ED304112 1988-05-00 The Wired Campus. ERIC Digest.

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ERIC Identifier: ED304112
Publication Date: 1988-05-00
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Source: ERIC Clearinghouse on Information Resources Syracuse NY.

The Wired Campus. ERIC Digest.

Imagine a campus where a student can sit down at a microcomputer anywhere, at anytime, and go to work. He or she logs on and gets a menu screen of options. With a few keystrokes the student can access files of any size from any kind of magnetic or optical storage medium. Enormous databases can be accessed, and portions downloaded for word processing and data exploration. Text, data, graphics, video, and audio can be combined and processed in one file. Information can be linked associatively across files. Assignments can be received and completed, and tests taken. Educational simulations and games can be played. Computer programs can be written and run, or electronic circuits designed and sent to a manufacturing facility.

Bulletin boards can be scanned, messages received and sent, and conferences carried on, internationally, if desired.

All of these capabilities are currently available on some sort of computer; they just aren't available from a single microcomputer workstation on the average campus. But this vision of the wired campus of the future is surprisingly close to actualization now. This digest will outline trends in academic information systems design, and briefly describe the policies of some universities that are taking creative advantage of these systems as educational tools.

INFORMATION NETWORKS

Traditionally, the "wired campus" has meant a network of terminals connected to a mainframe computer. In recent years, however, the widespread adoption of microcomputers has led to the decentralization of academic computing. Today the wired campus is seen as an integrated system with resource-sharing and information-processing capabilities that supersede those of both micros and mainframes. Van Houweling (1987) describes the new academic architecture as "an institution-wide information network, based on broad access to personal workstations, enhanced by a diverse set of server facilities, and integrated through a coherent software environment."
Technically, the system consists of microcomputer workstations with their own hard disk storage and software. These are linked to supermicrocomputers via wire, cable, optic fiber, or telephone line. The supermicros function as servers for special applications; these and mainframes offer greater storage capacities and the ability to process very large files. The information network has the following characteristics:

Widespread coverage: The network includes classrooms, public-access and research computer labs, faculty and administrative offices, libraries, and student housing. Access to the network can be extended by anyone using a modem with a personal computer to include off-campus residences, branch campuses, other universities, online databases/library services (Dialog, BRS, OCLC), information utilities (The Source, Compuserve), and national and international research sites.

Wide variety of services: Supermicrocomputers act as servers to facilitate applications such as data analysis, printing, communication, or design implementation and production. These servers may also provide access to databases and database indexes, optical media, video and graphics, text, and data. Some current supermicro systems use the multi-user, multi-tasking operating systems.

Distributed control: Local area subnetworks handle areas such as administration, student records, and teaching and research labs.

Security: Most files are processed at the microcomputer workstation level and stored in a larger computer. Personal files must be readily accessible from any workstation, but accessible only to their creators. Administrative and accounting files must be protected from unauthorized use.

Multimedia capability (in two senses): The network must handle information in all forms: text, data, graphics, video, and audio. And it must be able to access magnetic, optical and other storage media.

Integrated software: The network allows users to access and send files from any make of microcomputer--most often IBM or Apple standards--and to process them using familiar software. Options for network functions are presented along with micro workstation functions in integrated menus. The system defaults to a higher level of the network when the micro cannot handle a job such as large-scale data analysis. The network interface should allow the user to access different forms of information and move through the system freely without getting lost.

Adaptability and expandability: Hardware and software standards must allow for a great deal of flexibility and evolution of the system.

Reliability: Above all, the system must work! The allocation of certain functions to different servers should help avoid the overloading that tends to cause a system to crash.

PLANNING AND IMPLEMENTATION

The advantages of the integrated information network concept are obvious and impressive: unlimited storage capacity, variety and power of processing capabilities, ease of use. The disadvantages, for an institution considering implementation, are equally impressive. These include the hardware, software and consultation costs of purchasing and installing a large-scale network, especially considering the current incompatibility of many components, and rapid changes and developments in electronic technologies. Add to this the issues of allocation priorities, organization and management, security, maintenance, and user support, and the vision may seem even less realizable. There is, of course, no single correct way to develop an integrated information network. The approach of most institutions has been to proceed in stages, gradually building the network by installing, upgrading, and linking network components in small and then larger groups. Even after successful pilot projects, a public-access system may deteriorate rapidly from overuse, or simply fail to be sufficiently expandable. Early on, administrators must make a detailed needs assessment to determine tradeoffs in cost, service, and capabilities of an integrated network versus stand-alone configurations and intermediate alternatives. And the involvement of faculty in the planning process helps to enlist their support and ensure that they will use the network.
Software is another major consideration. The design of integrated information networks

is in part an outgrowth of new theories of learning and teaching. With a network in place, software development should not just continue, but accelerate. Moeller and Hanna (1987), of the Stevens Institute of Technology, discuss the responsibility of the university to encourage this effort by providing faculty incentives such as release time, compensation, and programming assistance. Supportive policies of this nature have led to the development of innovative programs that are not just usable, but commercially marketable. Examples are simulations that expose students to open-ended real-life situations--programs that students actually end up playing for entertainment. Some students may also need incentives in order to recognize the computer as a partner in the educational process. Ubiquitous computer access, easy-to-use interfaces, and informal seminars are some solutions.

Osgood (1987) describes five institutions that have made major commitments to the concept of the information network and established far-ranging policies: Drexel, Stanford, Carnegie Mellon, and Brown Universities, and Reed College. These wired campuses offer: o

in one cluster o

in use o o o o o o o

intelligence, etc. o

development o o o

donations

These institutions are on their way to realizing Van Houweling's institution-wide, microcomputer-based, resource-sharing integrated information network.

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This digest was prepared by Linda Schamber, School of Information Studies, Syracuse University, for the ERIC Clearinghouse on Information Resources. May 1988.

This publication was prepared with funding from the Office of Educational Research and Improvement, U.S. Department of Education, under contract no. RI88062008. The opinions expressed in this report do not necessarily reflect the positions or policies of OERI or ED.

Title: The Wired Campus. ERIC Digest.
Document Type: Information Analyses---ERIC Information Analysis Products (IAPs) (071); Viewpoints (120); Reports---Descriptive (141); Information Analyses---ERIC Digests (Selected) in Full Text (073);
Available From: ERIC Clearinghouse on Information Resources, 030 Huntington Hall, Syracuse University, Syracuse, NY 13244-2340 (free while the supply lasts).
Descriptors: Campuses, Colleges, Computer Software, Computer System Design, Higher Education, Information Networks, Information Systems, Integrated Activities,

Local Area Networks, Microcomputers, Systems Development
Identifiers: ERIC Digests
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