Information Technology Support Services: Crisis or Opportunity?

by J. Michael Yohe

Information technology support services are in crisis, due to dramatically increased expectations and stable or dwindling funding. This article examines the root causes and suggests actions which may help resolve the situation by reducing expectations, increasing effectiveness, and building partnerships.

In a recent issue of Change magazine, Steve Gilbert of the American Association for Higher Education discussed the very real support service crisis emerging in higher education, particularly in small colleges and universities. Rapid advances in hardware technology fuel new opportunities in applications, raise unrealistic expectations, and create unstable and unmanageable technological environments. Support services are expected to deliver everything that’s new, virtually instantly; continue support of legacy systems beyond their reasonable lifetimes; assure interoperability of disparate and sometimes incompatible applications; and do it all with resources that are rapidly dwindling in proportion to the work at hand.

But just as important as the crisis is the fact that colleges and universities across the country are finding effective ways to turn these problems into successes. In this article, we examine the causes of the crisis and explore ways in which beleaguered support services people can turn the crisis into an opportunity for a brighter future.

The vision: Utopia

We’ve done it to ourselves. For years, computer manufacturers, vendors, programmers, and support professionals promoted the “computer mystique.” The average person was systematically instructed in the magic and infallibility of computers. Even the stock “computer error” excuse for all failings of record systems was understood to be a cover-up for human fallibility.

We have convinced our customers that computers are omnipotent, omniscient, and infallible. We’ve created a sort of Buck Rogers Utopian vision of a society where all routine, tedious, time-consuming tasks are handled by automations, leaving us free to contemplate, invent, procreate, and play.

The expectation: perfection

What, then, are the expectations of our customers?

First, they expect that all information is immediately accessible to them; that they can have whatever information they want, whenever they want it, wherever they want it, and however they want it. We measure in minutes the time from experiencing delight that the library catalog is online to anger that the full text of all listed books is not instantly available on the screen.

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Next, they expect to have at their fingertips applications that will maximize their effectiveness. If it’s available anywhere, it is expected to be available on their workstation. This implies that they will have the latest technology; that they will have connections to all other points and everything they reach will interoperate with their desktop hardware and software; that communication will be instantaneous, with integrated voice, video, and data; that the interface will be

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completely transparent; and that information will be independent of software or hardware. There is little understanding of the fact, for example, that a particular program will run only on one hardware platform, and even less patience with it.

Third, they expect effective help in using these resources. We might postulate that this includes effective, conveniently available training and readily available, easily understood documentation. In fact, however, the real expectation is that the use of all of these resources will be intuitively obvious—with no recognition of the diversity of intuition that renders what is obvious to one person inscrutable to the next. They do not want to learn how to use these resources, only to know how.

Fourth, if support is required, they expect to make a single contact, which will result in instant, on-site response by a person who has full knowledge of all hardware and software, from the very latest to the earliest legacy systems. Each customer’s needs are naturally top priority to that person; the expectation is that they will be top priority to the support staff, too. Indeed, if a single customer has multiple needs, they are all top priority.

Finally, our customers expect that there will be no problems: no network bottlenecks, no power outages, no downtime, not even any housekeeping or system maintenance time. Full service, twenty-four hours a day, every day of the year.

If this all seems too harsh, let me assure you that computer professionals are no different when they are the customers. If you catch a computer professional in a weak moment, you may even elicit an admission that “they” is “us.”

**The reality: it’s not a perfect world**

Against the background of these expectations, we need to view the harsh realities.

Budgets are tight. The normal fund allocations are growing slightly or remaining stable, if we are lucky. Grant funds are becoming more and more scarce as governments need tighter and tighter control over their spending. Corporate generosity is tempered, in many sectors of the business world, by declining profits. Corporate downsizing adds competition to the entrepreneurial activities that have, in the past, provided extra revenues to colleges and universities. The result is a tendency to keep staff sizes small relative to the task at hand, or even cut them, resulting in work overload and staff burnout and frustration, and to defer the purchase of the equipment and resources that could enable staff members to use their time more effectively.

Change is constant and rapid. Computer professionals must learn new concepts and skills continuously or risk obsolescence. Technical knowledge that is cutting-edge one day is obsolete the next. Moreover, this change does not only affect existing activities; it is the hallmark of the computer industry that new technology lowers costs, increases market penetration, and begets greater utility and greater expectations. So change also expands the responsibilities of the computer professional. The advent in late 1993 of the Mosaic browser for the World Wide Web and the advent in August 1995 of the Windows 95 operating system are two examples of changes that have had an earth-shaking impact on computer support services.

