rothkopf	678-3100	938 Thorndike
Carla Seal-Wanner	678-4113	334 Horace Mann
Robert Taylor	678-3839	332 Horace Mann
Mary Alice White	678-3829	329 Horace Mann
Joseph Bowman	678-3807	345 Macy
Howard Budin	678-3773	332 Horace Mann
Terri Bush	678-3341	332 Horace Mann
Timothy Carlin	678-3344	332 Horace Mann
Patrick Casey	678-3740	Microcomputer Resource Center, 5th floor Library
Nancy Cunniff	678-3296	330 Horace Mann
Shirley Dunlap	678-3344	332 Horace Mann
Jean Follansbee	678-3296	330 Horace Mann
Amy Heebner	678-3104	331 Horace Mann
Andrew Hickmott	678-3910	332 Horace Mann
Ellen Meier	678-3098	332 Horace Mann
Marco Mitrani	678-3461	334 Horace Mann
Chris Pino	678-3874	332 Horace Mann
Edward Potoma	678-3344	332 Horace Mann
Janet Skupien	678-3098	332 Horace Mann
Jeffrey Strange	678-4114	334 Horace Mann
Karen Swan	678-3461	334 Horace Mann
Steven Taylor	678-3098	332 Horace Mann
Minh Uchiyama	678-3344	332 Horace Mann
Frank Moretti	212 722-5160	The Dalton School
Donald Nix	914 945-2173	IBM Watson Research Center

Faculty Members

Winthrop R. Adkins

Professor of Psychology and Education, Department of Social, Organizational, and Counseling Psychology; and Director of the R&D Center for Life Skills and Human Resource Development.

A.B., Princeton University, 1955; M.A., Columbia University, 1959; Ph.D, 1963.

Teaching and research interests: development and evaluation of prototypical interactive video programs which illustrate the application of this technology to various problems of learning, teaching, counseling and teacher/counselor training in a variety of subject areas and educational settings. Teaches classes in program design and evaluation, communication skills and counselling competencies, research methods, counselor supervision and the psychology of personal and career development.

Teaching/Research: In 1970, established the Research and Development Center for Life Skills and Human Resource Development. Has produced several comprehensive training programs, most recently the second edition of the "Adkins Life Skills Program: Career Development Series," a comprehensive 10-unit multi-media, video-based, counselling program for helping disadvantaged adults and youth learn psychosocial skills for choosing, finding, getting and keeping a job; the program has been installed in over 300 schools, colleges and learning centers in 30 states.

Was co-founder and developer of a 4.3 million dollar comprehensive and anti- poverty training program designed to develop learning resources for the education of disadvantaged youth. Served as Director of Special Projects, Vocational Service Center for the YMCA. Was a research fellow of the Center for the Study of Personality at Harvard.

Publications: *Adkins Life Skills Program: Career Development Series (2nd edition).* Also producer of 20 video vignettes and discussion guides on topics such as marital conflict, parental discipline, test anxiety, and cultural isolation based on a survey of life coping problems of disadvantaged adults. Publications appear in the *Personnel and Guidance Journal, Junior College Research Review, The Psychotherapy Handbook, and Teaching Psychological Skills: Models for Giving Psychology Away.* Co-author of *Where They Hurt: A Study of the Life Coping Problems of Unemployed Adults.*

John B. Black

Associate Professor of Computing and Education, Department of Communication Computing, and Technology in Education.

B.S., Massachusetts Institute of Technology, 1970; Ph.D., Stanford University, 1979.

Teaching/Research: Human-computer interaction and artificial intelligence. Current research focuses on the organization of narrative information in memory; intelligent computer-assisted instruction; the feasibility of teaching psychology using intelligent computer-assisted instruction and cognitive factors in design.

Is on the editorial board of Discourse Processes: Human-Computer Interaction; Journal of Experimental Psychology: General; Memory and Cognition; and Text. Associate of The Behavioral and Brain Sciences. Was a visiting scientist at Bell Laboratories and the IBM Thomas J. Watson Research Center. Has taught at Yale University and the University of Illinois.

Has received research grants from the International Telephone and Telegraph Corporation; Xerox Corporation (Palo Alto Research Center); National Institute of Mental Health; International Business Machines; and the Office of Naval Research and Army Research Institute.

Publications: Author and co-author of six books and numerous articles published in such journals as *Applied Psycholinguistics, Cognition and Brain Theory, Cognition Psychology, Cognitive Science, International Journal of Man-Machines Systems, Journal of Memory and Language Journal of Verbal Learning and Verbal Behavior, Memory and Cognition*, and *Poetics.*

James E. Corter

Assistant Professor of Psychology and Education; Department of Measurement, Evaluation, and Statistics; Department of communication, Computing, and Technology in Education.

B.A. Psychology, University of North Carolina, 1977; Ph.D. Cognitive Psychology, Stanford University, 1983.

Teaching/Research: Psychometrics, especially clustering and scaling methods; psychology of judgment; categorization; knowledge representation and knowledge transfer for tutoring systems.

Secretary, Classification Society of North America. Other professional affiliations include the Cognitive Science Society, Psychometric Society, Psychonomic Society, Behavioral and

Brain Sciences. Has consulted for a number of organizations, including SRI International, Xerox P.A.R.C., AT&T Bell Labs.

Robert McClintock Professor of History and Education, Chairman, Department of Communication Computing and Technology in Education.

B.A., magna cum laude, Princeton University, 1961; M.A., Columbia University, 1962; Ph.D., with distinction, 1968.

Teaching/Research: Specializes in the history of educational thought with particular interest in the relation between political theory and educational theory. Taught courses on the classical sources of Western educational theory, on major educational and social theorists since the Renaissance, and on technology and education in Western history. Since late 1970's research interests include the cultural effects of the emerging information technologies. Has taught in a special software development program at Teachers College and has given lectures on the humanistic uses of computing in education to a variety of academic groups.

Current research and development interests concern the use of massive storage media such as CD-ROM and videodisc as means by which microcomputers can deliver the full range of intellectual materials needed in the curriculum at various rungs of the academic ladder. This effort involves developing educationally effective user-interfaces that will permit relative novices to manage vast quantities of conceptually complicated information; mobilizing the materials pertinent to an undergraduate communication curriculum; applying the technology to a middle school curriculum; and using it also in republishing extensive collections of historical documents. Has taught at the University of Frankfurt in West Germany, the John Hopkins University, Finch College, and Newark State College.

Publications: Author of *Man and His Circumstances: Ortega as Educator* included by School & Society among "Outstanding Education Books of 1971." His articles and essays have been published in diverse journals, among them *The American Scholar, The New Republic, The Progressive, The Center Magazine*, and *Teachers College Record*, most recently, "Into the Starting Gate: On Computers and the Curriculum," in the Winter 1987 *Teachers College Record*.

Ernst Z. Rothkopf Cleveland E. Dodge Professor of Telecommunications and Education, Teachers College.

A.B., Syracuse University, 1948; M.A., University of Connecticut, 1951; Ph.D., University of Connecticut, 1953.

