The Online Help System:

Does it help or hinder information technology professionals who provide desktop support?

by

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of the School of Information and Library Science
of the University of North Carolina at Chapel Hill
in partial fulfillment of the requirements
for the degree of Masters of Science in
Information Science.

Chapel Hill, North Carolina

December 1999

Approved by: _____

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Advisor

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This study examines the effectiveness of an online help system. Specifically, how it affects the reporting frequency of technical support calls. In an effort to lighten the load of those who provide technical support, many companies are implementing online help systems. A combination of data collection and evaluation, survey responses, and user interface design strategies were used in this study. Also, communication theory and human-computer interaction was examined in an attempt to try and provide potential answers in bridging the communication gap between consultants and end users.

Headings:

Communication theory

Human-computer interaction

Web-based support

User interface design

To my father, Louis Henry Middleton, whose untimely death left a deep void in my life. He always emphasized the importance of obtaining a good education.

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I. Introduction

In every environment where a computer exists, computer problems will surely follow. The maintenance of these machines will have its rewarding and stressful moments. In today's workforce, consultants are overwhelmed with computer-related problems. In fact, some companies are in such desperate need of attracting competent consultants that high school students are being offered computer jobs upon graduation. Most computer problems are relatively easy to fix, but most end users are not equipped with the necessary skills to remedy their problems. Just think what would happen if end users were given access to a system which provided easy to follow instructions for resolving some of these problems. The implementation of an online help system may be the answer. An online help system can help educate end users, thereby decreasing downtime and increasing productivity.

Oftentimes, end users are not encouraged to troubleshoot their computer problems. This is a result of strict control imposed by some consultants, as well as a their lack of confidence in some user's ability to follow directions. These are common reasons why consultants do not promote an environment where end users are self-sufficient. Also, some consultants feel threatened when an end user shows initiative in resolving his or her problem, and believe that this type of behavior promotes an autonomous computing environment. Despite these reservations, most consultants will concede that a fair number of support calls can be resolved expeditiously and easily. By promoting a working environment whereby users can resolve some of their own problems, online

help systems coupled with hands-on support can significantly reduce help desk calls.

The purpose of this research was to determine the effectiveness of an online help system. Specifically, how it affects the number of help desk calls being reported. Currently, end users at the Graduate School at University of North Carolina at Chapel Hill report computer problems to technical support staff via telephone, e-mail, or direct office visits. In order to collect pre-test data, end users were encouraged to use an online request form to report all computer problems. These results were used to generate a list of frequently asked questions. The solutions to these questions are provided using PowerPoint slides, and would ultimately serve as the driving force behind the development of the online help system's web page. Post-test data were collected from log file activity stored on the School of Information and Library Science's Unix server. The results are intended to help supply potential answers to the effectiveness of online help systems.

II. Literature Review

In order to succeed in today's fiercely competitive business environment, users are increasingly depending on complex computer technology to do their work. The need to support this technology is great. According to the NASA news magazine, Johnson Space Center Roundup, "help desk calls have grown consistently during the past three years from 68,000 calls in 1994 to 142,000 in 1996. The increase in calls began with the deployment of Windows 95 and Office 95, and continued to increase as more and more NASA employees and contractors began using the Internet and local Intranets (Johnson Space Center, 1997)."

In order to reduce help desk calls, some companies are implementing software packages that support today's mixed platform environments. Whether it is a spreadsheet, e-mail attachment, non-standard document, or any other data created under a non-Wintel environment, some software manufacturers believe that software designed to support multiple formats has the potential to significantly reduce help desk calls.

Donna Knapp explains, "the number of incidents help desks handle is on the rise. In a recent survey, the Help Desk Institute (HDI), found that 74% of its members are experiencing an increase in their volume of service requests. This increase, coupled with management pressure to do more with less, is promoting many companies to make use of technology (p. 118)."

Another step companies are taking to help reduce help desk calls is to offer training classes on the specific applications that employees are using. End users are encouraged and sometimes required to take a certain number of classes per year. Not only does this increase the users' confidence, it also makes them more productive. At the very

least, it keeps them from being left behind due to incompatibility with systems, applications, and skills that have become obsolete. In some environments, users are forced to migrate to newer applications because of some DOS-based application's inability to integrate with the Windows operating system.

In an effort to provide support faster and more efficiently, some help desks believe that tracking problems can give them an advantage in tackling similar problems in the future. In a recent survey conducted by the Help Desk Institute (HDI), Knapp states that "77% of companies have implemented a system to enable their help desks to log and manage problems and requests(p. 119)." Many companies have put in place problem management and call tracking systems. These systems work by internally tracking ticket problems and escalating them to the appropriate support level. Once a ticket is opened, it remains open until the problem has been addressed and resolved. However, some companies cannot afford such elaborate systems and have to generate log files from voice and e-mail messages.

Another approach many organizations are taking in their attempt to reduce technical support calls is on-site training. At the University of North Carolina at Chapel Hill, a full-scale training facility offers a variety of hands-on computer software workshops to its staff, faculty, and students. The workshops are free, and are designed to accommodate users at different levels of proficiency. Classes are taught throughout the academic year. The university has also made computer-based training courses available to any university affiliate who has access to the World Wide Web. By taking advantage of these free services, end users can greatly enhance their technical skills and confidence. More importantly, these contributing factors can prove to be significant in

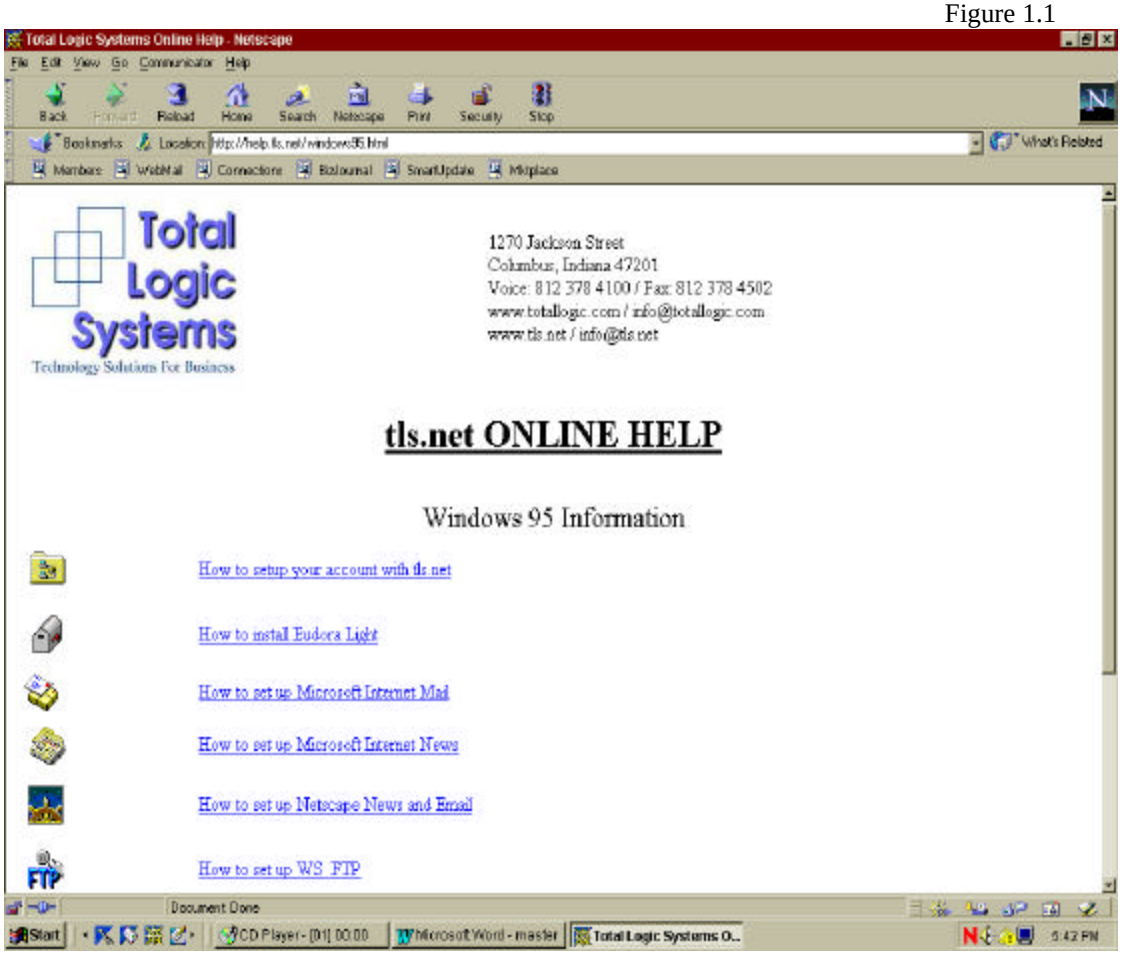
reducing technical support calls.

