NETWORK-BASED HIGHER EDUCATION PROJECT
Humanistic Psychology Institute
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EVOLUTION OF A GRADUATE NETWORK

Thoughts on Appropriate Education for the 1980s

ABSTRACT

Six months of life with a computer conferencing system is discussed in the context of non-campus doctoral programs--a form of education which is energy efficient, information intensive, developing as networks, and lacking community. To illustrate the ability of computer conferencing to create a non-geographical community, a 45 minute session on the Electronic Information Exchange System (EIES) is described and then extended to show the application to external academic communities. Four stages of development are foreseen: community-building (bootstrap), model building (funded project), consortium networking (multiple self-sustaining schools), and metanetworking (large-scale adoption). Initial strategy is focused on bootstrapping a working experiment comprising up to 10 people.

CONTEXT

As we each peer through our personal crystal balls into the 1980s, most of us see an energy-poor future which leads us to the inevitable conclusion that present patterns of energy use must change. Some of us also see another trend in our crystal balls, the explosive growth of information handling and communications capability. While the roots of these two trends are utterly different--finite reserves of fossil-fuels created over millions of years and high technology created over a few decades respectively--they are now significantly interrelated in our design for the future.

In many areas of human life, energy is a problem and information is a solution. This is especially true within education since all education is about the communication of information. Graduate

education is also about generating new information, about educating people who will be primarily responsible for producing new ideas. New ideas--new information--is what the human experience is all about.

The use of energy follows the law of entropy--once used, energy cannot be used again and, when exchanged, a little energy is always lost in the transaction. Not so with information. Information is in many respects the opposite of energy. Norbert Weiner, one of the theoreticians most responsible for the cybernetic revolution, believed that information was formally, mathematically, "negentropy"--"negative entropy."

Kenneth Boulding, a noted economist and pioneer in general systems theory, often uses teaching as an example of the "order-building" nature of information. When teachers teach and students learn, there is no net loss of information in the exchange. When Boulding uses his knowledge in a classroom, it is not then irretrievably lost. Rather than diminishing with use, information increases with use. This growth quality of information is enhanced even further when teachers learn as well as teach and students teach as well as learn.

Most of the energy involved in the process of education is used for indirect support of the institutions of learning. Education in America is based on the industrial model of centralized institutions utilizing cheap energy. It is campuses, not conversations, which require great quantities of energy. It is commuting, not taking courses, which is polluting.

In the last two decades, a new approach to education has emerged. "External degree programs" have sought to provide the communications essence of education without the overhead of campuses or the hidden costs of transportation. Like traditional education, these programs have faculties, administrations, and academic requirements. Unlike traditional education, they do not have resident halls, student unions, sports, clubs, or much in the way of libraries.

The external degree approach to education has been most successful in graduate studies, particularly doctoral programs. Doctoral students, by definition, are on the threshold of making a new contribution to knowledge and are preparing to take their place within the community of working scholars. External degree students tend to be older and many have already established families and careers by the time they are ready to seek advanced degrees.

The philosophy of external degree programs is based on the idea that students are (or can be) independent and self-motivated. External degree students are not isolated from "normal life," but rather must integrate education into an ongoing pattern of personal relationships and work. Indeed, the ability to work while learning is itself a tremendously effective approach to meeting educational costs in this era of escalating tuitions.

By the nature of their goals and format, external degree programs are developing towards a network structure rather than the hierarchic, bureaucratic forms now dominant in education. In contrast to role dependency which predominates in a bureaucracy,

networks are made up of relatively independent members. Networks are decentralized, rather than centralized, and they provide flexible guidance rather than rigid policies. Networks are focused more on relationships than things, and they cohere through shared values rather than through the reward and punishment bonds which tie together hierarchical structures.

Today, student-faculty interactions in external degree networks depend upon the same communications systems which support the rest of society--predominately the postal and telephone services. Periodic meetings, publications, and administrative notices add more channels to this network and enable it to function reasonably well. The process seems to be least effective during the pre-dissertation course-completion phase and most effective during the dissertation-writing phase.

For many students, the great disadvantage of the external degree format is the difficulty of achieving a "sense of community." Ideally, a campus is a common meeting ground for an academic community, fostering formal and informal faculty-student and student-student contact, supporting a forum for the exploration of new ideas. A non-campus model must try other approaches to achieving this intangible but crucial aspect of education.

