Library Services for Engineering and Technology Distance Learning Programs. Results of a Survey.

Nestor L. Osorio
Associate Professor and Science-Engineering Librarian, Northern Illinois University. Founders Library 303, DeKalb, Illinois, U.S.A. E-mail: c60nlo1@wpo.cso.niu.edu

Distance learning programs for engineering and technology fields have shown a continuing growth in the nineties, and the question of how academic libraries are responding to this form of teaching is one in need of more exploration. In order to gain some better understanding on this matter, a questionnaire was mailed in the spring of 1996 to seventy libraries of institutions offering academic programs in engineering or technology fields through distance learning. Questions dealt with remote access to electronic resources, assistance and instruction, delivery of materials, and institutional support. In general these libraries are making available services to distance learning programs by expanding existing ones, rather than creating services exclusively for dl users. Libraries are also experimenting with pilot programs on ways to serve these users. On the other hand, there are indications that the institutional support to libraries for these services is at a minimal level. There are some apparent variances on the level of services libraries offer to bachelor, master and beyond-master programs.

Introduction

Distance education has a significant role in the history of American higher learning. For over one hundred years it has served students at different levels of education. More recently, in the nineteen sixties and seventies new technologies - like educational television - (McCormack, 1996) were introduced in distance education but it has been in the last few years when with the use of more advanced telecommunication and computer technology that the virtual classroom has become a reality. There are several excellent definitions for distance learning and for the purpose of this study the one by the editors of *Petersons' Distance Learning* will be used: " Distance Learning is the delivery of educational programs to off-site students through the use of technologies such as cable or satellite, video and audiotapes, fax, computer modem, computer and video conferencing, and other means of electronic delivery." (Peterson's Distance Learning, 1997).

The above definition identifies that the visual extension of the classroom provided by the use of video communication has given educators the ability to communicate to multiple classrooms (Walsh & Reese, 1995). Furthermore, other well-established media as such audio and video cassettes as well as the use of the Internet/WWW (Boettcher & Conrad, 1997) are pushing for making "distance learning a core educational strategy in the 1990s." (Walsh & Reese, 1995).

Opportunities for distance learning programs has multiplied in the last few years in part due to the technology available today (Walsh & Reese, 1995), in part due to the perceived need of adult learners to be engaged in

lifelong learning activities in order to be up to date in their fields or to move into new professional areas (Peterson's Distance Learning, 1997). During a time of decline in enrollment distance learning also gives to some universities the potential to enter a market that can help with their budget. Therefore, they and are willing to invest in communications and computer technology (Rosenquist-Buhler, 1996).

Today, undergraduate and graduate programs are provided in engineering and technology by a large number of accredited institutions through a variety of networks, consortia and other arrangements. Though not all the courses in a programs may be available through distance learning, the work done at remote locations is accepted as part of it. Distance learning courses often require class participation, trips to the campus and students usually followed the same time-schedule as the on-campus bound (Peterson's Distance Learning, 1997). Having the same academic requirements as on-campus students distance learners, therefore, have the expectations of receiving the same level of support services provided by the institutions to the former.

Pedagogical changes abound: "Some of the ways students can communicate are electronic mail, phone, fax, and Web site with bulletin boards, online seminars, and conferences. Students can submit their assignments online, or they can use snailmail or fax." (Boettcher & Conrad, 1997). On the other hand "library professionals have focused on enhancing collection development and access through increased use of in-house and remote electronic databases." (Rosenquist-Buhler, 1996).

It is in this complex educational environment that librarians in charge of supporting engineering and technology programs must operate. The examination of providing library services to distance learning programs and the more traditional work for on-campus programs is the foundation for the present study. The question that forms the basis for this project is: What can be said about the current status of library services to support distance learning programs in engineering and technology? Library services entails many activities; the present study tries to examine the aspects of "(1) remote access to electronic resources, (2) assistance and instruction, and (3) delivery of materials." (Rosenquist-Buhler, 1996). The three aspects of library services covered by this survey may represent the main components of a model for library support to remote learners; a description of such a model is discussed in a recent paper by Jones and Moore. (Jones & Moore, 1997).

Finally, the present work tries to study the extent to which library services are available to faculty members, students and staff involved in distance learning activities. The results of this survey should not be taken as an absolute picture of the general question posted above, neither do they reflect library programs available at all institutions.