Teaching/Research: Learning and instructional technology; use of telecommunications technology for broad educational purposes and for specific instructional applications; psychological and practice issues in tailoring teaching to learner capabilities and interests with special emphasis on (1) research problems in adaptive instructional uses of computers and other stable media and (2) critical analysis of relevant psychological conceptions of learning, memory and aptitudes.

Current major projects include: (1) development of a formal macrotheory for instruction and purposive learning; (2) analysis of reading processes through eye movement and time measures; (3) longitudinal study of individual styles in eye movements during reading; (4) experimental studies of the effect of individual's processing capacity on learning from written discourse; 5) experimental studies on how to teach clear writing; (6) assessment of reading demands in practical situations; and (7) studies of context effects in instructional television and computer-based information systems.

Has taught at Rensselaer Polytechnic Institute; University of California, Berkeley; New York University; and Rutgers University.

Publications: Author of *A macrotheory of purposive learning and instruction* and co-author of *Verbal learning research and the technology of written instruction*. Published numerous articles in diverse journals, among them *Journal of Experimental Psychology*, *Educational Technology*, *Journal of Programmed Instruction*, *Journal of Educational Psychology*, *Journal of Verbal Learning and Verbal Behavior*, and *Instructional Science, Cognition and Instruction*.

Carla Seal-Wanner Assistant Professor of Instructional Technology and Media, Department of Communication, Computing, and Technology in Education.

B.A., Hampshire College, 1976; Ed.M., Harvard University, 1977; Ed.D., Harvard University, 1984.

Teaching/Research: Design and production of interactive video and television, especially for children and adolescents; media effects; theory of instructional design. Has worked on several significant projects with WNYC-TV Foundation, most recently as project coordinator for the research and development of a weekend interactive television series, which has been funded for pilot production by the Corporation for Public Broadcasting. Has been a consultant to the Children's Television Workshop, to Interactive Training Systems, Inc., and the New York Commission for Social Justice. Has produced a range of video materials from interactive training resources to TV documentary to special shows for adolescents.

Current interests focus on developing prototype multi-media learning environments to test effective interactive design formats. Several concerns drive these research and development efforts:

the possible gender differences in the response to and use of interactive learning technologies;

the application of new technologies for special education;

the changes in learner expectations regarding the use of new information resources (e.g. video archives) and the presentation of work derived from these new learning tools (video vs. text, linear vs. non-linear presentations);

the reasons for designing aesthetically appealing electronic media.

Publications: "Adolescents and Television News: Why Boys Tune It In and Girls Turn It Off," Ed.D. dissertation, Harvard Graduate School of Education, 1984.

Robert P. Taylor Associate Professor of Computing in Education, Department of Communication, Computing, and Technology in Education.

B.A., Denison University, 1956; M.A. and B.D., University of Chicago, 1959; Ed.D., Teachers College, Columbia University, 1970.

Teaching/Research: The teaching of computer programming; the use of computers in the Social Studies; computer-based computer literacy materials for teacher training; the use of computers in the improvement of writing; development of pre-computer skills in young children; making computing less mysterious to everyman; research on continuing education of practicing programmers. Has developed "FPL" -- a tutorial compiler for students without prior computing experience. FPL is a graphically represented programming language.

Has been active since 1970 in the Association for Computing Machinery (ACM), as an advisor to ACM's SIGCUE (special interest group on computer users in education), as an active participant in ACM's SIGCSE (special interest group on computer science education), and as a taskgroup leader for the ESS (Elementary and Secondary Schools Subcommittee on computing curricula). He is currently active in establishing cooperative efforts between IEEE and ACM on computing and education. In June 1985, he was elected Chair of SIGCUE, to serve for a term of two years.

Founder of graduate program in computing and education at Teachers College in 1975. Has worked with both private and public schools and agencies to integrate computing into the curriculum. Is the director of the newly-funded (June 1985) Center for Intelligent Tools in Education (CITE), a major research center for evaluating and promoting the development of appropriate uses of computing and other high technology to enhance education, particularly at the teacher education level. The major inaugural support for CITE is a $1.2 million grant from IBM.

Publications: Author of *Programming Primer*; editor of *The Computer in the School: Tutor, Tool, Tutee*; co-editor of *Tales of the Marvelous Machine*. Numerous articles published in educational and computing journals, among them "Computerless computing for young children," "Computing competencies for teachers," "The Scarsdale project: integrating computing into the K-12 curriculum," and "Fiction and the education of the systems analyst."

Mary Alice White Professor of Psychology and Education; Director of the Electronic Learning Laboratory, and Professor in the Department of Communication, Computing, and Technology in Education.

B.A., Vassar College, 1941; M.A., Columbia University, 1944; Ph.D., 1948.

Teaching/Research: Imagery and human learning. Served as coordinator for Program in Educational Psychology: Schooling at Teachers College; psychological consultant for the Pelham School System, and Director of the Psychology Department at New York Hospital-Westchester Division.

Numerous professional activities, among them Board of Directors, American Board of Professional Psychology; Chairman, Committee on training and certification, New York

State Psychological Association, School Division; and member of the Board of Directors and Executive Committee for the Joint Commission on Mental Health of Children. Served as editor of "Centerpieces" for the Teachers College Record and Behavioral Educator. In 1974 was recipient of Distinguished Service Award, Division 16, APA.

Publications: Author and editor of *The Future of Electronic Learning* and *What Curriculum for the Information Age*. Co-author of numerous books, among them *The School Psychologist; School Disorder, Intelligence, and Social Class*; *Education: A Conceptual and Empirical Approach*, and *The Parent's Handbook on School Testing*. Numerous articles and essays appear in psychoeducational publications, among them *American Psychologist* and *Journal of Educational Psychology*. Radio and TV interviews include the McNeil-Lehrer Report.

Instructors and Staff

Sherman Alpert Instructor in the Department of Communication, Computing, and Technology in Education; Research Assistant for the Center for Intelligent Tools in Education (CITE).

B.S., Computer Science, State University of New York at Stony Brook, 1974; M.A., Computing in Education, Teachers College, Columbia University, 1987.

Teaching/Research: Artificial Intelligence and its applications to education; Human-computer interaction: cognitive engineering applied to, and cognitive effects of; use of computers for special education populations; use of computer as an intellectual tool; interaction of computers with other media.

Experienced as computer consultant, programmer, and analyst. Clients have included businesses and major United States and international banking institutions.

Professional affiliations include the Institute for Electrical and Electronic Engineers Computer Society, the Council for Exceptional Children, and the American Association for Artificial Intelligence.

Janet Asteroff Fellow, Center for Intelligent Tools in Education and Consultant, Electronic Services Division, Citibank, N.A.

B.A. History, Lehman College, CUNY, 1974; M.A. American History, The University of Wisconsin, Madison, 1975; Ed.M.

Communication, Department of Communication, Computing and Technology, 1986; Ed.D, Communication, Department of Communication, Computing and Technology, 1987.

Teaching/Research: Computer-mediated communication, especially electronic mail; information retrieval; personal communications technologies; the history of technology; electronic technologies and scholarship; the social impact of communication technologies; United States social history.

Consultant, Electronic Services Division, Citibank, N.A.; Consultant and writer for the Diebold Group in electronic technologies and business; Editor, ACM-SIGCUE OUTLOOK.