As presently constituted, using print (publications and mail) and voice (face-to-face and telephone) communications, external degree programs are:

(1) Energy efficient;

(2) Information intensive;

(3) Developing as networks; and

(4) Lacking "community."

COMPUTER-LINKED COMMUNITY

I have tasted a variety of academic communities as a student--ranging from Ivy League (Dartmouth), state-supported (B.A., University of New Hampshire), classic "old world" (M.Litt., Oxford University), and innovative "new world" (Ph.D., Humanistic Psychology Institute)--and have chosen to live a stone's throw from a major supergalaxy in the academic universe (Cambridge/Boston, Massachusetts). All my life I have sought communities of the mind, particularly those coalescing around the vibrant flashes of creative probing into our possible futures. In my experience, such communities are not to be found in any one geographical place, no matter how rich in academic institutions and legend. The frontiers of the mind are dispersed throughout the country and the world.

While researching a book about social change networks, I gathered information on a unique experiment in "computer-conferencing"--the Electronic Information Exchange System, or EIES (pronounced "eyes") for short. Originally supported by National Science Foundation grants, EIES uses telephone links between its computer in New Jersey and typewriter-like terminals in peoples' homes and offices, functioning as a sophisticated "electronic mail"

service. A casual conversation over breakfast with Donald Polkinghorne, president of the Humanistic Psychology Institute (HPI) who was in Boston for a conference, led to a discussion of EIES and its potential for supporting the educational objectives of an external degree program. HPI subsequently sponsored my membership on EIES for an "exploratory" period of eight months.

Forty-Six Minutes on EIES

A typical EIES session begins with a telephone call from my home to the local Telenet node in Boston giving me access to a world-wide data transmission service, my common carrier link to the EIES host computer at the (Newark) New Jersey Institute of Technology. After typing in the NJIT connect code, my EIES membership number, and my secret password, I am greeted by EIES and reminded that I have left myself two reminders, followed by a bulletin announcing that the latest issue of CHIMO is ready (the "electronic newsletter" of the system--"just type +CHIMO for your copy"). Responding "Y" (for yes) to the system's question of whether I wish to see who else is also "on-line" right now, I note that MURRAY (Murray Turoff, the genius behind the system), P+T (EIES facilitators and new friends met through EIES), and TOM/MIKE (old friends now in San Francisco) are among those active at this moment. I also see an intriging new name, CONSCIOUS EVOLUTION, and decide to write myself a short reminder to look up the description in the directory of members and message a hello.

I have entered the world of EIES, a world where "space" means

memory space in the computer and geographical space is irrelevant, a world where time is predominately asynchronous and appointments are rarely necessary.

Completing the on-line list of about a dozen presently active people, EIES then informs me that I have 3 CONFIRMATIONS, 5 PRIVATE MESSAGES, and 2 GROUP MESSAGES. This is the heart of the experience of being in the world of EIES, the connection with other people. "Messages" are the units of communication by which people make contact, share information, stay in touch, conduct their business, and develop friendships. "Confirmations" means that messages I sent earlier have been picked up by the addressees, "private messages" are new notes waiting for me, and "group messages" are missives I receive as a participant in a specific subgroup of EIES. One of the messages is from P+T, explaining some software they have added to our OM ATTUNEMENT GROUP (a private space we share with a few friends on EIES where we come to quiet ourselves and reflect on the bigger picture). Immediately, I type out "+SEN; hello and welcome back from beach--got the OM msg., thanks" which I know will spurt out on the terminal of my colleagues in Oregon within moments.

INITIAL CHOICE? The system is waiting, wondering where I will go. From the main menu, I have access to (1) MESSAGES, (2) CONFERENCES, (3) NOTEBOOKS, (4) BULLETINS, (5) DIRECTORY, (6) EXPLANATIONS, (7) REVIEWS, (8) COMPOSITION, and (9) MONITORING. Each choice from the main menu will lead me to another menu and more options: MESSAGE, for example, gives me a list of options including: (1) get any message I have sent or received, (2) review the titles of

messages, (3) search for a message, (4) compose and send a new message, (5) delete an unwanted message from memory, (6) organize all messages, or (7) tabulate responses to questions I may have included in a message. I type "1,4" which takes me through the (1) MESSAGE menu and directly to the (4) "compose and send" sub-option, leaving me at the first line of my SCRATCHPAD, a working tablet of computer space where I initially write and edit messages or any other material for use on EIES.