While training courses may help prevent some problems, others will undoubtedly arise that require a response. In these situations, consultants are increasingly relying on online help systems. Knapp supports this theory stating that, "the proliferation of Web sites and the ease with which information can be delivered through these sites has prompted the support industry to embrace the Web and use it as a new way to support customers. (p. 125)" However, this alternative approach to customer support will not eliminate traditional methods for a number of reasons. Some end users that try to use the Web for support are impatient, which often leads to frustration. Because of this they find themselves reverting to telephone calls and e-mail messages to report computer problems. On the other hand, direct office visits are inevitable due to some users' need to speak to a human being. This type of behavior will not cease until end users reach a comfort level using web-based systems for support.

In Figures 1.1 and 1.2, these illustrations show how some companies and academic institutions have implemented web interface designs to provide technical support to end users. According to the designers of US Department of Agriculture's online help system, "online help has been used mainly by experienced users, with the less experienced user relying on print documentation. (National Soil Information System)" With this in mind, be aware of some of the things that can produce an ineffective help system. Several factors to consider when deciding on a delivery tool are:

1) document design
2) end user familiarity with the system
3) clear sense of purpose for the new system

Figure 1.1


Total Logic Systems Online Help - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Stop
Bookmarks Location: http://help.tls.net/windows95.html
What's Related
Members WebMail Connections Bizjournal SmartUpdate Mktplace
Total Logic Systems
Technology Solutions For Business
1270 Jackson Street
Columbus, Indiana 47201
Voice: 812 378 4100 / Fax: 812 378 4502
www.totallogic.com / info@totallogic.com
www.tls.net / info@tls.net
tls.net ONLINE HELP
Windows 95 Information
How to setup your account with tls.net
How to install Eudora Light
How to set up Microsoft Internet Mail
How to set up Microsoft Internet News
How to set up Netscape News and Email
How to set up WS_FTP
Document Done
Start
CD Player - [01] 00:00
Microsoft Word - master
Total Logic Systems O...
5:42 PM

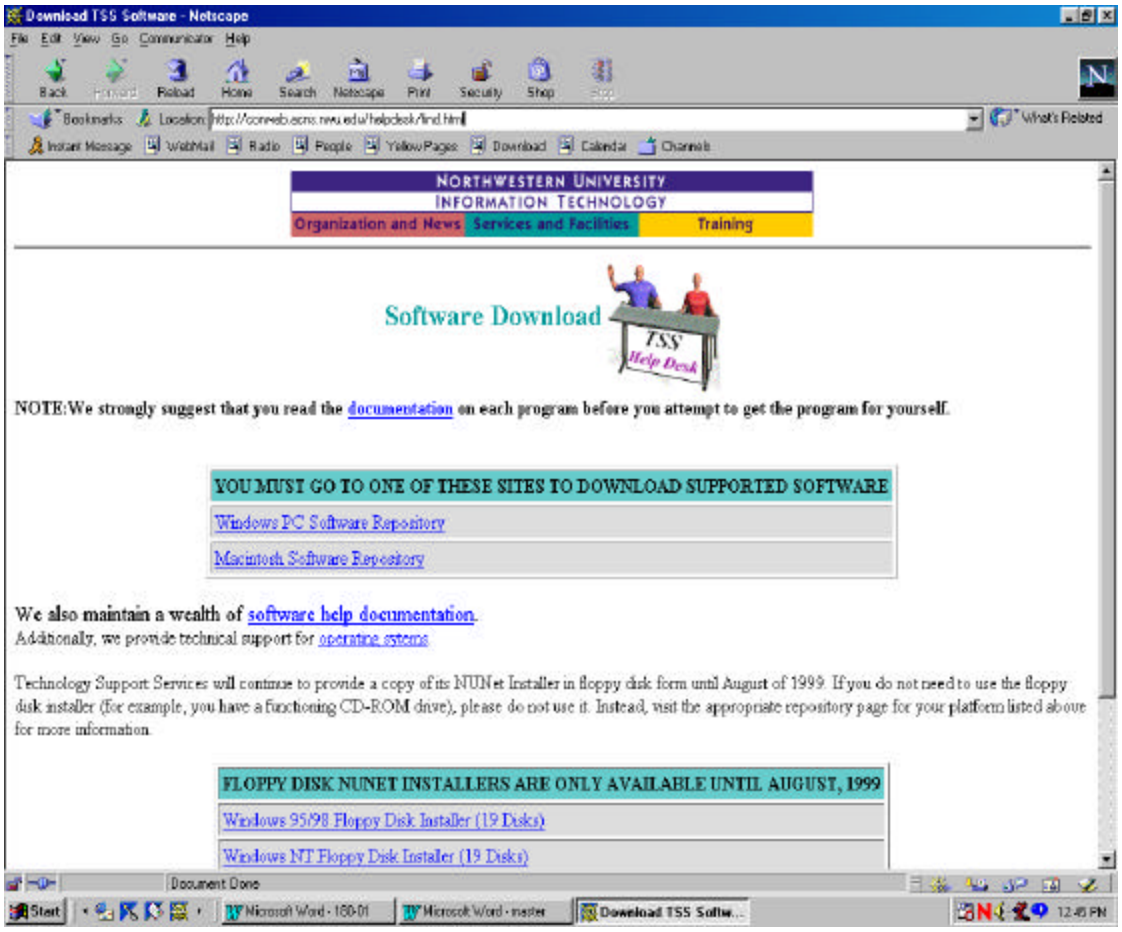

Download TSS Software - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Shop Stop
Bookmarks Location: http://conweb.acns.nwu.edu/helpdesk/find.html
What's Related
Instant Message WebMail Radio People Yellow Pages Download Calendar Channels
NORTHWESTERN UNIVERSITY
INFORMATION TECHNOLOGY
Organization and News
Services and Facilities
Training
Software Download
TSS Help Desk
NOTE:We strongly suggest that you read the documentation on each program before you attempt to get the program for yourself.
YOU MUST GO TO ONE OF THESE SITES TO DOWNLOAD SUPPORTED SOFTWARE
Windows PC Software Repository
Macintosh Software Repository
We also maintain a wealth of software help documentation.
Additionally, we provide technical support for operating systems
Technology Support Services will continue to provide a copy of its NUNet Installer in floppy disk form until August of 1999. If you do not need to use the floppy disk installer (for example, you have a functioning CD-ROM drive), please do not use it. Instead, visit the appropriate repository page for your platform listed above for more information.
FLOPPY DISK NUNET INSTALLERS ARE ONLY AVAILABLE UNTIL AUGUST, 1999
Windows 95/98 Floppy Disk Installer (19 Disks)
Windows NT Floppy Disk Installer (19 Disks)
Document Done
Start
Microsoft Word - 160-01
Microsoft Word - master
Download TSS Softw...
12:45 PM

Figure 1.2

Finally, many organizations are moving towards a standardized work environment, in particular, those who provide technical support. Czegel (1994) explains:

> Supporting a completely standardized environment is every Help Desk's dream. An environment in which standards have been established and are being enforced requires less support than one in which there are no standards. There will be fewer problems that are due to software or hardware incompatibility, therefore customers can be trained more easily. Help Desk staff will only be required to know a limited number of software products, and automation can be more easily employed. The Help Desk in the standardized environment will get fewer calls than its counterpart in the nonstandardized environment. (p. 57)

So then, how can an organization become standardized? There are several ways in achieving a standardized computing environment. The simplest way is to inform decision makers about the cost effectiveness of this type of approach. Also, management must be convinced that product quality will not be sacrificed for lower operating and support costs. While there may be situations in which a nonstandard format may be required to meet specific needs, this usually applies to a small percentage of the end user population.

There exist a plethora of computer support strategies that have been put in place to help ease the burden of technical support calls. However, to be successful, these strategies must have a clear sense of purpose along with service providers who share a common goal. As computer incidents continue to rise, we must draw on proven strategies and embrace new ideas to ultimately reduce support calls and enhance each user's computer knowledge.

III. Methodology

Participants

The participants of this study are comprised of the Graduate School's staff and student assistants at the University of North Carolina at Chapel Hill. Specifically, they consisted of one dean, four associate deans, five doctoral students, two master's students, two undergraduate students, and sixteen full-time staff members.

The overall study was conducted over a three-month period. One month was spent designing the online help system and making sure all links were working properly. One day was used implementing the new system, followed by three weeks of participant observation getting users acclimated to the new system. Approximately four days were used to construct the HOWTO list, which was generated from pre-test data collection. The remaining month was designated for the collection of post-test data.

Design Issues

Before implementation of the online systems, there were some design issues to contend with. In order to capture pre-test data, end users needed a system they could interact with comfortably. Therefore, it was imperative to design an online system that would not be intimidating, especially to low end users. Computer users typically fall into three different groups: novices, intermediate, and advanced. According to Hix and Hartson (1993):

> A novice user often approaches a system with anxiety, possibly with fear. They may also need comprehensible manuals, online tutorials, and demonstrations. An intermediate user prefer simple consistent commands, meaningful sequencing of steps, and easy to remember functions. The advanced user or power user has knowledge about the system. These users want fast interaction, powerful commands and customization of their own interface. (p. 52)

After the initial design of the system, information was gathered regarding the friendliness of its use. Prior to the system's initial implementation, each end user was informed via e-mail about the new reporting system. End users were also encouraged to submit their comments and suggestions about ways in which the reporting system could be improved. This process would involve participatory observation and answers obtain from a questionnaire. The system designer would conduct both processes. The participatory process involved visitation with two participants from each user group to monitor their response to the system. The only intervention by the system designer would be accessing the main web page. From there, each user navigated through the web site as their actions were recorded.