Scott Bechtold

Research Assistant for the IMELDA project, Center for Intelligent Tools in Education (CITE), and a doctoral student in Instructional Technology, Department of Communication, Computing, and Technology in Education.

B.A., Antioch College, 1981; M.A., Teachers College, Columbia University, 1983.

Teaching/Research: Knowledge representation for educational and informational systems; integration of intelligent database and videodisc technology; applications of computer technology to education in the humanities- particularly to the teaching/learning of history and literature.

Has taught at York College, Hudson County Community College; currently computer teacher to 6-9th grade boys at the Buckley School.

Peter Brooks

Instructor in Computing and Education, Department of Communication, Computing, and Technology in Education.

B.Sc., Californiat Institute of Technology, 1973; M.A., New School for Social Research, 1978.

Teaching/Research: Teaching computer languages and advanced computer techniques; interest in learning processes at the biological level (neuron groups); cellular automata, machine learning and perception.

As President of MicroMind, Inc., develops software for microcomputer programmers, including *RUN/C*, the C Interpreter; *PC?Profiler*; *PC/MAKE*. As founder and vice-president of The Instructor Ste, Inc., provides seminars on '

Language and UNIX programming in the United States and Japan.

Programming experience in C, UNIX shell, BASIC, APL, Fortran, Sail, and a variety of assemblers. Currently organizing the second annual conference for non-profit and social change organizations called "Computers for Social Change," which will be held in June 1987.

Jeanne Buckley Research Assistant and Instructor in Department of Communication, Computing, and Instructional Technology.

B.A. University of Maine, 1973; M.L.S. Simmons College, 1977; M.S. in Instructional Design, Development and Evaluation, Syracuse University, 1986.

Teaching/Research: Design and production of instructional materials including print and multimedia; integration of cognitive science and current instructional design theories, the role of motivation in instruction and learning; gender differences in response to instructional strategies; and film/print criticism.

Background: University media director and instructor; produced numerous educational slide/tape and videotape programs; taught courses on educational media, videotape production, and women and the media. Designed and outfitted university media facilities. Provided consultation services to university faculty on instructional development activities. Film and book reviews carried by *Library Journal, School Library Journal*, and *Salem Press*, a division of Dow Jones Online Book Review Service.

Currently: Research Assistant for Dr. John Black; projects include Learning with Minimal Training (IBM-funded), and Motivation and Cognitive Science.

Professional Affiliations: Association for Educational Communications and Technology, Division of Instructional Development; American educational Research Association; Women in Technology.

Terrill Bush Coordinator, Institute for Learning Technologies

B.A., Alabama College, 1961; M.A., Teachers College, 1967. Doctoral student in Applied Linguistics, Department of Languages and Literature.

Joseph Bowman, Jr.

Instructor in Computing and Education, Department of Communication, Computing, and Technology in Education, and Communications Specialist for the Institute of Urban & Minority Education (IUME).

B.A., State University of New York at Albany, 1972; M.L.S., 1974; M.A., 1974; M.Ed. (Technology and Education), Teachers College, Columbia University, 1983; M.A. (Computing and Education), 1984.

Teaching/Research: Instructional design and implementation of technology training programs in educational and industrial settings. Teaches course in computer applications in education for the Department. Programming experience in Pascal, LOGO, FPL, BASIC; use of the DEC-20 and a wide range of microcomputers. Also teaches TV production through the telecommunications division of IUME and at the Institute of New Cinema Artist under the auspices of Malcolm King College and Fordham University. Presently, Coordinator of CITE/CAMEO Teaching Lab at Teachers College.

Has taught TV production for the Schenectady School district; State University of New York at Albany, and the State Department of Education, Summer Leadership Training Institute. Served as Supervisor of Entertainment for the 1980 Winter Olympic Games. Has been a producer/director of several television and radio programs. Presently is a reporter and photographer for several newspapers and magazines including *Black American Newspaper*, *The Caribbeat*, *The Nation*, *Class Magazine*, *Amsterdam News,* and *The Village Voice.*

Howard R. Budin

Instructor in Computing and Education and Coordinator of the M.A. program in Computing and Education, Department of Communication, Computing, and Technology in Education.

B.A., Columbia University, 1968; M.S., City College, 1975; M.A., Teachers College, 1984.

Teaching/Research: Computer education with emphasis on curriculum design and development. Currently is developing software on map skills for young children, and database software for high school students. Serves as Editor for new Teachers College Press series on using computers in education. Has conducted workshops for publishers, school administrators, computer coordinators and teachers. Has served as a consultant to the New York City Board of Education, schools in southern Westchester County for BOCES.

Publications: Author of *Fun to Program*, (a set of 5 books about programming in BASIC), and co-author of *Using Computers in the Social Studies*, and *Practicing Programming*.

Timothy Carlin

Instructor in Graphics, Department of Communication, Comupting and Technology; Assistant Director, Educational Technology Center, New York Institute of Technology, Old Westbury, New York.

B.A., Rutgers University, 1971; M.A., Teachers College, 1981; M.Ed., 1985; Doctoral Candidate, Program in Instructional Technology and Media.

Teaching/Research: Computer graphics, design and animation systems, production of educational materials. Consultant for AT&T Bell Laboratories on implementing distance education in computer science and engineering at AT&T sites. Consultant on diverse computer graphics projects.

Publications: "Rapid Mass Frame Creation Strategies," IBM Research Division, November 85 ; "Empirical Tests of videotext Way Finding Aids," IBM Research Division, October 1985. Exhibit of "graphic Spinoffs", Hempstead Harbor Art Gallery, Fall 1984.

Nancy Cunniff

Instructor in Computing and Education, Department of Communication, Computing, and Technology in Education; Research Assistant, Center for Intelligent Tools in Education.

B.A., College of St. Elizabeth, 1974; M.Ed., Rutgers University, 1979; M.A., Teachers College, Columbia University, 1984; M.Ed., Teachers College, 1986. Currently doctoral candidate for the Instructional Technology and Media Program, Department of Communication, Computing, and Technology in Education.

Teaching/Research: Teaching computer programming to children and adults; investigation of relationships between learning style and modes of computer/human interaction, especially focusing on the use of graphics; development of thinking skills and problem solving strategies in relationship to computing; currently teaches classes for the Department in beginning and advanced programming.

Extensive programming experience in Pascal, LOGO, FPL, and BASIC on the IBM-PC, DEC-20, and a wide range of other micro-computers. Coordinator of Computer Consortium for the Metropolitan School Study Council. Was Computer Coordinator for a K-8 school district and presently serves as a consultant for school districts in the development of computer use, curriculum

and teacher in-service. Participant in ACM's Computer Human Interaction Doctoral Consortium, 1986.

Publications: Co-author of "Does programming language affect the bugs in novices programs?"(1986) *Proceedings of CHI'86* and "The effect of programming language on conceptual bugs in beginners programs" (1986) in *The Role of Language in Problem Solving 2*. "Learning, Research, and the Graphical Representation of Program" (1986) *Proceedings, Fall Joint Computer Conference.* "The Graphical Representation of Programming: Research with Alternatives for Learners" (1987), presented at NECC '87.

Jean E. Follansbee Instructor in Computing and Education, Department of Communication, Computing, and Technology in Education.