After writing and sending several messages, I branch into CONFERENCES to catch up on some of my groups. EIES has myriad conferences on-line, subsets of members who establish common memory spaces for conducting ongoing discussions in special-interest areas. Conference topics range from solid-waste disposal to devices for the handicapped, from mathematics to poetry, from legislative research to personal computers. I check into the GENERAL SYSTEMS group and find that three comments have been added since I last looked, but a review of the titles indicates that they are a continuance of a particularly dull discussion so I decide not to print the comments out. Checking the TRANSFORM conference, I see that there are two comments, which I take and find quite funny. Finally, I check on a private conference set up by the Neighborhood Information Sharing Exchange for a national "community fair" in Seattle where STEVEJ, another new EIES friend, has been providing a daily digest of comings and goings as well as soliciting comments and resource suggestions from the EIES community.

Glancing at my watch, I see I have spent 15 minutes in the world

of EIES. This immediately translates into the dollars and cents reality of the $3.75 per hour connect charge for using Telenet, so sessions tend to move right along. I branch to NOTEBOOK and open my reserved computer space--equivalent to several hundred pages of text--where I compose and keep my own growing memory bank of reports, sketches, good ideas, long conference comments, repeating messages, and personal grafitti. Today, I am entering a letter about the network book I am writing jointly with my wife which can then be pulled out and sent as a message to various people on EIES. I begin the letter "Dear EIES friend," knowing that I will personalize that greeting with a person's name every time it is used. Because the "form letter" is part of the computer's memory, it consequently is easily modified--<u>everything</u> written in EIES is easily edited, reviewed, organized, and interchanged (for example, a notebook page may be added as a comment to a conference which may then be pulled out and sent as a private message).

Drawing on my limited knowledge of the various commands, codes, and little tricks required to use EIES, I manage to get the letter to print out neatly and properly paragraphed, but cannot figure out how to get a blank line between paragraphs. So, I type "?.TEXT" which immediately results in a half-page description of the function of the control command ".TEXT" with examples, including the information that ".TEXT SKIP" will provide a line between paragraphs. Typing "?" in front of any command produces an explanation of that command--EIES contains its own instruction manual and instantly provides the correct chapter and verse upon request. More comprehensive insight

into the workings of EIES may be obtained by choosing EXPLANATIONS from the main menu which, for example, offers a 22-page guide to text editing on the system, while "+EINDEX" provides a detailed list of all available explanations in alphabetic order. On EIES, learning the ropes is a self-guided process where information is available on a "need-to-know" basis. Still having trouble? Message "?HELP" to rouse your nearest on-line consultant.

With my new command in place on the network letter, I move the letter into a temporary storage space adjacent to my scratchpad, add the letter as a page into my permanent notebook, branch back to MESSAGE, pull the letter out of storage, modify it for P+T and send it, repeat the process again for TOM/MIKE, and then, for kicks, send it to myself so I can check on how it appears. About to sign-off, I decide to get the CHIMO newsletter mentioned in the headline when I signed on: This issue has a report on rumors of a hike in Telenet costs, an item by a consumer-information agency in Washington which introduces itself and its on-line services, a note soliciting interest in starting a women's group on EIES, and a follow-up to a questionnaire about the desirability of providing secretarial/printing services through EIES.

Typing "--" to disconnect, I am informed that I have two messages waiting, which I eagerly accept. One is the test message I sent to myself, showing the network letter in flawless form. The other is a short note from P+T acknowledging the +SEN one-liner, offering a contact suggestion for our book, and ending with a few phrases of hope and encouragement. As the system disconnects, EIES

tells me that my session has taken 46 minutes and cost $2.90. I have left the world of EIES.

Fifteen Minutes with HPI on EIES

As one who has survived the process of doing doctoral work while living 3000 miles from the "home office" on the opposite coast, it is easy to translate my EIES experience into the external degree format. I can imagine signing-on and seeing that DONP (HPI president) has been connected for hours, probably doing fancy things with his APPLE personal computer, while VERONA, HPI/ADMIN, and SAL (which is what faculty member Marcia Salner inexplicably has chosen as her on-line nickname) all have plugged in within minutes of 9 AM PST. I have confirmations from HPI/ADMIN which received my trimester report, also sent to DONP, my faculty advisor, and also a confirmed pick-up. Among my messages is a short note from Don acknowledging the report and murmuring approval that I am making progress, as well as a more detailed message from him about a paper I have submitted for independent study.

