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Technology Infrastructure and Information Literacy

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Introduction

The fundamental purpose of higher education is the preparation of students for their futures. If graduates of today and tomorrow are to flourish in the modern, fast-paced, high-tech world, they must have information seeking and technology skills. They must be information and technology literate. The means of acquiring these literacies must be imbedded in student learning and be part and parcel of their educational experience. For this to be so imbedded, it is necessary for the institution to develop and maintain a robust information technology infrastructure.

Information Literacy

Information literate people have a number of qualities and skills. First of all, they recognize when they have an information need. This, as we all know, is not a quality possessed by everyone. They know the appropriate places to look for information, and they know the appropriate strategies to use for each of them. The information literate person has the ability to recognize the information when it is found, and then to determine if it is the best, most accurate, or most current information available.

Information literacy can combine various elements of library literacy, computer literacy, media literacy, network literacy and other literacies, but it should be noted that in the best educational experiences, students become more information literate in the natural course of learning subject content and research methodologies of the various disciplines they study.

Whether our institutions of higher learning expressly articulate it or not, they all want their graduates to have developed these competencies and many believe their students have done so. Even though all want their students to be information literate, few have specifically built the means of acquiring those skills into the curriculum. We are all aware that inculcating these competencies should be a curriculum-wide responsibility. But because of the differences in technical expertise among the faculty and the technical resources on our campuses, not all can contribute equally to the effort.

Infrastructure

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There is an important area that seems to get little notice when college and university administrators, librarians and faculty discuss the needs for development of information literacy among their charges. In most cases the needs and values, the courses, and the specific skills all receive adequate attention when programs are planned and implemented. But all too often the basic ingredients that undergird the information literacy programs are ignored. Even more likely they are routinely taken for granted. We refer here to the information and technology infrastructure. All too frequently we find the information and technology infrastructure are incomplete and/or inadequately maintained to provide consistently high quality support in all areas that technology can and should be called upon to deliver.

How does a campus go about maintaining the information/instruction technology that will support a curriculum that pursues information literacy as an educational outcome? Without doubt most campuses have had some success dealing with these issues in recent years. Nonetheless, there are few if any institutions that can say they have had no instances of student or faculty frustration with parts of the technological infrastructure. Nearly everyone has encountered technology failures, or at the very least, technology that did not work as smoothly or as intuitively as the users would want it to.

We all know that sometimes this failure is 'just the nature of technology', or can be attributed to 'user error', or the result of poor directions, documentation or user guides. But some of it is due to failure of the infrastructure itself. Of course, not all frustration can be eliminated, nor should it be since in things educational, as well as elsewhere, 'no pain, no gain' is a valid concept. But, this does not excuse us from attempting to provide the best technical and information infrastructure we can. As much as possible, we must be prepared to provide the best support our resources allow so we can to make the campus educational and work experience a positive and productive one. A predictable, stable, and dependable infrastructure will encourage use of the resources, learning by students, and incorporation of instructional technology into the curriculum by the faculty.

It is important to recognize that development and maintenance of the infrastructure is very complex and expensive. Probably none of the campus technology promoters and users are fully aware of its cost in budgetary resources or in human effort-- not the administration, when they venture into 'technifying' the campus, nor the faculty or students who are the direct beneficiaries and most numerous and persistent users of the infrastructure's resources. Probably not even the support staff in the library and computer centers who acquire and maintain it on a daily basis are fully aware of its cost.

Everyone on campus is a potential beneficiary and perhaps all use at least a small portion of its total offerings. But, therein probably is where some of the difficulty lies. Hardly anyone will use all of the options and applications offered, certainly not on a frequent basis. Each of us will have a favorite technology, application, information database or service, and will expect that part to be available always, and regularly improved or upgraded.

However, sometimes we fail to remember that computers, networks and electronic information resources are immature technologies. Yet we expect them to perform mission critical functions unfailingly. There should be little surprise that the tension levels of the users and providers run high when parts of the system fail. The resultant stress is further compounded by frequent changes, upgrades and new versions of hardware and software.

What are these various infrastructure elements? There are a number of them that we should consider in this essay: the campus wide network, telecommunications, equipment and hardware, software, information resources, and service and training.

Network Infrastructure

A major infrastructure component is the campus-wide network, that system of wires, routers, bridges, computers, etc., which allows for communication and transfer of information throughout the campus and connection to the campus mainframes and servers from all the offices, classrooms, student resident halls, computer labs and from home. These miles and miles of wires and connections are fraught with all manner of uncertainty and potential failure. Then we have the equipment infrastructure which includes the servers, computers, printers and scanners in the computer labs, the classrooms, and in faculty and staff offices. Many campuses also have computers in the residence halls that must be maintained and upgraded. All of this requires attention through installation, upgrades, maintenance and service.

Add to this the telecommunications infrastructure, that is the AT&Ts, the Ameritects, and cable companies of the world. Though largely maintained by others and generally more mature as technologies, they can cause much difficulty, frustration and uncertainty for users particularly when we rely on them for POTS (Plain Old Telephone Service), voice mail, satellite programming, video conferencing, internet and www, etc.

Besides computer equipment, there will be VCRs, monitors and televisions, satellite receivers, slide projectors, document cameras, camcorders, and myriad other media equipment. These too require upgrades, repair, maintenance and instruction in proper use.