B.S., State University of New York College at Cortland, 1973; M.S., University of Massachusetts, 1977; M.A., Teachers College, Columbia University, 1985. Presently a doctoral candidate of the Instructional Technology and Media Program in the Department of Communication, Computing, and Technology in Education.

Teaching/Research: Use of computer technologies to observe and analyze movement. Teaches beginning and advanced computer programming classes for the Department.

Extensive programming experience in Pascal, LOGO, FPL, C using the DEC-20 and a wide range of micro-computers.

Currently Department Chairman of Physical Education and Director of Aquatics at Barnard College. Holds numerous certifications, among them Water Safety Instructor and Instructor Trainer and Lifeguard Training Instructor and Instructor Trainer. Has taught at City of Boulder Recreation Department, Sullivan County Community College, University of Massachusetts and Jericho Junior Senior High School.

Deborah Greh Research Fellow, Center for Intelligent Tools in Education

B.A. College of St. Elizabeth 1971; M.A. Montclair State College 1978; Ed.M. Teachers College, Columbia University, 1986; Ed.D., Teachers College, Columbia University, 1987.

Teaching/Research: Computer graphics, High School Art Education, Uses of computers in Art education and design, use of graphics in all aspects of education. Workshops on incorporating computers into art curricula. Consultant on establishing computer art center.

Professional Affiliations: National Art Education Association; Editorial Board, *Art Education*; Siggraph, National Computer Graphics Association.

Publications: "Technology and Art", *Electronic Learning*; "Using Computers in Secondary Art Education", and" Art Education in the Third Wave", *Art Education.*

Amy Heebner

Instructor in the Instructional Technology and Media Program, Department of Communication, Computing, and Technology in Education; Research Assistant, Center for Intelligent Tools in Education.

B.F.A., California Institute of the Arts, 1975; M.A., New York University, 1978. Presently a doctoral candidate in the Communication Program in the Department of Communication, Computing, and Technology in Education.

Teaching/Research: Qualitative study of the role of technology in educational settings; aesthetic aspects of media. Current research in collaboration with Teachers College Writing Project, directed by Professor Lucy McCormick Calkins, focuses on staff development methods for integrating computers with the teaching of writing in elementary schools. Teaches classes in "Computers and Writing" and "Producing Graphic Materials in Education" for the department. Has taught in the Communication Arts Department of St. Francis College.

Professional affiliations include the Association for Educational Communications & Technology, National Council of Teachers of English, International Communication Association, American Educational Research Association.

Publications: Presentation on "Computers and Classroom Culture" at New York State English Council, Seminar on Research in Language. Presentations at several conferences sponsored by the Teachers College Writing Project. Essay in *Film as Art*, unpublished anthology of film criticism by Louis Forsdale. Report on videotext project staffing in Final Report: *Rapid Mass Frame Creation Strategies,* IBM Research Division Contract No. 466117.

Andrew J. Hickmott

Systems Programmer, Institute for Learning Technologies.

Teaching/Research: Design and implementation of full-text retrieval system for large educational datqa-bases; system programming for the College-wide LAN currently under development through CITE and the Institute.

Has four years experience as a systems programmer at the Yale Computer Center, working primarily on communications software for VAX/VMS, Unix, and Macintosh systems. Works with a wide variety of languages and operating systems, especially C.

Marco Mitrani Research Assistant and Director of the Usability Laboratory in the Instructional Technology and Media Program, Department of Communication, Computing and Technology.

B.A. Marlboro College, 1971. M.Ed., Keene State College, 1983.

Teaching/Research: Human computer interaction; the role of inference in learning; the formal relationship between aesthetics and cognition. Presently teaching the laboratory for research design.

Experienced in elementary school teaching, teaching and organizing computer instruction for children, teaching job skills to delinquent adolescents, leading group therapy sessions for the children of battered women.

Christopher D. Pino Chief of Systems Development and Instructor in Computing and Education in the Department of Communication, Computing, and Technology in Education.

B.S., Michigan State University, 1974; M.S., Graduate Faculty of The New School for Social Research, 1980. Presently doctoral candidate in Clinical Psychology at Yale University.

Teaching/Research: Interactive multi-media systems; transfer of methods and theory from experimental psychology to clinical psychology and education. Concerned with the measurement of emotion as both a social and psychological process and evaluation of psycho-social and educational intervention. Interests also include computer networking and communication and the development of innovative teaching methods to foster significant computer programs for the classroom.

Publications: Co-author of a series of chapters on the evaluation of psychological services. Wrote *CAVRIDEX*, the first commercial interactive video database system for microcomputers. Co-authored *Tin Can*, a program for Macintosh-IBM Mainframe communication.

Edward Potoma Instructor, Computing and Education

B.S., Manhatten College,1976; M.A., Teachers College, M.Ed.; Doctoral Candidate

Teaching/Research: Interactive Video, Alternative high schools; integrating the computer into instruction.

Presently high school science and computer teacher.

Daniel Schwartz Research Fellow, Center for Intelligent Tools in Education; M.A. Candidate in the Computing and Education Program.

B.A. Swarthmore College, 1979.

Teaching/Research: Has taught a spectrum of grades and subjects in Kenya, inner-city Los Angeles, and and the Alaskan Bush. Research interests include cognitive psychology, psycho-anthropology, artificial intelligence, and the basis of effective simulations. Developmental interests encompass using the cutting edge technologies of powerful micro-computers, programming techniques, and inter-active video disks to create effective simulations and computer based tutors.

Janet Skupien Instructor in the Communication Program, Department of Communication, Computing, and Technology in Education.

B.A., cum laude, Rosary College, Illinois, 1969; M.A., University of Toronto, St. Michael's College, 1972; Ed.M., Teachers College, Columbia University (Communication and Education), 1979; M.Phil., Columbia University, 1985. Presently a Ph.D. candidate in Philosophy/Communication at Teachers College, Columbia University.

Teaching/Research: The study of human social behavior, the theory of communication, the application of information theoretic and cybernetic concepts to issues of human action and learning, and the research program that follows from this. Has organized annual conferences on social and technologically-mediated interaction. Currently initiating development of a multi-media video and computer-based system for teaching and study of original research materials in conversation analysis. Teaches courses in face-to-face interaction, nonverbal dimensions of human communication, conversation analysis, semiotics, and theories of communication and technology.

Has taught at Hunter College of the City University of New York and St. Michael's College, University of Toronto. Was

administrator of the Institute for Nonverbal Communication Research in New York City (1980-81) and research assistant for a multi-media alternative junior high school humanities curriculum (1978-79). Presently serves as an evaluation consultant for New York City Board of Education.

Publications: *Body Movement and Nonverbal Communication: An Annotated Bibliography, 1971-1981*, and *Behavior as Sign*. Journal articles appear in *Semiotics* 1984 and *Kinesis.*

Jeffrey Strange Instructor in the Educational Technology and Media Program, Department of Communication, Computing, and Technology in Education; Research Fellow, Center for Intelligent Tools in Education.

B.A., Phi Beta Kappa, University of Oregon, 1980; M.A., Teachers College, Columbia University, 1984. Presently pursuing a doctorate in Psychology and Communication.