As I had hoped, my friend and fellow-student Bob McAndrews, living in Colorado Springs, has sent a response to my first fledgling ideas about a dissertation topic. Having met only once, during a national meeting, Bob and I immediately decided that we wanted to exchange ideas and support during our thesis ordeal, a collaboration made possible through EIES. Pondering Bob's "sweet-and-sour" ruminations on my idea, I branch to the HPI HUMAN SYSTEMS conference and check out three waiting comments, one of which is a

self-introduction from a new student interested in systems approaches to consciousness. After scanning the directory information on this potential colleague, I branch to MESSAGE to send a "hello-sounds-interesting" note as well as a quick thanks to Bob for his response. Signing-off, I am informed of a group message waiting which turns out to be a bulletin about tuition that HPI/ADMIN has apparently just written. I have used 15 minutes at a cost of $.90

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I have experienced community in a unique fashion on EIES, a richly-textured experience of connectedness, belonging to, friendships, casual aquaintances, frustrations, exhilarations. While expecting to explore the far reaches of electronic mail, text handling, and computer conferencing, my central impression of EIES now is fixed on its simplest--and cheapest--aspect: Its ability to nurture and support a genuine sense of community among geographically disparate people.

I have made new friends and reestablished old friendships. I have said "hi" to names I recognized and "hi" to names that I haven't. I have stumbled into an old government contact now working in the White House and reconnected with an activist friend in Paris--establishment and counterculture are both on-line and well-represented in the microcosm of EIES where they seem to co-exist amicably. At times, I wander into the places for games and the spaces for grafitti and even into a small alcove for meditation.

EIES-world provides fecund soil for nurturing communities of the mind, for elaborating emotional and intellectual links between physically scattered people. Remarkably, generating a sense of community is a natural attribute of the EIES medium and consequently is the least expensive function to achieve through the system. Signing on for a few minutes most days and perhaps a couple of hours on the weekend can keep a rich message life flowing without spending a fortune in connect time.

In short, I think that what an external degree program needs most--a context for creating nongeographically-based communities of scholars--is the function that EIES provides most readily and inexpensively.

STEPS TO THE FUTURE

Imagination easily soars in thinking of all the ways computers can facilitate the external degree process--from the administrative and fiscal files of an institute office to a community bibliography bank to a word processor at home to type papers and dissertation chapters. Hence, the questions concerning the application of computers to education are not "whether" but rather "when" and "how."

Looking again through our crystal balls and focusing more sharply on computers, two trends appear. Computers began life as a

centralizing process--based on large, expensive, complex installations--but in the past five years the thrust of computer evolution has moved strongly towards decentralization. Heralded by the explosive public demand for pocket calculators, the widespread availability of cheap computers is clearly at hand, converging neatly in the 1980s with the arrival of video player/recorders and cable/satellite television. In many applications, the giant centralized computer systems are being dismantled and functions are being distributed into a network of smaller intelligent work sites. Under conditions of dispersed computer capability, interconnection for common goals reappears as networking, using telecommunications to create horizontal patterns of information exchange, often with a facilitating "hub" to coordinate the activities of network members.

EIES is a feasible "here-and-now" way to step to the frontier of using computers in education without a large initial investment in equipment. EIES acts as an "amplifier" of the most elementary computer subsystem--the terminal, ordinarily meaning a typewriter-like keyboard and either a printer or a tv screen--and immediately gives a user access to state-of-the-art networking capability. Fortunately, EIES most strongly amplifies the qualities required to establish nongeographical communities.

The first steps in the evolution of a telecommunications-based graduate network is to coalesce a sufficiently viable sub-community of faculty and students on EIES. I think the catalytic number is somewhere between 5 and 10 people with a specific involvement in the educational project.

If a few people in the graduate network have more than a simple terminal to use--perhaps a personal computer or minicomputer--then large volumes of material may be written and edited "off-line" and then fed to EIES at great savings in connect time. These facilities already exist; I have a mini, DONP (Donald Polkinghorne) has a personal computer, and P+T (the Johnson-Lenzes in Lake Oswego, Oregon) have assembled microcomputer components into an ideal off-line system. With a few intelligent nodes in the system, a large background of relevant information can be developed to greatly enrich the searching and browsing of many members. Services can be provided for entering documents (e.g., papers, dissertation chapters) into the system for editing by the client-student before printing in "camera-ready" form. Administrative systems, bibliographic systems, data base systems, examination systems, and research systems can gradually be added to the network as they become available.