After meeting with each participant, a questionnaire was issued to elicit specific responses from the sample group. To reduce errors sometimes generated by hard to answer questions and questionnaire format, there was one user from each user group selected to inspect the questionnaire before distribution to all participants. Babbie (1998) advises: "the surest protection against such errors is to pretest the questionnaire in full and/or in part. (p. 159)"

The questionnaire contained the web address of the online request form being evaluated. At the bottom of the questionnaire, space was provided for each participant to express his or her concerns on improving the design of the web page. Also, a ratings box accompanied statements so that users could quantify the strengths of their evaluation. Figure 1.3 is an illustration of the online request form. Located in Appendix A, page 29, is a sample copy of the questionnaire.

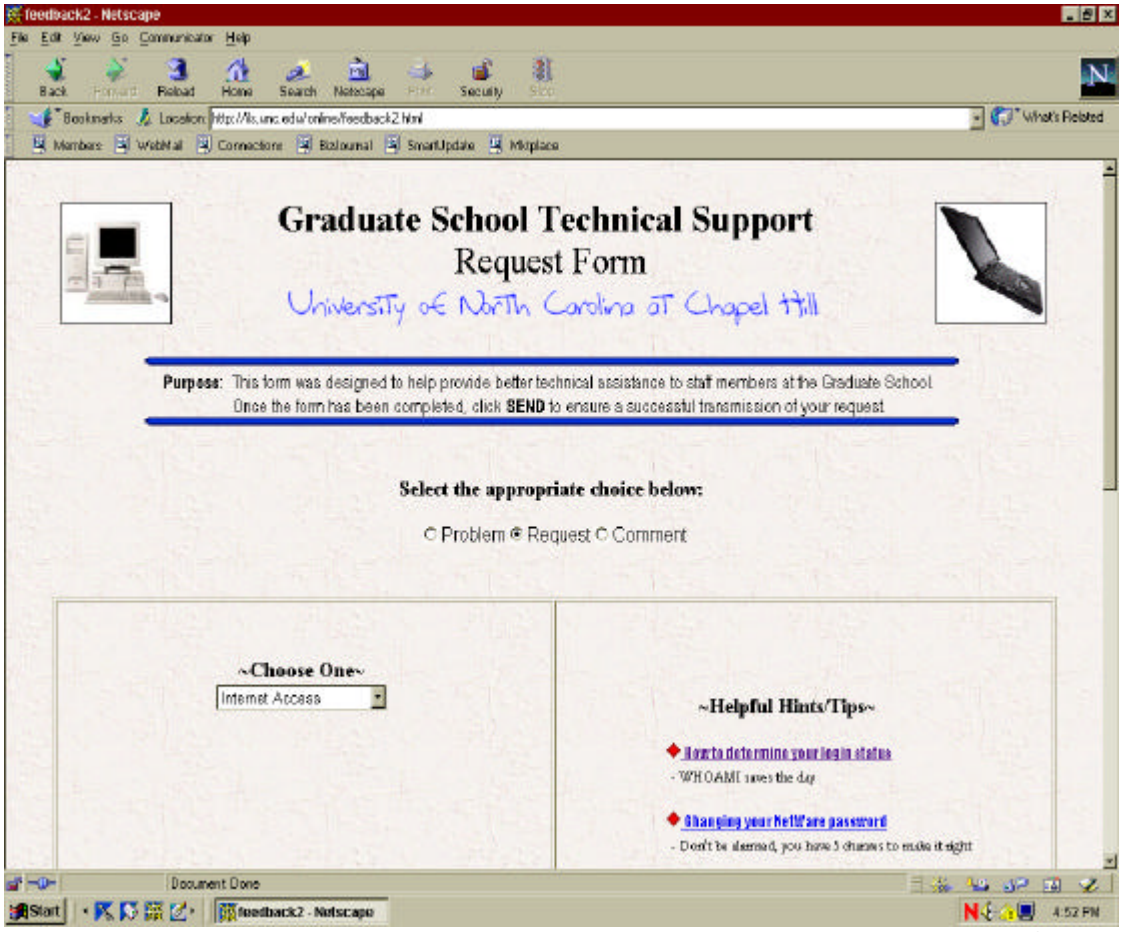

feedback2 - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Stop
Bookmarks Location: http://ls.unc.edu/online/feedback2.html
What's Related
Members WebMail Connections Bizjournal SmartUpdate Mktplace
Graduate School Technical Support
Request Form
University of North Carolina at Chapel Hill
Purpose: This form was designed to help provide better technical assistance to staff members at the Graduate School. Once the form has been completed, click SEND to ensure a successful transmission of your request.
Select the appropriate choice below:
Problem Request Comment
~Choose One~
Internet Access
~Helpful Hints/Tips~
How to determine your login status
- WHOAMI saves the day
Changing your NetID/are password
- Don't be alarmed, you have 5 chances to make it right
Document Done
Start
feedback2 - Netscape
4:52 PM

Figure 1.3

Heuristics

Strengths and Weaknesses

After examining the results obtained from questionnaires submitted by participants, there were adjustments made to the online request form shown in Figure 1.3. As you will notice, this web page violates a key design issue of user interface systems. Lynch and Horton (1997) assert "many human interface researchers and designers of graphic user interfaces have noted the disorienting effect of scrolling on computer screens." It can be cumbersome to some end users when navigational elements disappear off-screen due to long Web pages. Also, Jakob Neilsen (1996) reports, "only 10% of users scroll beyond the information that is visible on the screen when the page comes up."

This page contains links to additional PowerPoint slides as well as a submit button at the bottom half of the page. Because these components are not visible to the user, however, the impression that this is merely a request form is created. End users that view scrolling as an inconvenience often run the risk of missing these important links. Another design flaw is page resolution. The standard format on most computers are 800 by 600 resolution setting. The setting for the online request form is 1024 by 768 pixels. Such a design will present viewing problems for those whose machines have the standard resolution setting.

One of the features that participants did like was the screen shots illustrating solutions. According to a questionnaire comment, "having screen shots that depict the Windows 95 desktop makes step-by-step instructions easier to follow." Samples of the step-by-step instructions are displayed in Appendices B through E. These were designed to allow users to copy actions exactly as they are presented on screen. If properly executed, these step-by-step instructions would prove invaluable to

inexperienced users. These instructions are in accordance to Hix and Hartson's (1993) advice: "for those aspects of the interaction that are difficult, designers should attempt to make them as straightforward and understandable as possible by breaking complex tasks into simpler subtasks. (p. 35)" These subtasks can often be clarified with visual aides. Because of this, textual information was supplemented with graphic illustrations.

Another strength of the web design was the easy access to user information. For instance, the design included two pull-down menus that contain usernames as well as a list of commonly encountered computer problems. Not only do the menus keep the page space from being cluttered, they also make navigation simple and orderly. End users can submit their request just as quickly and easily as picking up a telephone to report their problem. This design approach is supported by Mayhew's advice:

> When use is casual, users are inexperienced, the number of valid inputs is large, and inputs are difficult to spell or remember. Consider providing the option of pop-up or pull-down menus within fields to present entry options. Even if selection is via keyboard entry, it can be faster than entry under these circumstances.

Combining the strengths and weaknesses gathered from questionnaire results and each participant's comments, it was necessary to revamp the online request form. Figure 1.4 illustrates the new and improved online request form that is currently being used at the Graduate School. So far, both end users and consultant are happy with its implementation. Major design changes included:

- the elimination of scrolling
- the movement of ill-placed links to their own page
- the reduction of oversized PowerPoint to ½ screen size

Due to the involved design strategies used to develop the online request form, the online help desk, shown below in Figure 1.5, was much easier to design.