With the expansion of computing into broader and broader segments of society comes a proliferating set of problems. Antisocial activities such as hacking and the creation of viruses are on the increase. Deliberate penetration of security systems for personal gain is accelerating as the ability to connect computers together continues to outstrip our knowledge of how to defend the new connections. Complaints of unsuitable or objectionable materials, inappropriate use of resources, and violations of copyright and common standards of propriety, if not law, are exploding. Computer professionals are expected to address all of these.

The lower cost and greater market penetration begets one other problem that is so important that it deserves special mention. “Experts” buy their own hardware and software without consulting computer support staff; these purchases often do not excite the purchasing departments because the dollar value is not great enough or the description of goods does not reveal the true nature of the purchase. Once these goods are on the campus, it is too often demanded that the support staff resolve problems of networkability and interoperability.

**The challenge: walk on water**

These, then, appear to be the major challenges for an information technology support staff:

*Providing sufficient connections (including intra- and inter-building cabling), servers, routers, and hubs.* This involves the questions of network design, robustness, and redundancy.

*Providing sufficient capacity, in a multitude of dimensions.* As the saying goes, “you can never have too much bandwidth or too fast a processor.” Network capacity issues include backbone bandwidth, subnet bandwidth, bandwidth of the Internet connection, as well as capacities of hubs and routers. Host capacity includes processor speed, memory, disk capaci-
The challenges

- Providing sufficient connections (including intra- and inter-building cabling), servers, routers, and hubs
- Providing sufficient capacity, in a multitude of dimensions.
- Coordinating efforts
- Integrating technology
- Keeping up with the pace of technology
- Securing funding
- Hiring and retaining qualified staff
- Attaining and maintaining peak efficiency and effectiveness

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- Keeping up with the pace of technology. The PC product half-life is now about six months, though most of us use equipment far longer than that. The pace of change generates the requirement to keep up with new developments as well as the need to preserve the physical and intellectual effort that has gone into developing course materials or data for older systems.

- Integrating technology. This is a dual-faceted challenge. The first aspect is bringing diverse technologies together to accomplish such objectives as desktop video conferencing or bringing up a caller’s database record on a computer screen in response to an automatic caller ID code from the telephone system. The second facet is infusing appropriate technologies into our everyday academic activities of instruction, research, outreach, and office or professional activities.

- Keeping up with the pace of technology. The only way to meet all of these challenges is to take on an even bigger challenge: attaining and maintaining peak efficiency and effectiveness. It is this challenge to which we now turn.

- Coordinating efforts. Ideally, this would begin at the top of the institution, with an overall plan for information technology—tied to the institutional strategic plan and the budget, and coordinated with all interested units. Such a plan would delineate clear, consentaneous priorities (including the computing support functions), specify guidelines or even standards for supported hardware and software, and articulate authority and procedures for making decisions within the scope of the plan. At the very least, this includes working with the various constituencies on the campus to establish directions and get agreement on key issues. This kind of coordination has the important function of helping to avoid surprises.

- Securing funding. We can expect that normal allocations won’t change much; that grants and contracts will be more and more difficult to obtain; and that revenue opportunities will experience increasing competition from the business sector. Yet, the need for funding continues to accelerate.

- Hiring and retaining qualified staff. Candidate pools are typically small, especially for new technologies. Even as larger corporations trim their staffs, the demand for qualified computer support people continues to increase. Some of our students graduate from our institutions and take jobs paying twice as much as we pay their mentors. Similarly skilled people on our staffs see this and begin casting about themselves, disenchanted with the myth of the “good life” in academe and tired of the sixty- to eighty-hour weeks.

- The crisis: morale

A maxim attributed to Peter Drucker holds that efficiency consists of doing things right, and effectiveness consists of doing the right things. Generally, support services groups tend to be quite efficient about what they do; most tend to be effective as well. So why the crisis? It goes back to the expectations—particularly to the expectation that an effective organization will do all the right things. It is this assumption that we must challenge. To see why, we look at the support service crisis from the two sides of the fence.