Taking a long view, I see four possible stages in the evolution of a graduate education network:

Stage One -- Community-building: In the beginning, I see a period of informal associations among a few students, a few faculty, an administrative node, a coordinator, and an unknown number of resource people resident on EIES. Primarily using the conferencing and electronic mail features of EIES, with some off-line computer support, the dimensions of the community-enhancing capabilities of this medium are explored and mapped while experience slowly accumulates about how the

educational function is most effectively served. Initial funding is likely to be diverse and small, ranging from out-of-pocket contributions to small grants, but in doing rather than talking, the bootstrapped network provides precedence, availability, and readiness to undertake a more formal experiment in computer-based doctoral education.

Stage Two -- Model-building: This is the formal project stage, a period of "institute-centered" development including the acquisition of off-line computer capability to support administrative chores, advisory responsibilities, module (course) procedures, paper preparation, bibliographic exchange, and word processing services as well as expanded community functions. An efficient, effective, and fun process that could easily be replicated by other old or new educational institutions would be the goal. This phase probably requires one or more large sponsors with an interest in this approach to education.

Stage Three -- Consortium networking: The "take-off" stage is reached when one institute with a few programs is joined by a variety of other schools and together they create a rich ecology of common resources and specialized interests, shared values and healthy competition. New businesses would develop to provide equipment and services for students, while software houses would offer a variety of programs for managing an educational network.

Although major subsidies would continue to be necessary to develop new aspects and new nodes of this educational network, the system would rapidly become self-supporting because of the economics of decreasing information costs and increasing energy costs coupled with an intensified social need for education to cope with complexity.

Stage Four -- Metanetworking: Looking ahead a few years with video/cable/satellite/computer patterns now in place, the time will come when education is/can be universally available, substantially decentralized, and organized for lifelong learning. Perhaps, because of the early involvment of a few people committed to humanistic approaches in learning and science, the metanetwork will develop as a human universe where people meet and exchange and learn and create. In the metanetwork, "old paradigm" and "new paradigm" may perhaps dance and spar and change and transform.

STRATEGY

Long journeys begin with first steps, and I suggest a three-fold strategy to guide us as beginning travelers: (1) Bootstrap an informal but functioning experiment as soon as possible; (2) join with others in promoting the concept of network-based education to governments and foundations; and (3) develop a detailed and

well-documented proposal for an extensive model project. I think that the key to a workable project lies in (1) starting small and fast, building up experience, living off a hodge-podge of funding, and learning through doing--a phenomenological, participant-observer experiment undertaken with few prejudgments but with clear values and intentions, letting the process unfold naturally, the outline of the future presenting itself directly without conceptual contortions.

As a practical matter, it takes time to research, prepare, persuade, and receive a major grant for an innovative project. Effort spent in encouraging a potential funder to act is often rewarded by support going elsewhere. Regardless of how a funder learns about and becomes excited about a potential innovation, the funder's next step is usually to "look around" for small projects already going that appear most like the desired program. Such going concerns have the powerful scent of authenticity and the credentials for developing models for replication by others.

As a practical matter, funding an informal network could come from a variety of sources. Some students might be willing to pay their own EIES costs in addition to tuition and some faculty might be willing to pay some or all EIES expenses, or share a rotating terminal and password. Perhaps a corporation or two will support students or provide terminals; several private donors might be found for a few scholarships; and a small grant might be obtained to support administrative and coordinating functions. Maybe a research contract falls into place, or an untapped federal resource is located, or a sugar daddy wanders through the door. The scheme may

not be elegant, but it will work.

A working on-line program naturally fuels an on-going effort to promote the development of network-based education, educate potential supporters of this development, and make the necessary contacts to kick into the second stage of the process. This strategy maximizes the ability to take advantage of serendipity while minimizing the chance of being ripped off and being left by the wayside. Beyond practical considerations, I suspect that this path is likely to be more enjoyable than stalking big funding game, and I suspect that it will contribute to our growth as individuals and to the future we share.