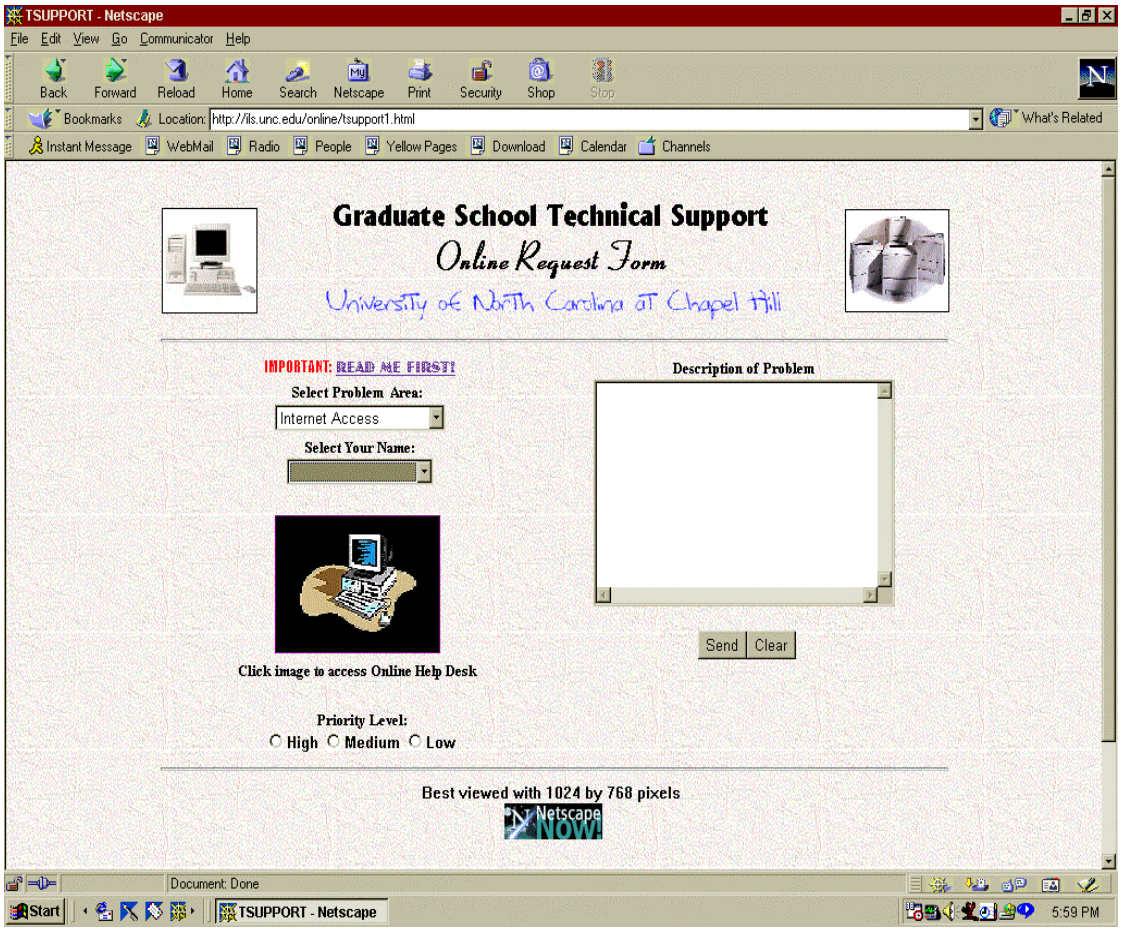

TSUPPORT - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Shop Stop
Bookmarks Location: http://ils.unc.edu/online/tsupport1.html What's Related
Instant Message WebMail Radio People Yellow Pages Download Calendar Channels
Graduate School Technical Support
Online Request Form
University of North Carolina at Chapel Hill
IMPORTANT: READ ME FIRST!
Select Problem Area:
Internet Access
Select Your Name:
Click image to access Online Help Desk
Description of Problem
Send Clear
Priority Level:
High Medium Low
Best viewed with 1024 by 768 pixels
Netscape Now!
Document: Done
Start
TSUPPORT - Netscape
5:59 PM

Figure 1.4


Untitled - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Stop
Bookmarks Location
What's Related
Members WebMail Connections Bizjournal SmartUpdate Mktplace
FIRST TIME VISITORS Click Here !!
HOWTO
Change your network password
Viewing folders
Find a file in Windows 95
Change your screensaver
Change your e-mail password
Create a simple web page
Scan an e-mail attachment
Check your network login status
Remove banner page from printout
Use the online request form
Copy file to a network drive
Manually scan your computer
Set up an alias e-mail account
Create an application shortcut
Arrange icons on desktop
Scan your floppy diskette
Locate your IP address
Format a floppy diskette
Change your Windows password
Check computer disk space
Check computer memory
Scan a picture
Password protect your screensaver
Use File Transfer Protocol (WSFTP)
Start an application automatically
The University of North Carolina at Chapel Hill
Online Help Desk
Information Technology
THE GRADUATE SCHOOL
Information Technology
Request Form
Downloadables
Training Schedule
Contact List
Click on each computer part to open PowerPoint display
IMPORTANT NEWS
Y2K STATUS
- HARDWARE -
INVENTORY DATABASE
COMPUTER VIRUS UPDATE
COLOR LASERJET PRINTING
NETWARE 5 CONVERSION
Y2K STATUS
- SOFTWARE -
RE-WIRING PROJECT
CCI
Document Done

Figure 1.5

Data-Gathering Techniques

Figure 1.6 illustrates how pre-test data was captured. As mentioned previously, end users were required to report all computer-related problems via the online request form. This form used a simple computer graphics interface script that routed each computer request to my campus e-mail account. In order to distinguish these messages from daily messages, each computer request was labeled with a HTTP server header. As these messages arrived, they were placed into the "Request" folder. Post-test data were collected from October 1, 1999 to October 31, 1999. From these results, the HOWTO menu listing was constructed, which provided step-by-step solutions to questions most frequently reported via the online request system.

Figure 1.7 illustrates how post-test data were captured. Almost every Unix server maintains a log file that captures information concerning the activity of directories, subdirectories, and files. In order to determine how many times a file was accessed, the "grep" command was used. This is a Unix command that allows you to search the contents of files for a pattern. After finding the pattern, it will specify the files in which it appeared and print out the relevant information. This command was crucial in determining the number of hits encountered, end user activity, and most searchable topic.

Unlike post-test data, the intent for collecting pre-test data were to determine the most frequently reported problems by end users at the Graduate School. This information proved to be invaluable in targeting specific areas where technical support efforts were intensified.