Teaching/Research: Design and development of video, film and videodisc software to bridge gap between formal and non-formal educational settings; study of media systems as they interact with cognition and culture; and international communication. Teaches courses in design and production of educational video and television for the Department.

Experienced in video/film productions, among them scriptwriting for Educational Computing Profile; visual and script research for Heritage: Civilization of the Jews; videography for Finding One's Folklore; and videodisc design for Communication Studies in Anthropology. Has conducted formative evaluation and design for the *Palenque* videodisc at Bank Street College's Center for Children and Technology and led workshops on a variety of information technologies for the U.S. Department of Education. In 1981, recipient of the International Travel Grant for Journalists.

Publications: Co-author of *Microcomputer Communications and Information Retrieval: A Guide for Educators* (in press). Reports for the U.S. Department of Education include: *Video Teleconferencing in the National Diffusion Network: A Formative Evaluation; Interactive Video: An Introduction and Guide for Educators*; and *Computer-based Message Systems*. Has written numerous newspaper and news magazine articles and conducted various interviews on political and cultural issues in the United States and abroad.

Karen Swan

Research Assistant and Instructor, Computing in Education Program, Department of Communication, Computing, and Technology.

B.A., University of Connecticut, 1972; M.Ed., Keene State College, 1983; Ed.M., Teachers College, Columbia University.

Teaching/Research: Cross-contextual transfer of problem solving skills; Tools for manipulating interactive videodisc; Epistemology. Teaches lab course for "Computers and Cognition" and "Teaching Computing to Children thru Logo." Has taught numerous workshops on list manipulation in Logo and interactive videodisc tools.

Experienced elementary school computing teacher, mother, commuter.

ADCIS, Monadnock Area Logo Users, Fairfield County Logo Users.

Marie M. Taylor

Instructor in Computing and Education in the Department of Communication, Computing, and Technology in Education; and Instructor/Research Assistant in the Department of Special Education.

B.A., William Paterson College of New Jersey, 1983; M.A., Teachers College, Columbia University, 1985; Presently a doctoral candidate of the Instructional Technology and Media Program in the Department of Communication, Computing, and Technology in Education.

Teaching/Research: Computer applications, with emphasis on instructional design, for disadvantaged populations particularly the learning disabled and physically handicapped. Teaches classes in computer applications in education for the Department. Computer applications in special education for Department of Special Education and supervises computer aided tutoring program in Special Education.

Has served as a microcomputer and instructional design consultant in a variety of settings including Teachers College and the Educational Products Information Exchange Institute. Interested in research about the use of graphics and artificial speech in the education of learning disabled students, the use of artificial speech as a communication aid for the speech impaired, and use of student produced video in raising the self-concept of the handicapped.

Professional affiliations include the Association of Computer Educators, Association of Computing Machinery, International Council for Computers in Education, and the Council for Exceptional Children, Technology and Media Division; Closing the Gap, and The National Society for the Study of Education.

Publications: Script writer for two editions of *Computing Profile -- a KET Educational TV production.* "Evaluation of Software in Special Education: Where do we go from here?" *The Forum*, Winter 1985.

Steven Taylor Instructor in Computing and Education program; Research Assistant, Center for Intelligent Tools in Education.

B.A., SUNY Oswego, 1979; M.A.T., Manhattanville College, 1983; M.A., M.S., Teachers College, 1985 and 1986. Certified in elementary and special education.

Teaching/Research: Research interests include children's use of information retrieval systems; design of video retrieval systems; design of computer-user interface. Teaching includes computer programming and computer literacy.

Minh Uchiyama Instructor in the Computing and Education Program, Department of Communication, Computing, and Technology in Education.

B.A. and B.M., University of Washington, 1979; M.A., Teachers College, Columbia University, 1984. Presently a doctoral candidate of the Instructional Technology and Media Program, Department of Communication, Computing, and Technology in Education.

Teaching/Research: Computer programming languages and computer literacy. Teaches courses in computer applications in education and programming for the Department.

Experienced in various programming languages, among them BASIC, FPL, LOGO, Pascal and Pilot, and in the use of computer hardware, including the DEC-20, IBM PC/XT and Apple. Has conducted workshops and taught classes on micro- computer applications in education for secondary and university students. Develops software for Apple and IBM personal computers.

Anne M. Vollmer Instructor in the Instructional Technology and Media Program, Department of Communication, Computing, and Technology in Education.

B.A., Mount Saint Mary College, 1969; M.A., Teachers College, Columbia University, 1980; Ed.M, 1981. Presently a doctoral candidate of the Instructional Technology and Media Program, Department of Communication, Computing, and Technology in Education.

Teaching/Research: Computer literacy, software evaluation and integration of software into the school curriculum. Currently teaches software evaluation for the Department. Presently serving as junior high school computer coordinator. Since 1982, has worked with the Educational Products Information Exchange (EPIE) as a trainer for inhouse, school district, and state level software evaluation workshops. Synthesizer and writer for software Pro/Files. Scriptwriter for Educational Computing Profile (KET-TV).

Other computer-related activities include: technical writer of software package user guides for MBG Associates, Connecticut; Coordinator of the Computer Consortium for the Metropolitan Schools Study Council, Teachers College and Consultant to the New York State United Teachers Task Force on Educational Policy.

Publications: Presenter and co-presenter of numerous papers, among them "Microcomputer courseware primer for librarians," "Achieving faculty literacy: some do's and don't's," "Introductory computer experiences with commercially-available software: differences between three-year-olds and five-year-olds," and "Criteria for evaluating and selecting educational software for remediation."

Sophia Wu Teaching Assistant, Program in Technology and Media

B.Ed., Taiwan Normal University,1981; M.S. University of Wisconsin, 1984; Ed.D., Northern Illinois University,1985

Teaching/Research: Educational T.V. design and production, Research on educational T.V.

Irwin Witzel Research Assistant, Department of Communication, Computing, and Technology in Education.

B.A., Illinois Institute of Technology, 1976. Currently pursuing a doctorate in the Computing and Education program, Department of Communication, Computing, and Technology in Education.

Teaching/Research: Intelligent computer-assisted instruction and software design for use in education. Has taught adult education classes in BASIC programming, word processing, and data-base software. Has taught programming to elementary and high-school students (LOGO, FORTRAN, BASIC and Pascal). For the past ten years, has been active in alternative education for minority groups on the Navajo Reservation and in inner-city Chicago, teaching mathematics, photography and computer science.

Adjunct Faculty

Robert J. McCarty Freelance Producer, Director and Writer of Film and Video.

A.B., Princeton.

Teaching/Research: Has been producing, directing and writing films and video since 1960. Productions range from the quest of science to adolescent life styles. Clients include Fortune 500 sponsors (General Motors, AT&T, Xerox, General Electric, Dean Witter Sears, and Panasonic); Adkins Life Skills Program; the Governor of North Carolina and La Mama.

Recipient of numerous awards, among them, *Academy Award Nomination* (short subject); *International Film and TV Festival*; *CINE*; and *Chicago International Film Festival*. Feature films done for *Embassy, Cinema Five, 20th Century Fox*; and a TV pilot for McGraw Lyttle.

Frank Moretti Assistant Headmaster for Curriculum at the Dalton School, New York.