From the service provider’s point of view, the crisis is one of unrealistic expectations, or at least the perception of unrealistic expectations. There is simply more to do than we can handle in the time allotted (and perhaps even in all the time available). There is a feeling, usually accurate, that most matters can be treated only superficially and not to any reasonable standard of quality. The staff member may work more and more hours, still without satisfying the increasingly angry customers, whom the staff member perceives to have insatiable appetites. The cycle continues in a downward spiral until the staff member burns out and either leaves or gets fired.

From the customer’s point of view, the service provider can’t meet even the most reasonable expectations. If a workstation is not functional, most customers are unable to work until it gets fixed, and two or three days is an unreasonable length of time to wait. Advertising extols the virtues of the latest software, but the version the customer is using is two or three revisions old.
Requests for service seem to fall on deaf ears. If training is offered at all, it is not at the time when the customer can conveniently take advantage of it; and, besides, the workshop is several hours long and the customer wants only a few pointers. And so on. In short, the service provider just isn’t providing service.

How can we possibly see an opportunity in this?

**The opportunity: promote self-sufficiency**

The opportunity lies in redefining the understanding of service and changing the paradigm for meeting the needs of the customer. This is not a new concept at all. In fact, we have a ubiquitous model: the telephone system.

Today, we don’t think twice about placing our own telephone calls. We simply pick up the phone and key in the number we wish to call, or perhaps even have a computer key it in for us. Yet many of us can remember when placing a long-distance telephone call involved calling the operator, who set up a connection to an operator in a neighboring area, who further set up a connection, and so on until the two parties were connected by a chain of operator-established connections. Dialing a long-distance call was simply not possible. Some may remember times or places where dialing calls was not possible at all; one picked up the phone, turned a crank to ring a bell in the central office, and the operator answered and manually patched the circuits together.

We need to heed the telephone system model. Most of the time, most people should be able to take care of their own needs for computer support. The support services staff needs to be working behind the scenes to keep the infrastructure running, and be available for direct service on the rare occasions when the customer’s needs exceed abilities.

What kinds of changes are necessary if we are to resolve the current crisis and promote increased self-sufficiency among our customers? We offer some suggestions.

✓ **Control expectations**

If unmet expectations are at the root of the support service crisis, then an obvious first step is to ensure that the customers’ expectations are realistic and reasonable.

**Planning.** A key factor in setting realistic expectations is a campuswide planning effort with representatives of all constituencies participating. This can be a major challenge in that it requires leadership from the top and strong incentive for constituents to participate. The planning process must be tied to the budget, and include the setting of clear and consentaneous priorities. Those activities that are high enough on the priority list will be funded; those that aren’t funded cannot be expected, either. The new president of the University of Northern Iowa has begun such a process; a similar process is recommended by Steven Gilbert in an article in *Change* magazine.

**Advisory committees.** Regardless of whether a comprehensive planning process is undertaken, advisory committees that represent the various constituent groups can aid both in helping the service provider interpret campus expectations and in helping the campus review and adjust expectations in light of the resources available.

**Teaching, Learning, and Technology Roundtables.** One of the most exciting recent developments in working toward reasonable expectations is the Teaching, Learning, and Technology Roundtable (TLTR) program of the American Association for Higher Education (AAHE). This is a structured program for bringing together the faculty, administrative, and support service leaders on a college or university campus to develop objectives and projects leading to an appropriate and effective application of technology in the educational process.

**Service level agreements.** It stands to reason that a mutual understanding of the nature and extent of service provided will help forestall unreasonable expectations. Many institutions use written service level agreements to ensure this mutual understanding; such agreements, for example, are used at Fermi Labs.

✓ **Reduce work**

One of the best ways of increasing effectiveness is to identify activities that aren’t really necessary. Clearly, time not spent in routine or unproductive activities can be devoted to projects of higher priority.

**Create a single point of contact.** Sometimes called a help desk or hotline, a single point of contact can aid in tracking requests for help and reducing interruptions for the technical staff.

**Automate problem tracking.** The University of Northern Iowa has purchased a database system to aid in tracking trouble calls and their resolution. Although staff are not in a position to respond immediately to each call, the calls that get entered into the system are usually resolved in a reasonable length of time. Those that drop through the cracks are the ones that bypass the system. The technical staff can be freed from having to answer and screen the calls in the first place, and questions about progress on the service request can be referred to the help desk.
“If it’s easier to call than to use the information access tools at hand, [people] will generally call.”


rather than the technical staff. Similar systems are in use in a number of places; a paper by Tom Murray and Liz Brigman discusses a related experience at Rice University and lists a number of other places using problem tracking software.5

Use automated phone attendant/answering machine/voice mail. As frustrating as these systems sometimes are, there are valid applications. There is no reason for a live person to spend time answering questions about when this or that lab will be open; the answers to such common questions can be recorded and called directed (or transferred) to the recording.