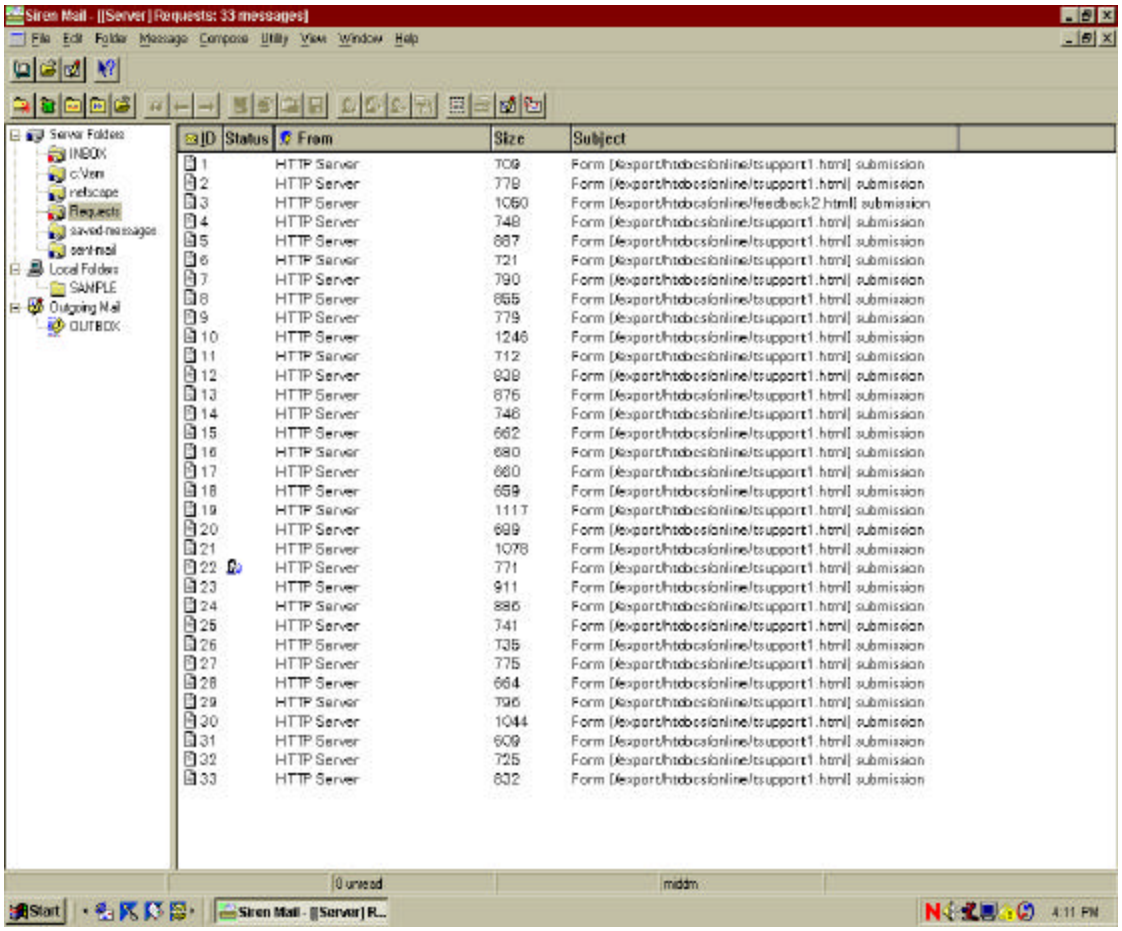

Siren Mail - [[Server] Requests: 33 messages]
File Edit Folder Message Compose Utility View Window Help
Server Folders
INBOX
c:\vm
netscape
Requests
saved messages
sent-mail
Local Folders
SAMPLE
Outgoing Mail
OUTBOX
ID Status From Size Subject
1 HTTP Server 709 Form [/export/htdocs/online/tsupport1.html] submission
2 HTTP Server 778 Form [/export/htdocs/online/tsupport1.html] submission
3 HTTP Server 1060 Form [/export/htdocs/online/feedback2.html] submission
4 HTTP Server 748 Form [/export/htdocs/online/tsupport1.html] submission
5 HTTP Server 687 Form [/export/htdocs/online/tsupport1.html] submission
6 HTTP Server 721 Form [/export/htdocs/online/tsupport1.html] submission
7 HTTP Server 790 Form [/export/htdocs/online/tsupport1.html] submission
8 HTTP Server 655 Form [/export/htdocs/online/tsupport1.html] submission
9 HTTP Server 779 Form [/export/htdocs/online/tsupport1.html] submission
10 HTTP Server 1246 Form [/export/htdocs/online/tsupport1.html] submission
11 HTTP Server 712 Form [/export/htdocs/online/tsupport1.html] submission
12 HTTP Server 939 Form [/export/htdocs/online/tsupport1.html] submission
13 HTTP Server 676 Form [/export/htdocs/online/tsupport1.html] submission
14 HTTP Server 748 Form [/export/htdocs/online/tsupport1.html] submission
15 HTTP Server 662 Form [/export/htdocs/online/tsupport1.html] submission
16 HTTP Server 680 Form [/export/htdocs/online/tsupport1.html] submission
17 HTTP Server 680 Form [/export/htdocs/online/tsupport1.html] submission
18 HTTP Server 659 Form [/export/htdocs/online/tsupport1.html] submission
19 HTTP Server 1117 Form [/export/htdocs/online/tsupport1.html] submission
20 HTTP Server 699 Form [/export/htdocs/online/tsupport1.html] submission
21 HTTP Server 1078 Form [/export/htdocs/online/tsupport1.html] submission
22 HTTP Server 771 Form [/export/htdocs/online/tsupport1.html] submission
23 HTTP Server 911 Form [/export/htdocs/online/tsupport1.html] submission
24 HTTP Server 886 Form [/export/htdocs/online/tsupport1.html] submission
25 HTTP Server 741 Form [/export/htdocs/online/tsupport1.html] submission
26 HTTP Server 735 Form [/export/htdocs/online/tsupport1.html] submission
27 HTTP Server 775 Form [/export/htdocs/online/tsupport1.html] submission
28 HTTP Server 664 Form [/export/htdocs/online/tsupport1.html] submission
29 HTTP Server 796 Form [/export/htdocs/online/tsupport1.html] submission
30 HTTP Server 1044 Form [/export/htdocs/online/tsupport1.html] submission
31 HTTP Server 609 Form [/export/htdocs/online/tsupport1.html] submission
32 HTTP Server 725 Form [/export/htdocs/online/tsupport1.html] submission
33 HTTP Server 602 Form [/export/htdocs/online/tsupport1.html] submission
0 unread
mddm
Start
Siren Mail - [[Server] R...
4:11 PM

Figure 1.6

Host name	Access Date	Information Accessed
218bbynum.grad.unc.edu	- - [03/Oct/1999:17:16:14 -0400]	"GET /online/howto1.gif HTTP/1.0" 304
218bbynum.grad.unc.edu	- - [03/Oct/1999:17:16:14 -0400]	"GET /online/label2.gif HTTP/1.0" 304 -
218bbynum.grad.unc.edu	- - [03/Oct/1999:17:16:14 -0400]	"GET /online/label4.gif HTTP/1.0" 304 -
218bbynum.grad.unc.edu	- - [03/Oct/1999:17:16:14 -0400]	"GET /online/title12.gif HTTP/1.0" 304 -
218bbynum.grad.unc.edu	- - [03/Oct/1999:17:16:14 -0400]	"GET /online/title10.gif HTTP/1.0" 304 -
218bbynum.grad.unc.edu	- - [03/Oct/1999:17:16:14 -0400]	"GET /online/title11.gif HTTP/1.0" 304 -
218bbynum.grad.unc.edu	- - [01/Oct/1999:15:45:22 -0400]	"GET /online/label2.gif HTTP/1.0" 304 -
218bbynum.grad.unc.edu	- - [01/Oct/1999:15:45:22 -0400]	"GET /online/title12.gif HTTP/1.0" 304 -
218bbynum.grad.unc.edu	- - [01/Oct/1999:15:45:22 -0400]	"GET /online/title11.gif HTTP/1.0" 304 -
218bbynum.grad.unc.edu	- - [01/Oct/1999:15:45:22 -0400]	"GET /online/title10.gif HTTP/1.0" 304 -
218bbynum.grad.unc.edu	- - [01/Oct/1999:15:45:22 -0400]	"GET /online/label4.gif HTTP/1.0" 304 -
218bbynum.grad.unc.edu	- - [01/Oct/1999:15:45:22 -0400]	"GET /online/pc.jpg HTTP/1.0" 304 -
218bbynum.grad.unc.edu	- - [01/Oct/1999:15:45:22 -0400]	"GET /online/label3.gif HTTP/1.0" 304 -
218bbynum.grad.unc.edu	- - [04/Oct/1999:11:19:18 -0400]	"GET /online/label2.gif HTTP/1.0" 304 -
218bbynum.grad.unc.edu	- - [04/Oct/1999:11:19:18 -0400]	"GET /online/title12.gif HTTP/1.0" 304 -
218bbynum.grad.unc.edu	- - [04/Oct/1999:11:19:18 -0400]	"GET /online/title11.gif HTTP/1.0" 304 -
218bbynum.grad.unc.edu	- - [04/Oct/1999:11:19:18 -0400]	"GET /online/title10.gif HTTP/1.0" 304 -
218bbynum.grad.unc.edu	- - [04/Oct/1999:11:19:18 -0400]	"GET /online/label4.gif HTTP/1.0" 304 -
218bbynum.grad.unc.edu	- - [04/Oct/1999:11:19:18 -0400]	"GET /online/pc.jpg HTTP/1.0" 304 -
218bbynum.grad.unc.edu	- - [04/Oct/1999:11:19:18 -0400]	"GET /online/label3.gif HTTP/1.0" 304 -
152.2.44.123 -	- [04/Oct/1999:16:52:33 –0400]	"GET /online/helpdesk.html HTTP/1.0" 4
210bynum.grad.unc.edu	- - [04/Oct/1999:17:12:56 –0400]	"GET /online/howto1.gif HTTP/1.0" 304 -
210bynum.grad.unc.edu	- - [04/Oct/1999:17:12:56 –0400]	"GET /online/title12.gif HTTP/1.0" 304 -
210bynum.grad.unc.edu	- - [04/Oct/1999:17:12:57 –0400]	"GET /online/title10.gif HTTP/1.0" 304 -
210bynum.grad.unc.edu	- - [04/Oct/1999:17:12:57 –0400]	"GET /online/title11.gif HTTP/1.0" 304 -
210bynum.grad.unc.edu	- - [04/Oct/1999:17:12:57 –0400]	"GET /online/label2.gif HTTP/1.0" 304 -
210bynum.grad.unc.edu	- - [04/Oct/1999:17:12:57 –0400]	"GET /online/label3.gif HTTP/1.0" 304 -
210bynum.grad.unc.edu	- - [04/Oct/1999:17:12:57 –0400]	"GET /online/label4.gif HTTP/1.0" 304 -
210bynum.grad.unc.edu	- - [04/Oct/1999:17:12:57 –0400]	"GET /online/label5.gif HTTP/1.0" 304 -
217bynum.grad.unc.edu	- - [04/Oct/1999:17:14:42 –0400]	"GET /online/title12.gif HTTP/1.0" 304 -
217bynum.grad.unc.edu	- - [04/Oct/1999:17:14:42 –0400]	"GET /online/title10.gif HTTP/1.0" 304 -
217bynum.grad.unc.edu	- - [04/Oct/1999:17:14:42 -0400]	"GET /online/title11.gif HTTP/1.0" 304 -
217bynum.grad.unc.edu	- - [04/Oct/1999:17:14:42 -0400]	"GET /online/label2.gif HTTP/1.0" 304 -
217bynum.grad.unc.edu	- - [04/Oct/1999:17:14:42 -0400]	"GET /online/label3.gif HTTP/1.0" 304 –

Figure 1.7

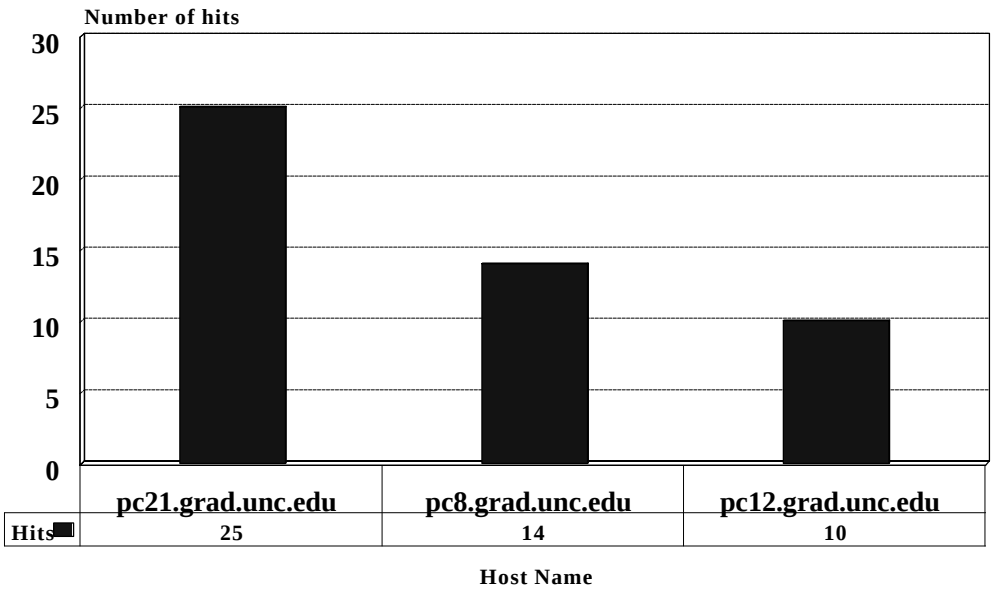
IV. Data Analysis

The data were analyzed manually using the results produced by the Unix command, "grep". Figure 1.7 depicts the host name, access date, and information accessed. As each file was accessed, it was documented automatically into the Unix system's log file. After issuing the [**grep -i "get /online/helpdesk.html" access_log > /my_access.txt**] command at the **/var/log/httpd** subdirectory, information was extracted to a text file containing hits made to the online help desk's home page. Each hit represented a single request from a web browser for a single item from a web server.