B.A., Bonaventure University, 1965; M.A., Columbia University, 1967; Ph.D, 1983.

Teaching/Research: For the past ten years has worked at program and curriculum development in diverse settings. At Bloomfield College helped design a liberal studies program for educationally disadvantaged students. For five years developed and directed a two year liberal arts program in the NYU School of Continuing Education for students with high aptitudes and low high school achievement. At the Dalton School, works to enrich the curriculum across all levels, K through 12, and is presently involved in a number of collaborations with other institutions, among them, the Metropolitan Museum of Art, the Museum of Natural History, the China Institute, New York University's School of Continuing Education and Graduate School of Education, and Bank Street College of Education.

Publications:

His Ph.D. dissertation on *Pietas and the Pedagogy of Power: Virgil and Agustus* showed how poetry, iconography, and ritual were used as forms of political education in imperial Rome. Currently writing a series of critical essays of the uses of schooling and the curriculum in contemporary culture.

John Nicholas Freelance Director and Writer.

B.A., Fordham University, 1958. Has taken numerous post graduate film and literature courses at Fordham and N.Y.U.

Teaching/Research: Director and writer of many films, videotapes, interactive videodiscs, and multi-media presentations for business and industry. Experienced in supervising the complete production process: from concept development, script, and production budget; through location and studio shooting; to editing and post production completion.

Experienced in a broad range of communication programs: Public Relations, Employee Motivation, Sales, Sports, Theater and TV Shorts, Customer Relations, Employee and Management Training, Recruiting, Education, Community Relations, and TV Commercials.

Clients include AT&T, CBS, Carrier, Control Data, E.I. duPont, Dun & Bradstreet, IBM, National Science Foundation, and various government agencies. Recipient of major awards including Grand Award and Gold and Silver Medals at the International Film and TV Festival of New York; Golden Eagles at the CINE Festival; CHRIS Awards; American Film Festival Awards; and the Chicago International Film Festival Awards.

Donald H. Nix Manager of Exploratory Educational Systems, the IBM Thomas J. Watson Labs in Yorktown Heights.

Ph.D., Columbia University, 1978.

Teaching/Research: Specialist in the psychology of reading comprehension. Developed an artificial language, LINKS, for investigating natural language comprehension. Developed HANDY, a powerful and flexible authoring language for managing multimedia presentations with a microcomputer, which has been developed as a tool of educational research and is being used in diverse developmental projects in a number of schools and universities. His long term goal, for both his software development projects and associated research projects, is to promote equity of cultural access through computing. Research and teaching on the educational potential of multimedia workstations and the user interfaces appropriate for them.

Publications: Research articles in journals such as *Contemporary Educational Psychology*, *Journal of Reading Behavior*, and *Developmental Psychology*. Wrote the *User's Guide to HANDY* and has given numerous presentations on the language throughout the nation and written many scripts for teaching diverse topics with it.

Anthony Rifkin Adjunct Assistant Professor of Computing and Education.

B.A. University of California, Berkeley, 1977; Ph.D., City University of New York, 1986.

Teaching/Research: Cognition and computing. Dissertation on how knowledge is represented for descriptive assertions about objects, that can be adapted to meet the demands of particular contexts. Presently working to develop intelligent tutoring systems based on the above model, and research into coordination of declarative and procedural knowledge, and the implications of the above model for reasoning.

Professional affiliations include the Cognitive Science Society, the American Psychological Association, and the Society for Research in Child Development.

Henry Wexler Research Associate, Institute for Learning Technologies, Teachers College; Principal Investigator, Narcotic and Drug Research, Inc. under NIDA funding; Adjunct Professor, Sociology Department, CUNY Graduate Center.

B.A., Wagner College, 1965; M.A. Yeshiva University, 1967; Ph.D., Yeshiva University, 1975.

Teaching/Research: Drug treatment in prisons; therapeutic strategies for helping substance abusers; computer applications to psychotherapy and substance abuse prevention. Conducts a private practice of individual and group therapy in New York City.

Publications: Member of the editorial board of *The American Journal of Drug and Alcohol Abuse*. Diverse contributions to professional journals such as *The International Journal of the AddictionsPM, The Psychotherapy Bulletin*, *Journal of Psychoactive Drugs*, and to books of readings such as *Therapeutic Communities for Addictions*, edited by G. De Leon and J. T. Ziegenfuss.

Kathleen S. Wilson Research Associate and Media Designer at the Center for Children and Technology, Bank Street College of Education. Instructor in the Department of Communication, Computing, and Technology in Education, Teachers College.

B.A., Middlebury College, Vermont, 1973; M.Ed., Rhode Island College, 1976; Doctoral Candidate, Harvard University Graduate School of Education, Department of Human Development, 1979-present.

Teaching/Research: Director of the Palenque Project at Bank Street's Center for Children and Technology. With support from RCA, is developing an educational prototype for their new DVI system. Responsibilities include designing, producing, and researching an interactive video prototype and pilot for children based on Bank Street's "Second Voyage of the Mimi" television series.

Has worked as a Sony Fellow at Bank Street on the design and development of interactive videodisc prototypes for children. Previously worked for Digital Equipment Corporation on IVIS corseware and surrogate travel and navigation projects.

Resources

Graduate study is a form of action in the world in which the margin between excellence and mediocrity depends on your ability to draw together a full repertory of resources to support your work. These come in diverse forms -- personal energy, critical insight, supportive friends, adequate finances, good tools, serendipitous encounters, demanding teachers, time and a room of one's one, health, bureaucratic services, patience and perseverence, professional organization, well-chosen collections, and a cause, be it social, political, or intellectual. Here are some pointers on available resourses.

Admissions Office	678-3710	146 Horace Mann (Jan Owen)
Audio Visual Services	678-3822	4th Floor Library (Glann Arnold)
Bookstore	678 3920	1224 Amsterdam Avenue (Vincent Porcaro)
Bursar	678-3057	134 Thompson (John Doorly)
CCIMS Microcomputer Center	678-5399	242 Horace Mann (Howard Spivak)
CITE/CAMEO Lab	678-3807	345 Macy (Joseph Bowman)
Cintinuing Education	678-3987	186 Dodge Hall (Philip Fey)
Controller	678-3016	175 Dodge Hall (Victor Mainente)
Dean and Academic Vice Presdient	678-3050	122 Main (Judith Brandenburg)
Associate Dean	678-3052	116 Main (Bill Baldwin)
Disabled Student Services	678-3157	158 Thorndike
Division IV Administrative Office	678-3469	309 Main (Betsy Currier)
Doctoral Studies	678-4058	153 Horace Mann (Howard Chislett)
Duplicating	678-3703	36 Main Hall
Electronics Engineer	678-4073	4th Floor Library (Abdur Raquib)
Emergency	678-3333	28 Main
Facilities	678-3010	28 Main (Ed Monroe)
Foreign Student Advisor	678-3406	138 Horace Mann (Sue Nanka-Bruce)
Housing	678-3235	1st Floor Whittier (Alan Karp)
Information Desk	678-3777	1st loor Main Hall
DEC-20 Systems Programmer	678-3305	241 Horace Mann (Jonathan Intner)
LibraryCirculation	678-3028	1st Floor Library
Library Reference Desk	678-3494	1st Floor Library
Library Reserve Desk	678-3025	1st Floor Library
Lost and Found	678-3334	28 Main
Microcomputer Purchases	678-3302	244 Horace Mann (Howard Spivak)
Microcomputer Resource Center	678-3740	5th Floor Library (Pat Casey)
Personnel Services	678-3175	112 Main Hall (Donald Dean)