Communicate via electronic mail. E-mail is a well-known time saver, both for requests and for notifying customers of the status of their requests. Setting up a special account or alias with a mnemonic name can encourage the use of this medium, as can an automatically mailed response form on a World Wide Web space. Automatically posting such messages on an internal bulletin board can allow staff members to claim and respond to the messages, so no one staff member needs to screen and distribute the messages.

Ohio State University is one of many institutions using this resource effectively.6

Publish frequently asked questions (FAQs) and answers. Publishing carefully crafted answers to FAQs in accessible places (such as the World Wide Web space or on a bulletin board) can both reduce the number of live contacts and improve service by making help on the most common questions available around the clock. FAQs should be reviewed and updated regularly, and records of calls received will suggest additions to the list.

Employ conversion programs and utilities. The well-publicized availability of conversion programs and utilities can allow people to help themselves rather than asking for help from the support service staff. Better yet, staff should select and support software that has built-in conversions from a variety of competing applications of the same type.

Automate routine tasks. This seems obvious, but “who is worse shod than the shoemaker’s wife?” Opportunities abound; Catholic University, for example, automates a number of tasks connected with the operation of computer labs, and the University of New Mexico automates software installation on desktop systems.7

Move to automated/unattended operation. In some cases, facilities, ranging from computer rooms to terminal clusters, can be left to operate themselves entirely. Most institutions leave central computers running unattended for at least a portion of each day. Some institutions leave computer labs unattended, monitoring them with closed-circuit TV or with card-key access systems. At the University of Northern Iowa, dumb terminals are placed in public places for faculty, staff, and students to use in checking e-mail, library catalog, text-based Web pages, and so on. These terminals are not particularly useful in any other venue, and the campus community values the convenience enough to guard the terminals to some extent. In any case, if one is stolen, it can be replaced from retired stock or, if necessary, for a few dollars on the open market.

Improve interface and access to information. People are like electricity in that they follow the path of least resistance. If it’s easier to call than to use the information access tools at hand, they will generally call. Making more information available via the easily used, ubiquitous World Wide Web interface or other convenient means will tend to improve service and at the same time cut down on the number of telephone calls (read “staff interruptions”). At Princeton University, online information is used as a primary means of training student staff members.9

Standardize hardware, operating systems, application software, protocols. Standard systems tend to reduce the amount of work for the central support staff for a couple of reasons. First, there are fewer questions if everything looks the same from one workstation to the next. Second, questions can often be answered by colleagues in the same office rather than by central services.

Minimize number of supported products. The fewer different products we have to answer for, the less work we have to do in learning or remembering product information. Clearly, we must support a functional suite of software; and most of us must support a suite for Intel-based machines and another for Macs. Even at that, there are opportunities to minimize support requirements by choosing software that runs comparably on multiple platforms. There should be no requirement, in any case, to support multiple vendors’ word processors, for example, on a single platform.

✔ Get help

Strange as it may seem, we don’t always avail ourselves of the help at hand. This has always been the case; from the early days of computers, college and university computing services suffered from the so-called NIH (not invented here) syndrome. It has been a very long time since any of us could afford the luxury of traveling alone.

Students. University of California Berkeley is only one of many institutions reporting effective use of student help.10 In fact, very few of us could do what we do without student help, and it may seem like we are belaboring the obvious. How-
ever, many people tend to underestimate the abilities of students. At the University of Wisconsin–Eau Claire in the early 1980s, we had a well-run and effective help desk staffed entirely by students with the part-time supervision of a single full-time staff member; the same approach is being used at the University of Virginia. On the other hand, in other venues I have seen managers refuse to give students significant responsibility, with the predictable result that the students also failed to make significant contributions. We all have students who can shoulder large chunks of the load, if we but let them.

**Experiential learning.** At some institutions, class projects or co-op assignments are reasonable sources of help for small projects. Since these projects are of limited duration and the students' dedication to the project is not likely to survive the immediate assignment, care must be taken in the selection of these projects; however, they can be of significant benefit in some circumstances.