Figures 1.8, 1.9, and 1.10 are charts constructed based on the results taken from the Unix system's log file. Before constructing each chart, information was sorted in Figure 1.7 by host name and IP address. Registered addresses appear in text, while unregistered addresses appear in numerical form. Therefore, IP address and hostname are identical. Information extracted from this log file would determine who were the top hitters, and the most frequently accessed PowerPoint slides. Key elements in making these determinations were the helpdesk.html file, files ending with the ppt extension and IP/host name addresses. After performing a sort on each of these elements, the following graphs were produced:

Top 3 Hitters
By Host Name

Online Help Desk Activity

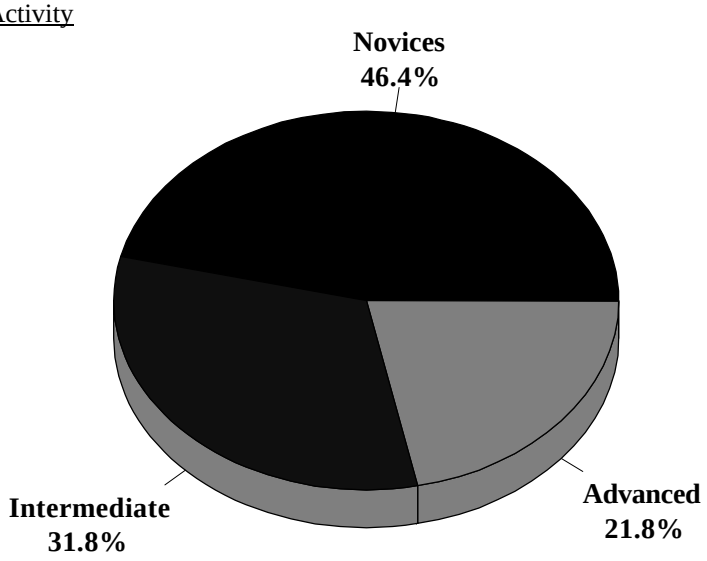


Data collected from Oct 1 - Oct 31, 1999 Based on 125 hits

Chart 2.1

Percentage of Hits
By User Type

Online Help Desk Activity



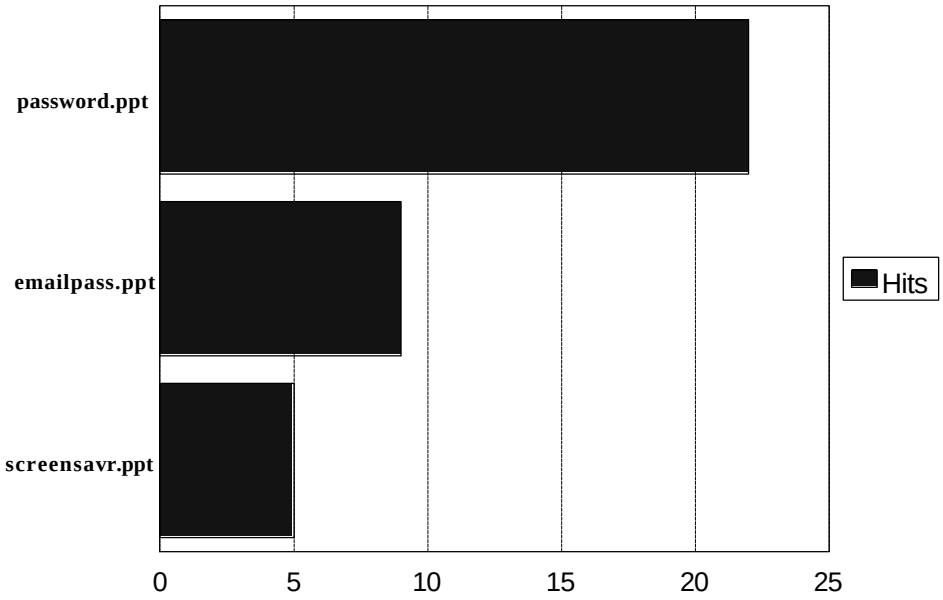
Data collected from Oct 1 - Oct 31, 1999

Based on 27 users

Chart 2.2

Top 3 Accessed File

PowerPoint Slides



Data collected from Oct 1 - Oct 31, 1999

Based on 27 users and 125 hits

Chart 2.3

V. Results and Findings

The results from the server's log file clearly show that users immediately embraced this new system. The top requester of services from this page accounted for 1/5 (25 out 125 total hits) of all the total hits. A closer examination of the activity log file indicates that the top hitter accessed every GIF, PowerPoint slide, and link from the home page. Also, based on IP/host name addresses, each user accessed the new system at least once.

Further investigation shows that each user accessed a minimum of two PowerPoint slides. The average number of hits for the month was 4.6 per user. Also, the most accessed PowerPoint slide was password.ppt. As expected, this slide illustrates how to change an expired password. This study proved to be consistent with other research findings. In a recent Novell advertisement, an anonymous author stated, "research shows that 40% of all help desk calls are a result of users having to change their password. (Novell, Inc.)"

This research also reflected the activity of each of the three user groups. The study shows that intermediate and novice users were the most active. They accounted for almost 80% of the total hits. This high-hit percentage could very well reflect the design factors in this research. One of the major design goals while developing this system was to ensure that the ability to use it would not supersede the skill level of low end users. Christine Faulkner (1998) asserts, "systems should be user-friendly and resilient. (p. 141)" As end users become more familiar with the material contained in the online help system, more difficult solutions will be added.

Finally, the intent of this study was to provide potential answers concerning the

effectiveness of an online help system. Specifically, how it affects the reporting frequency of technical support calls. Although the slightest decrease in support calls would be considered a positive influence, help desk calls continued to flow in at the same frequency. However, this study confirmed that online help systems can serve as a viable alternative to information technology professionals who provide desktop support. More importantly, information gathered from this study provided new insights about ways in which technical support strategies could be vastly improved.

End users continued to report service requests at a high rate. The main contributing factor for such high influx of requests was due to end users not being able to identify what their problems were. There exists a "language barrier" between consultants and end users and how these two groups communicate. Below are two direct quotes from end users who were apart of the research group. According the first user, this person stated:

> Could you tell me why there is an additional sheet of paper that precedes my actual printout? This page has my initials on it, and I cannot get it to stop printing. I went to the online help desk, but there were no solutions present. Could you please help me?" (Quotation from end user)

Had this user known the appropriate terminology that describes this sheet of paper, the problem could have been resolved. This sheet of paper is commonly referred to as a banner page. There is link that exist on the online help desk that explains how to remove a banner page. Therefore, the solution did exist, but the end user did not know the correct terminology. Conversely, the second user's experience was quite different. This person stated:

> I just received an e-mail attachment, and I know that this is one of the fastest ways in which computer viruses are transmitted. I recall from one of your previous postings, that it would be best to scan an attachment before opening. I thought to myself, I know how to do this. I immediately went to your online help desk and downloaded the appropriate PowerPoint slide, which explains how to scan an e-mail attachment. After scanning the attachment, it showed that the file contained no viruses. (Quotation from end user)

In an attempt to bridge the communication gap, it would be fitting to have a system whereby computer users can be taught the appropriate jargon used in the information technology. It will remain difficult to have an effective online help system if this gap continues to widen.

According to Korfhage, "the great variety of information needs that a system must handle makes development of the system a challenging task. This development involves process, product, and feedback. (p. 10)" During feedback, a consultants can use this opportunity to educate end users about appropriate terminology used by IT professionals. Figure 1.8 illustrates how this process works. As you will notice, communication is vitally important in bridging the communication gap between consultants and end users.

In the computer industry, creating a more knowledgeable end user environment is a major goals of most IT professionals. Although feedback is crucial in this endeavor, we must continue to develop innovative strategies that will collectively educate end users. One step in that the direction would be to incorporate computer literacy programs with employee orientation. This strategy would enhance the computer skills of new employees and thus promote a more knowledgeable end user environment.