Placement	**678-3140**	**44 Morace Mann (John Buckey)**
Purchasing	**678-3136**	**34 Main**
Registrar's Office	**678-4050**	**148 Horace Mann (Roland Rinsland)**
Room Assignments	**678-3707**	**115B Main**
Student Activities	**678-3748**	**116 Main**
Student Aid	**678-3714**	**140 Horace Mann (Nan Haxby)**
Forsdale Video Lab	**678-3359**	**265 Macy (Carl Jones)**
Word Processing	**678-3403**	**34A Main (Rocky Schwarz)**

Financial Aid and other Helps

You will find a good summary of student aid possibilities at the end of the current Teachers College Bulletin. In addition, you can get a small brochure, "Financial Aid for Part-time and Full- time Students", put out by the TC Office of Student Aid. Both give basic information about a variety of aid sources:

Tuition Assistance Awards
Tuition Deferment Plan
Guaranteed Insured Loan Program
National Direct Student Loan
Teachers College General Loan
College Work Study
Employee Tuition Benefits
Tax Deductions
Veterans Benefits
Disability Benefits
The Grants Register
Professional Development Incentive Award
Teachers College General Scholarships
Minority Group Scholarships
Professional Nurse Traineeships
Special Education Traineeships

You can pick up or write for an aid application and instruction packet from the Student Aid Office (140 Horace Mann, Box 309) and we recommend that you seek to make full use of College-wide sources of assistance. Such College-wide sources are not sufficient, however, either to meet your needs or, even before that, to define your needs fully, for these go beyond the problem of mobilizing sufficient financial assistance. What follows will put the matter in a somewhat wider context.

Teachers College schedules most of its courses between five and nine in the evenings, Monday through Thursday, on the assumption that many students work in regular jobs. College-wide the proportion of full-time students is low and decreasing. This is a problem, especially in our Department.

Communication, computing, and technology are time-intensive; to master them you should aim to build up both your stock of knowledge and your repertory of skills. Ideally, most of the study in the Department should be in the form of apprenticeship as we work together, full-time, on substantial research and development projects. Few of our students have the resources to be in residence continuously with the result that teaching and study usually proceed in ways far short of the optimum.

Mobilizing resources to support graduate study in the field is more complex task than simply finding money to pay your tuition and living expenses, although that "simple" task is complex enough. Mobilizing resources is really a question of mobilizing the right amounts and quality of time to engage yourself fully in the matters you seek to study. Doing this does not always mean "full- time study" in the traditional sense -- the right job pursued in the right spirit can be an essential component of your full engagement in your studies while "full-time study" without the right sense of being centered in your endeavor can be most inimical to intellectual engagement. Thus you will need to find the center and make sure that what you do to make your graduate study financially possible is also substantively integral to it so that the sum of your activity holds together.

To help you do this, the faculty members of the Department are committed to generating for you an increasing range of opportunities for remunerative work that will be integral to your studies. Essentially such opportunities are of three types: assistantships in research and development projects, instructorships to teach basic courses in your field, and internships in industry, government, and education. Currently there are about six assistantships for Department students as a result of the grant received recently from IBM, with these assistantships paying a maximum of about $10,000 per year with some benefits and fifteen free course points. About a dozen students hold instructorships offering one or more courses, usually at the rate of $1,250 per course. Another dozen or so students currently hold internships of one sort or another, most of these paying a negligible amount. We aim to improve this range of possibilities systematically, with the greatest possibilities for improvement being in the research and development assistantships and in the external internships. However successful we prove to be in this aim, resources to support your advanced studies will unfortunately remain scarce and dependent largely on your initiative in a competitive environment. To depict the situation differently would be to dissimulate over-optimistically.

Equipment and other Tools

Presently, students in the Department have a reasonably sophisticated technical environment in which to work. We have substantial computing resources. Currently, the Department has a Macintosh SE and 5 Macintosh 512's and an equal number of Apple II's. We maintain a College-wide IBM PC Network with a total of over 80 machines on it, including quite a number situated in the Department: a dozen IBM AT's, 2 XT's, and several PC's. This network uses the Novell 286 Netware as an operating system and it currently has three fileservers on it with over 400 megabytes of storage between them. In addition to linking the machines located in the Department, this network serves a teaching laboratory of 20 IBM XT's and a software development laboratory with 7 IBM AT's, both of which are used heavily in our courses. We are well equipped for videodisk work, possessing Digital's PRO/IVIS System and IBM's experimental authoring system, *Handy*. We have 5 VT220 terminals directly wired to a VAX 11/750 and three DEC VAXStation II's, which are configured for software development in LISP and C. We have an AT-class machine specially configured for desktop publishing, including a Conographic high-resolution monitor.

Through the Institute for Learning Technologies, members of the Department have use of laboratories well equipped for experimental studies of the effectiveness of various computer configurations and user-interfaces. Funded by endowment, gifts and grants, the Institute brings together faculty and students from a broad range of academic backgrounds for work exploring the potentials of electronic technologies, striving always to build structures which will further both excellence and equity. There are currently seven distinct facilities in various stages of development, and these together make an important basis for advanced research and development work:

The Usability Lab. This lab, currently equipped with diverse computer workstations and video equipment, cameras, recorders, monitors and mixers, enables researchers to observe and record how people use different types of hardware and software so that difficulties of use can be understood and usability of designs improved.

The Multimedia Development Lab. This lab, currently equipped with a Handy multimedia system and an IVIS videodisk system, enables researchers to prototype multimedia curricular materials and to study what does and does not seem to work in practice.

The Intelligent Learning Environments Lab. This lab, currently equipped with three MicroVax II systems, a Macintosh development system and several IBM AT's, enables researchers to investigate the educational uses of AI workstations, developing intelligent tutorial programs and studying their strengths and weaknesses in use.

The Human Information Processing Lab. This lab, equipped with specially configured projection and timing equipment, permits controlled observation of how people process complex forms of information, textual, auditory, and visual, and to observe how they respond to it both rationally and emotionally.

The Academic Networking Facility. This facility, consisting of an IBM Series/1 network-serving system and about 12 IBM AT's for courseware development, linked by a PC Network to two microcomputer equipped classrooms, enables interested faculty members to explore and test ways to integrate computers and related peripherals into their courses.

The Software Development Lab. This lab, currently equipped with four IBM ATs, is being used by a group of software developers to implement the introductory programming language FPL and to use it through the CITE/CAMEO microcomputer teaching lab, to study how novices learn to program.

The CD-ROM Development Facility. This facility, soon to be installed, will be equipped with a quality optical character recognition system and a CD-ROM emulation system, run from an IBM AT, and it will enable developers to mobilize the materials requisite for CD-ROM curriculum resources and to implement and test alternative user-interfaces and data structures for those materials.