**Local experts.** Most institutions and communities are endowed with people who have relevant expertise and can be prevailed upon to share it with the institution. Local vendors may conduct training classes for new releases of software; local consultants may be willing to give advice on network design.

**Outside consultants.** Particularly in the case of special projects, it is worthwhile to consider hiring a qualified consultant. It may well be less expensive to hire the expert than for staff members to bring themselves up to date on specific technologies such as telephone systems. The presence of an outside expert tends to give recommendations a degree of credibility they would not otherwise have, no matter how well qualified the local staff may be. And work done by the consultant does not have to be done by local staff, thus freeing up their time for other pursuits.

**Faculty and staff.** Faculty and staff members may be willing to take part-time or summer appointments with the support service organization to teach workshops, help with installing new equipment or software, or undertake other short-term projects that would benefit from their expertise.

**Distribute responsibility**

A frequent complaint of the customers of a support service is that there is too much appetite to control what the customers are doing. In some ways, this is inevitable; if the network is to function smoothly, all participants must adhere to appropriate standards, and one organization must have responsibility for and knowledge of the network. At the same time, some responsibilities can be distributed to colleges, departments, and individuals in a way that reduces the workload on the central support staff.

**LAN management.** Local area networks generally support some logical subgroup of the campus community. Often, there are special applications within that subgroup that are not of general campus interest or applicability, and it usually makes sense (to both the central service and the group members) for those to be managed within that group. That being the case, it may also make good sense for the entire LAN to be managed within the group. The central service should establish standards for LAN configuration, backup, mail addresses, and so on; and an informal team of LAN managers from across the campus will help maintain consistency and interoperability across the LANs, even though they may be managed within disparate administrative structures. This approach is being used successfully at Iowa State University. Distributed management reduces central workload and customer frustration with the “bureaucracy.”

**Desktop systems.** This seems like a non-issue; after all, each person who has a desktop system also manages it. Some do that better than others. Since the central service does not customarily manage desktop systems, it may not seem to be a matter of concern; however, we can be sure that central services will be called in when the customer's system has been mismanaged. Some problems (but by no means all) can be forestalled by providing system setups, documentation, and utilities that encourage behavior that will reduce problems and make recovery easier when they occur. An obvious example is a startup file that automatically does a system backup on the first start of the day.

**Job entry and report generation.** In earlier times, people who wanted reports from the databases would call the programmers, who would...
submit jobs through a job control staff to run the reports, and the results would be picked up at the computer center. Networking and job scheduling tools make it increasingly possible for customers to submit their own jobs, with the results appearing on their own workstations or printers. Clearly, time not spent in processing routine requests can be applied to other priorities, and the customer assumes the responsibility for the correctness of the request.

**Collaborate**

A roof truss is made up of a number of small structural members, no one of which could handle the expected load alone, joined together in such a manner that the union does the job with capacity to spare. Likewise, collaborative relationships build on the strengths of all members, producing a result that can easily bear loads that would overwhelm us individually.

Related units on campus. Library professionals, educational media professionals, and computing professionals increasingly are recognizing the convergence of their disciplines. At the 1993 Small College Computing Symposium, the University of Wisconsin, Eau Claire, presented a paper on library/computing collaboration, the Third Library Solutions Institute, held in Chicago in 1994, focused on partnerships between libraries and computing organizations; the Fall 1994 issue of *CAUSE/EFFECT* focused on library/IT collaboration; and the Coalition for Networked Information offers a working retreat for campus librarians and information technologists to foster collaboration. It is not uncommon to find that other campus units are supporting similar activities, and that the units and the institution alike benefit from combining these efforts.

Technical coordinators. Some units may have enough equipment and resources to need a full-time or part-time coordinator. In some cases, these coordinators may be funded by and report to the support service, but often they report to the college and function independently. The University of Kentucky has found that close collaboration with these individuals results in better service to the customers and a more effective use of staff time. Since the University of Northern Iowa gave one of its college coordinators access to the central problem database, complaints of poor service in that college have virtually ceased.

Liaisons. The idea of identifying key people in each department to meet together to exchange information and ideas with one another and with central service staff has been around for some time; many institutions have some variation on this theme. It goes by different names in different places; at Northern Iowa the group is called Liaisons. When Liaisons call the central support service, they get preferential treatment. Others are generally referred to their department’s Liaison or placed in the normal priority queue. Both Brigham Young University and Loyola University Chicago implemented such liaison-type programs early on.