Communication Feedback Diagram

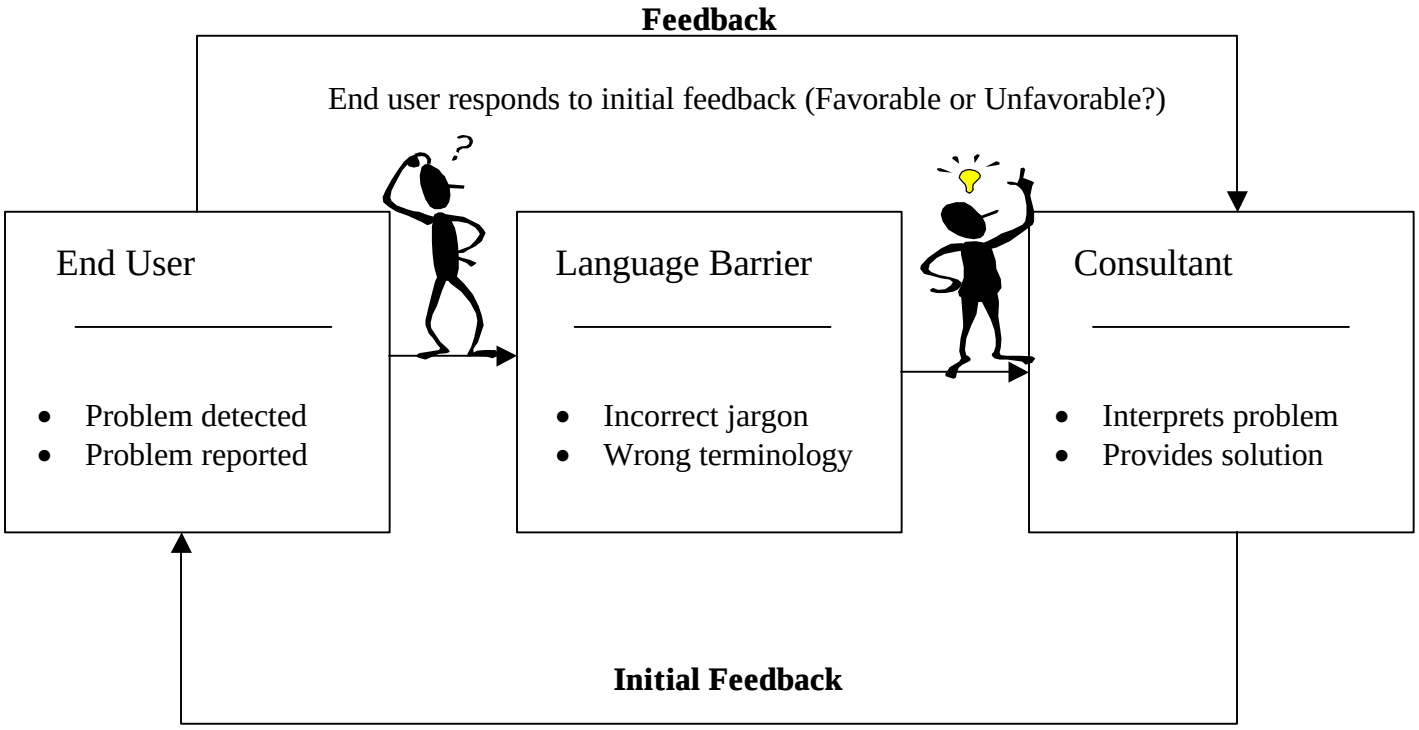


Figure 1.8

VI. Significance of Work

Measuring the effectiveness of online help systems and their contributions to the reporting of computer problems is in desperate need of further research. A well-designed online help system will be a more effective support tool once the communication gap between consultants and end users is closed. In doing so, it can create a more productive work environment for everyone.

Moreover, in an industry where there is a shortage of competent computer professionals, online help systems can serve as an alternate way whereby users can help themselves. Other key components in the quest to reduce help desk calls are e-mail listserves, computer support groups, and standardized workstations. In response to this growing need, computer software manufacturers like Novell and Microsoft have implemented push technology and policy packages to enhance system management. This technology rebuilds computer configurations each time a user logs in. It also can restrict each user's ability to modify default settings.

In an ideal world, we would have end users who are self-sufficient and computers that never needs maintenance. Until that happens, we must use every available tool at our disposal to work smarter and not just harder at resolving computer problems.

VII. Conclusion

Although this research did not produce expected results, it did illuminate the areas in which further research should be concentrated. On the positive side, end users appear motivated in trying new things they may not have tried three months ago. Many of the users have been able to take advantage of the simplicity of the PowerPoint slides to identify their problems, access the online help system, and solve their problems. Even so, there is still much research to be done to create more efficient online help systems.

In terms of the actual research, these results would not have been possible without a well thought out approach in designing user interface systems. By conducting a survey, the end users played a significant role by submitting their opinions on addressing system design issues. Other areas that prove to be beneficial are the collection and evaluation of data. Without these results, it would be difficult to narrow down specific areas where extensive research should be conducted.

Finally, with the emergence of Windows 95, help desk calls skyrocketed to record levels and have continued to rise. As if that was not enough, the implementation of Windows 2000 is just around the corner. Are we ready for the new millennium? Only time (and the consultant's pager number) will tell! The best approach is take proven strategies pre-millennium years and apply them aggressively in the new millennium. With careful planning and additional research, we will be able to provide better support for the years to come. Ultimately, a reduction of support calls will depend on our ability to foster a more knowledgeable user environment.

Appendix A

Online Request Form Questionnaire

http://ils.unc.edu/online/feedback2.html

1 – Agree strongly
2 – Agree slightly
3 – No opinion
4 – Disagree slightly
5 – Disagree strongly

Characters were easy to read on main page
1 2 3 4 5

Main page consists of too many fonts
1 2 3 4 5

Main page contains sufficient instructions
1 2 3 4 5

Main page contains too many images
1 2 3 4 5

Main page is color coordinated
1 2 3 4 5

Main page is easy to navigate
1 2 3 4 5

Main page information is properly aligned
1 2 3 4 5

This system will be useful in providing support
1 2 3 4 5

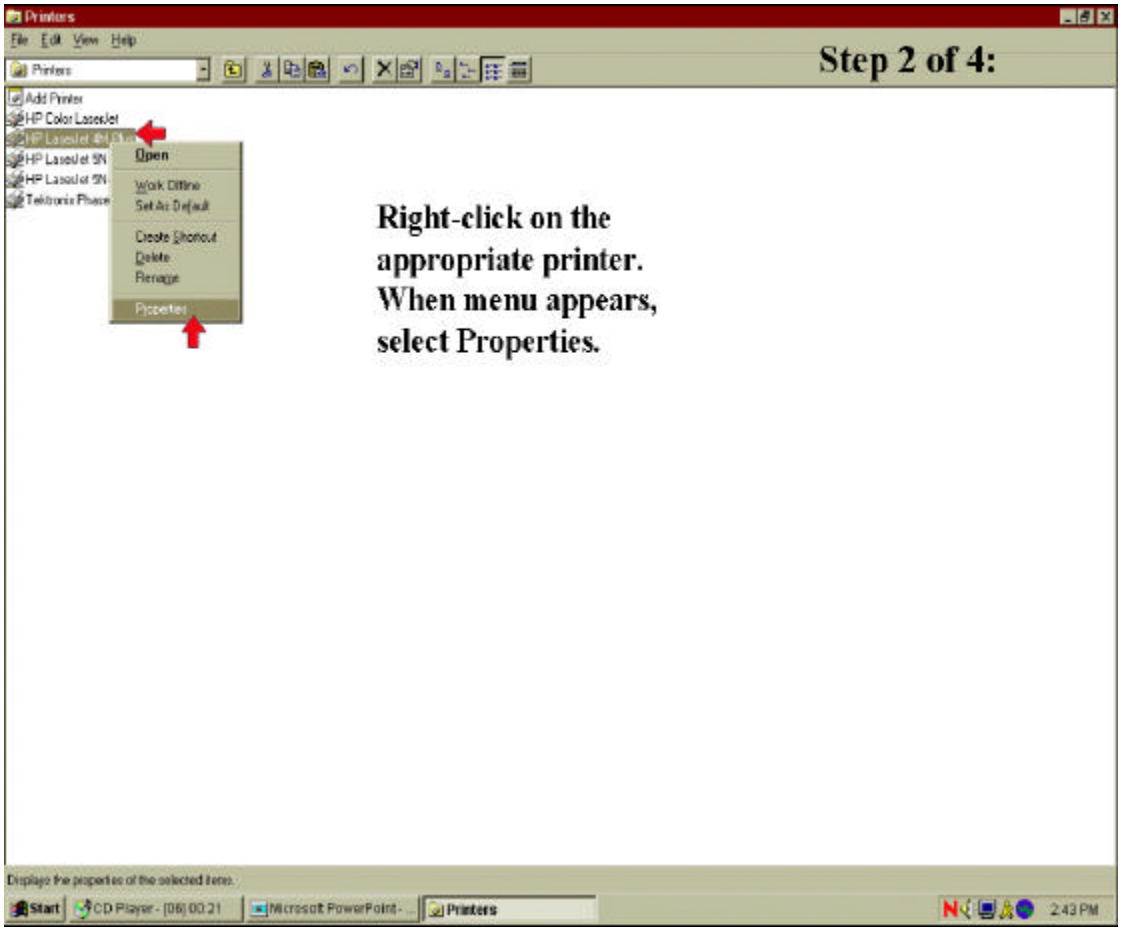
Please give your comments on how the design of the online request form could be improved.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