Computer software and different network operating platforms also complicate the infrastructure, including DOS, the several Windows platforms (3.1, Win 95, Win 98, Win NT, etc.), MacIntosh, Unix, Novell, Banyan to list only a few. Numerous e-mail packages are available, along with choices for word processing, spreadsheets, databases, and presentation software such as PowerPoint and Harvard Graphics, not to mention the specialized software like SPSS, Turbotax, CCH tax software, and GIS packages. Keeping up with these basic computer applications can be very time consuming for all users. All of these must be compatible with each other and with the hardware, if they are on the same network, or at least, they must not be in conflict. Again, besides maintenance and upgrading, proper instruction in its use is required.

Then there is the information infrastructure which includes library databases such as library catalogs, periodicals collections with full-text articles, CD-ROM resources, remote library access, interment resources, and web sites. Also, we can include student information systems, and student administrative systems for tracking financial aid, and credits completed and still needed for graduation. Providing access to these resources by legitimate users, complicates this aspect immensely with the authentication and security issues.

Service Infrastructure

Overarching the technology and information infrastructure is the service infrastructure, which includes the skilled experts (the librarians, the computer network staff, instructional technologists and media specialists) who not only keep things humming and up-to-date, but provide help and instruction to users who must learn to operate the hardware and software. It is here that the concerns regarding infrastructure co-mingle with the need to teach information literacy competencies, since they are concerned with not only the physical infrastructure, but also the pedagogical assistance to students and faculty. These services include showing users how to fully utilize the several parts of the technology infrastructure such as:

- finding and evaluating print and electronic library resources, such as catalogs, CD-ROM, and Internet sources,
- learning basic computer skills, including word processing and e-mail
- using specialized software, such as SPSS,
- creating web pages and electronic portfolios, and
- using media equipment, such as VCRs, camcorders, document cameras and projectors.

It can not be expected that the classroom instructor will do all the teaching of information technology skills. Rather, the campus should provide a proactive information technology support unit to help students, faculty and staff deal with the rescues available. Support units can be viewed as primary service contacts with peer faculty assistance as supplemental, or the other way around. In any case, using both staff groups has obvious advantages over using only one of them.

What might a proactive information technology support unit do? We would recommend a whole panoply of help formats. Different methods and instruction modes are advisable for different people's learning styles and for different resources. One size (method) does not fit all when it comes to learning. We would recommend any and all of the following, depending upon the situation and the learner:

- workshops for special applications,
- hands-on instruction in labs and classrooms
- tutoring in faculty and staff offices,
- reference desk help in the library, computer help in the labs,
- technology help-desk for the campus as a whole,

- staff development, in-house or at off-campus sites.
- bringing consultants and experts to campus, in person or via video conferencing, satellite programming, etc.
- creating helpful handouts, point-of use aids, and computer help screens.

These activities can be done cooperatively by campus staff or other experts, supported by the IT budget, the Dean or Provost or other campus units. It is clear that a campus must be truly committed to the value of technology and the creation of information literate graduates. It needs to provide much equipment for the students and reasonable upgrades for the users. It also is necessary to provide sufficient staff to deliver the help and support needed. When insufficient resources are provided, parts or all of the technology infrastructure will begin the fail or be less reliable. When this happens alternative methods will be sought by users and the learning mission is likely to be less successful.

What Should We Do?

The various constituencies on our campuses must come together. We all know these are challenging times with many demands made on limited resources, and with higher education as a whole being criticized as overly expensive and with costs continuing to rise excessively each year. Planning is necessary if we are to muster support for the common vision, i. e. the creation of an institution that puts the achievement of the information literate graduate as its ultimate product. This planning would include a strategic technology plan and a curriculum plan that weaves technology into its goals and enabling objectives.

We need to join forces as allies, administration and staff, the faculty, and the academic support staff to make the case for increased support for, and use of, technology. At the same time we need to remember that students rarely use these resources in scholarly pursuit unless classwork requires it. And, as those who work closely with students know, our undergraduates are not as computer competent as they are often portrayed to be. Many are less intimidated by technology than are some of their instructors, but that should not suggest they know how it should be used. Also, we should remember that many undergraduates are as uneasy around computers as are some older people .

When we all work toward the same goals, we greatly increase the probability that we can succeed, even in the face of the intimidating expenses that a robust infrastructure would require. Because administrators themselves do not always use the information and technology resources requested by faculty, or if its been some time since they have been in the classroom, some may fail to see the faculty need. On the other hand, because their classroom experience is so immediate and seemingly urgent, faculty sometimes lose sight of the larger picture and fail to have the patience that is needed to build an infrastructure that will support the greater needs of the community. Rather, they tend to focus on the immediate needs of a particular course. Often when our own needs loom so obvious, it seems like it should be equally so to others. Nonetheless, creation of, and adherence to,

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the strategic and curricular plans by all parties will enable the creation and maintenance of the robust information technology infrastructure. That, in turn, will support the curricular efforts that produce the information literate graduate.

In the last analysis, however, nearly all of us can be convinced by results. Student technology projects that demonstrate the acquisition of information literacy qualities should be shared with administrators, faculty colleagues, trustees, alumni and classmates. All should be invited to see successful student projects first-hand. If successful technology projects are shared, and the acquisition of the desired skills affirmed, rewards to the institution will come in the form of increased support from all parties involved. Thus, the whole interrelationship comes full circle. Support for the infrastructure will make it possible to produce information literate graduates. Development of information graduates enhances the reputation and esteem of the institution, in turn insuring support for the institution's future and basic infrastructure.