**Affinity groups.** We know that proximity is the single most important factor in determining who we turn to for help. At Eastern Michigan University, purposeful support of these informal alliances has paid handsome dividends by capitalizing on the natural zeal for technology combined with commonality of professional interests.

Training centers. These may be formal programs, such as the one at the University of Wisconsin, Eau Claire, or informal arrangements such as a training facility shared by a number of departments. The effect, however, is to bring people together in offering training, and the proximity tends to promote better division of work and freer exchange of ideas.

Faculty. If you look around your institution, you’ll likely find that faculty members are writing good documentation for their classes. There is no reason for central services to duplicate the effort; faculty members are usually quite willing to share the fruits of their labors.

Colleagues in other institutions. Often it’s possible to share documentation, training modules, and expertise with colleagues in other locations. The Internet makes this kind of sharing incredibly easy. These arrangements can be diverse and suited to the particular institution and problem at hand. A handful of ACM members representing institutions on both coasts and in the nation’s midsection have formed an informal Virtual Consulting Service (ViCS), through which they share expertise on knotty problems as well as personal support. Another “virtual community” shares documentation in Iowa. The Iowa Research and Education Network binds together some seventy public libraries and educational institutions at all levels; IREN members freely ask and offer advice from one another on a multitude of topics. In many states, affiliated public institutions share software, hardware, and staffs. The possibilities are limited only by the imagination of the participants.

Online information. There is a wealth of information available, free for the taking. Locally, there may be bulletin boards or mailing lists that deal with specific topics of interest. Often these can be opened for wider use by simply cajoling the organizers. Globally, there are not only many good sources of information, but, increasingly, sources such as Yahoo where searches can be
conducted; online information from vendors or other institutions may be accessible, at least to the support service staff. A support services organization can perform a valuable service for a modest investment by codifying these sources and making them known to the campus, as has been done at the University of Virginia.23

Personal networking. Never underestimate the value of personal contacts. If the budget permits, it is wise to send every staff member to one or two meetings a year. For networking purposes as well as for the professional value to be obtained from them, regional meetings such as that of the Small College Computing Symposium or focused national meetings such as the CAUSE annual conference and the Association for Computing Machinery SIGUCCS (Special Interest Group on University and College Computing Services) meeting are most valuable.

✓ Communicate

Advertising doesn't cost; it pays. This maxim from the business world is equally applicable to our world. Unfortunately, most technical people aren't marketers. If you have the best resources in the world, and your customers don't know about them, you've wasted your investment.

Newsletter. Newsletters can be works of art, but they don't have to be. They simply need to get critical information in the hands of our constituents. If the articles are short and to the point, some of the newsletters may even be read before they hit the circular file. If you have a lot of time to invest in page layout and graphic arts, so much the better; but a plain old text flyer is far better than no information at all.

E-mail. The aficionados, at least, tend to notice their electronic mail. Critical information can be communicated quite effectively this way. Just be careful not to overdo it: focus the messages, send them selectively, and send only when necessary. People despise junk e-mail more intensely than junk postal mail, and almost as passionately as they hate junk phone calls.

Liaison meetings. Since these are theoretically meetings of the most interested and knowledgeable people at the institution, they should be extremely effective in communicating both directions. In practice, we've found that to be true, but it takes a persuasive agenda, good leadership and participation in the discussion, and a healthy dose of luck to make it work well.

User groups. Emory University has found that focused interest groups are an excellent source of suggestions as well as a natural vehicle for communicating information.24

Management teams. When specific needs are addressed by teams consisting of people "in the trenches" and people from the support service, the level of understanding is deepened quickly and dramatically. Rice University has found this approach effective.25

Conclusion

The real crisis in technology support services is that we are not recognizing the opportunities at hand. To do that, we need to revise our thinking. Technology support services have historically been paternalistic enterprises because they had to be; the technology was inscrutable to most who did not have a strong technological background. Modern technology has erased many barriers, but many of us have been afraid to change with the times. Only when we recognize that information, like love, multiplies when you give it away will we be fully prepared to abandon our crisis thinking in favor of the synergistic behavior that opens the door to the future for everyone.

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20 CAUSE facilitates the sharing of such campus documents through its Information Resources Library. Many of the campus documents are available electronically through the CAUSE Web server (see http://cause-www.colorado.edu/information-resources/ir-library.html) while others can be ordered through the print-on-request service of the Library.