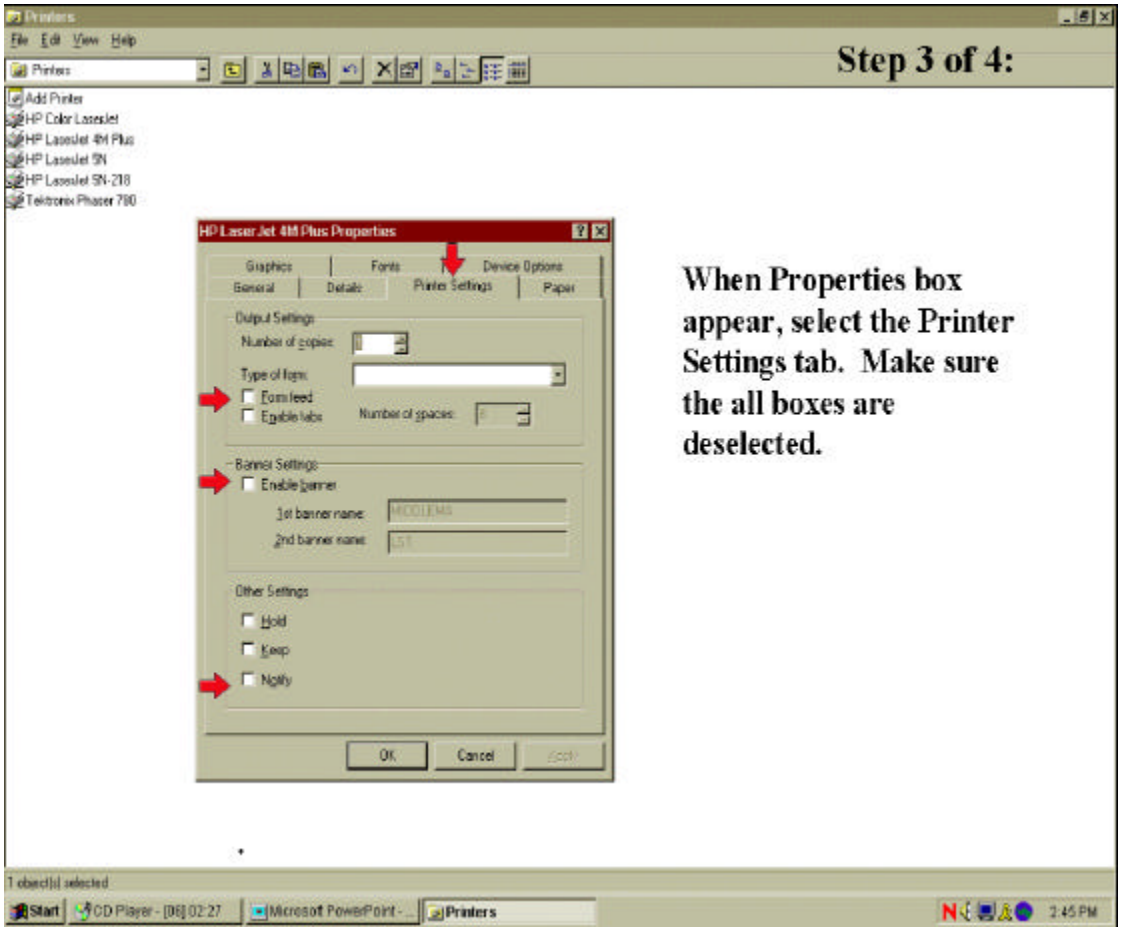
Appendix B


Step 1 of 4:
Click Start button, scroll to
Settings and select Printers
COMPAQ
Start
Control Panel
Printers
Taskbar...
2:42 PM

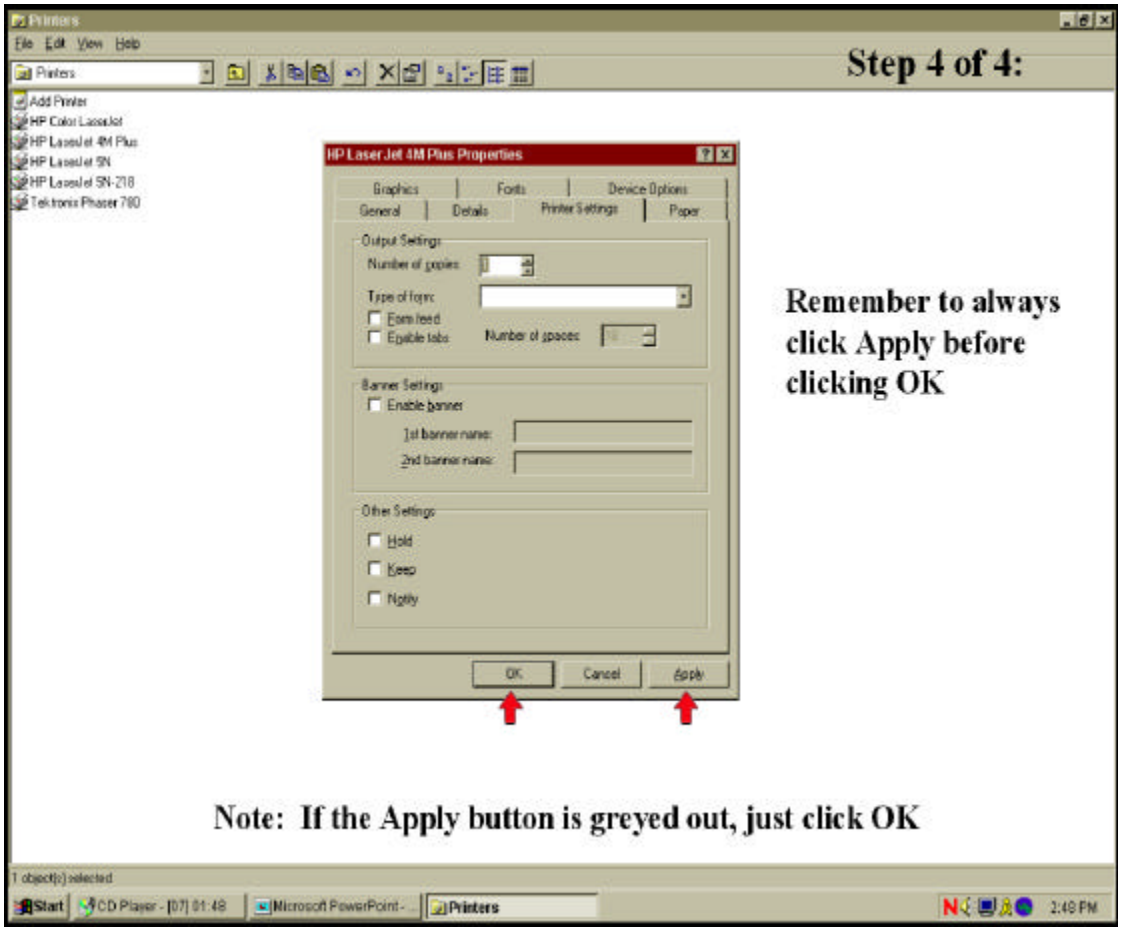
Appendix C


Printers
File Edit View Help
Printers
Add Printer
HP Color LaserJet
HP LaserJet 4Si SX
HP LaserJet 5N
HP LaserJet 5N
Tektronix Phaser
Open
Work Offline
Set As Default
Create Shortcut
Delete
Rename
Properties
Step 2 of 4:
Right-click on the appropriate printer. When menu appears, select Properties.
Displays the properties of the selected items.
Start
CD Player - [06] 00:21
Microsoft PowerPoint - ...
Printers
2:43 PM

Appendix D


Step 3 of 4:
When Properties box appear, select the Printer Settings tab. Make sure the all boxes are deselected.
HP LaserJet 4M Plus Properties
Graphics
Fonts
Device Options
General
Details
Printer Settings
Paper
Output Settings
Number of copies:
Type of form:
Form feed
Enable tabs
Number of spaces:
Banner Settings
Enable banner
1st banner name:
2nd banner name:
Other Settings
Hold
Keep
Notify
OK
Cancel
Printers
Add Printer
HP Color Laserjet
HP Laserjet 4M Plus
HP Laserjet 5N
HP Laserjet 5N-218
Tektronix Phaser 780

Appendix E


Step 4 of 4:
HP LaserJet 4M Plus Properties
Graphics
Fonts
Device Options
General
Details
Printer Settings
Paper
Output Settings
Number of copies:
Type of form:
Form feed
Enable tabs
Number of spaces:
Banner Settings
Enable banner
1st banner name:
2nd banner name:
Other Settings
Hold
Keep
Notify
OK
Cancel
Apply
Remember to always click Apply before clicking OK
Note: If the Apply button is greyed out, just click OK

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