The Video Production Facility. This facility will provide 3/4 inch editing and finishing resources to projects that can provide their own cameras. In addition, the facility will provide technical advice and assistance to substantive specialists who need good video work but want to concentrate on the academic, not technical, side of their project.

The Center for Computing and Information Management Services (CCIMS), directed by Shirley U. Willig, offers computing support to both academic and adminstrative activities of the College. CCIMS operates and maintains both a mainframe computer, the DEC System-2060, a minicomputer, the VAX 11/750, and a microcomputer facility. The DEC-2060 is a medium-size, general purpose interactive time-sharing machine used by both the academic and administrative areas of the College. The VAX 11/750 is currently dedicated to academic research. CCIMS

Microcomputer Center was set up to expand computing capacity for students and instructional staff.

Students and researchers alike have available a staff of experienced consultants to help computing activities proceed smoothly. Regularly scheduled consulting hours are held to handle routine problems, while problems requiring special attention are handled by appontment. CCIMS staff regularly provide training workshops for faculty, students, and staff. Some of these workshops are sponsored jointly by CCIMS and the Columbia University Center for Computing. Details on all services are available in the CCIMS offices.

CCIMS Mircrocomputer Center is principally equipped with IB< and Apple Macintosh computers. Other manufacturers are represented with individual machines. A local area network connects several of the IBM Computers. To help in the preparation of written documents, an Apple Laserweiter, a Hewlett Packard Laserjet, and several models of dot matrix and letter quality printers are available. A multi-pen plotter is also available to aid in the production of graphs. Communication with the mainframe is provided for the purpose of file transfer. There is a continually expanding collection of software, including word-processing packages, spread sheets, graphics, educational packages, file management tools, and languages such as LOGO, C, Pascal, and BASIC.

The College's DEC-20 configuration includes one and a half megawords of main memory, 1.2 gigabytes of online disk storage, two amgnetic tape drives, a card reader, and a high-speed line printer, and can support 80 interactive terminals. Public terminal rooms are provided for students. In addition of the hardware, the DEC-20 system offers a rich variety of software facilities. The DEC-20 and VAX11/750 are linked via DECnet to Columbia University, Carnegie-Mellon University, Case Western Reserve University, New York University, Stevens Institute of Technology, and Vassare College. Via Bitnet we have links to most colleges and universities throughout the country.

Through CCIMS, students, staff, and faculty members can get excellent prices on a wide range of microcomputer equipment as a result of discount purchasing arrangements with IBM and Apple. You can get a "Guide to Purchasing Microcomputers through CCIMS," along with current price lists, by stopping at the CCIMS offices at 241 Horace Mann (Box 43).

The Milbank Memorial Library contains the largest and richest collection of materials on the educating, psychological and helth

service professions in the world. A major renovation, begun in 1979, is transforming the library's facilities into one of the most technologically advanced education libraries in the nation and doubling its capacity for service and the collection. Exceptionally comprehensive collections deal with all levels of education in the United States, including courses of study and administrative reports of school systems; original documents; historical and contemporary textbooks; early catalogs and histories of academic schools.

Resources are considerable, numbering almost 418,354 volumes of books, bound periodicals, and an extensive collection of non-print materials and media. Current 3periodical title subscriptions amount to almost 3,012 and the reference collection is comprehensive. The library holds the complete set of ERIC mnaterials on microfiche, and has access to more than 200 other data bases, including ERIC, for research in education, and Pasar in psychology, through a Lockheed DIALOG terminal. This academic year the Library added the ERIC CD-ROM, which provides access to the two parts of the ERIC database, the Current Index to Journals in Education (CIJE) and Resources in Education (RIE), for 1981 through September 1986. In the near further the retrospective files covering 1966 through 1980 will be available on two additional compact discs for complete user-searchable access to ERIC vial microcomputer.

Teachers College is one of 59 members in the Research Libraries Group (RLC), which provides access to research material for its constituents through shared resources, supported by an automated information system combining their data bases and computer systems.

The Microcomputer Resource Center in the Milbank Library was established to provide a facility for research in the applications of microcomputers in education and for training personnel in their uses in educational settings. The Center is well equipped with a variety of microcomputers often used in educational applications. A recent development in the MRC is the clustering of 15 PC's with a file server on the College-wide network. This cluster has been designed to help faculty and students have easier access to educational software frequently used in class instruction.

Another facility in the Library is the Learning Technology Services, a center for the production, in many formats, of educational media materials for learning and information purposes. LTS is coposed of three units: Imagery Services, Audio-Visual Services, and Electronic Design and Repair. The facilites include a 3/4 inch color TV studio equipped with three Sony M#A cameras, VHS and 3/4 inch editing, VHS EFP, Amiga,

IBM XT, and Apple microcomputers with associated peripherals for graphics and animation, four track audio production and mixing capability, Hitachi video printer, copy stand and slide copying room, black and white darkroom, clear light multi-image production and display equipment, and C ban satellite reception facilities.

Both CCIMS and Milbank Library run workshops and orientations on using their facilities, services which you should use to make the most of these resources. In addition, as a student at Teachers College you have University-wide library privileges, giving you access to one of the largest, most distinguished university library collections in the country. You can get a very informative booklet, "Columiba University Libraries: An Introduction," by stopping in to Butler Library's information center adjacent to its main entrance.

One further source of useful information: "Getting Started at Teachers College" has a wealth of information about students services, the Morningside Heights area, and some street-sense savvy of the City. You can get a copy from the Office of Student Activities, 116 Main Hall.

> You could not discover the limits of soul, even if you traveled every road to do so; such is the depth of its meaning.
>
> Heraclitus

TC CU CCT

Teachers College/Columbia University
New York, New York 10027

Department of
Communication, Computing, and Technology

Transfer Credit Worksheet: For students starting an Ed.M. or Ed.D. during Summer A, 1987 or later

Name: _____

School from which you are transferring credit: _____

Dates you attended there: _____

Your degree and major there: _____

College Core courses to be met with transfer credit	Course from elsewhere to substitute for it Indicate course ID, title, and number of points
TK4029. Theories of human cognition and learning	
TF4000. Education and public policy	
TI4122. Probability and statistical inference	

Department Core courses to be met with transfer credit	Course from elsewhere to substitute for it Indicate course ID, title, and number of points
TU5000. Proseminar in communication, computing, and technology	
TU5500. Research paper	
TU4018. Design and communication in contemporary culture	
TU4032. Cognition and computers	
TU4083. Instructional design of educational technology	

Communication Core courses to be met with transfer credit	Course from elsewhere to substitute for it Indicate course ID, title, and number of points
TU4006. Formal analysis of media	
TU4008. Telecommunications and education	
TU4017. Theories of communication and technology	

(over)

Computing Core courses to be met with transfer credit	Course from elsewhere to substitute for it Indicate course ID, title, and number of points
TU4031. Programming I	
TU4035. Computers as an instructional aid	
TU5031. Programming II	

Instructional Technology Core courses to be met with transfer credit	Course from elsewhere to substitute for it Indicate course ID, title, and number of points
TU4008. Telecommunications and education	
TU4085. New technologies for learning	
TU5186. Design of educational video	

Courses transferred to major	Indicate course ID, title, and number of points

Electives transferred	Indicate course ID, title, and number of points