The Survey

In order to investigate how libraries are providing services to distance learning users from engineering and technology programs, a survey of academic libraries at selected institutions that offered degree programs through distance learning in engineering and technology was undertaken in the spring of 1996. As is mentioned above the principal purpose of this study is the examination of services libraries provide to degree granted programs in engineering and technology through distance learning. To achieve that, a list of institutions from

Peterson's Distance Learning Web site was obtained. Institutions of higher learning that were listed under engineering and technology fields and that offered bachelor's, or beyond-bachelor=s degree programs were selected. This list included institutions from all geographical regions of the United States, private and public schools. The institutions included in the survey are: Arizona State university, Auburn University, Boston University, California State University-Dominguez Hills, California State University-Fullerton, California State University-Los Angeles, California State University-Northridge, Central Missouri State University, City University-Bellevue-Wa., Colorado State University, East Carolina University, Embry-Riddle Aeronautical University, Georgia Institute of Technology, GMI Engineering and Management Institute, Indiana State University, Iowa State University, Kansas State university, Lehigh University, Michigan State University, Michigan Technological University, Mississippi State university, National Technological University, New Mexico State University, New Jersey Institute of Technology, North Carolina State University, Northeastern University, Old Dominion University, Oklahoma State University, Pennsylvania State University-Park Campus, Purdue University-West Lafayette, Rensselaer Polytechnic Institute, Rochester Institute of Technology, Roger Williams University, San Jose State University, Southern Methodist University, Stanford University, State University of New York at Buffalo, Stevens Institute of Technology, Texas Tech University, University of Alabama in Huntsville, University of Alabama-Toscaloosa, University of Arizona, University of California-Santa Barbara, University of Colorado at Boulder, University of Houston, University of Houston-Clear Lake, University of Idaho, University of Illinois at Urbana-Champaign, University of Iowa, University of Maryland-University College, University of Massachusetts-Amherst, University of Missouri-Kansas City, University of Nebraska-Lincoln, University of New Mexico, The University of New York-Regents College, University of North Dakota, University of Phoenix, University of South Carolina-Columbia, University of South Carolina at Union, university of South Florida, University of Southern California, University of Tennessee-Knoxville, University of Tennessee-Space institute, University of Texas at Arlington, University of Virginia, Virginia Polytechnic Institute and State University, Wayne State University, Western Oregon State College, and Worcester Polytechnic Institute.

Programs are offered in the following disciplines: Aerospace, aeronautical & astronautical engineering; Bioengineering and biomedical engineering; Chemical engineering; Civil engineering; Civil engineering technology, Computer engineering, Electrical and electronic engineering-related technology, Electrical, electronics and communications engineering; Engineering; Engineering science; Engineering related-technologies; Engineering/industrial management; Environmental control technologies; Environmental/environmental health engineering; Fire protection; Geological engineering; Industrial equipment maintenance and repairs; industrial production technologies; Industrial/manufacturing engineering; Materials engineering; Mechanical engineering; Mechanical Engineering-related technologies; Nuclear & industrial radiologic technologies; Quality control and safety technologies; Surveying; and Systems engineering. There are four degrees offered: bachelor degree, master degree, graduate certificate, and doctoral degree. Undergraduate certificates and Associate degrees are not included in this study. A total of 70 libraries were mailed questionnaires. Participants had the option of answering the questionnaire via surface mail, e-mail or fax. After an initial mailing and one follow-up mailing, 36 responses were received (a 51.43% return rate). This return rate might limit the scope of the conclusions, but since the purpose of the study is to get a better understanding of this matter, the responses offer a solid ground to discuss how libraries are servicing this type of user.

A set of questions was asked to be answered by the engineering librarian or by other qualified staff members. These questions first focused on the extent libraries provide remote access to electronic resources for users at other locations, such as branch campuses, satellite classrooms, offices, labs, and homes. The librarians were asked about online catalogs, indexes databases, electronic journals, fulltext databases, and subject specialized Internet sites. They were asked about how these services were obtained by the library such as files mounted, vendor's files, or other methods of obtaining them.

The librarians were asked about the assistance and instructional services distance learning users can obtain at remote locations, such as library homepage and electronic reference. Librarians were asked about the way delivery of library materials is done, such as electronic document services, and electronic reserve. Finally, librarians were asked about the institutional support libraries are receiving to provide services to distance learning users.

As is noted, the number of questions is fairly extensive, so the entirety of the questionnaire, along with the responses, are in Appendix A and B.

It is interesting to compare the geographical distribution of schools listed above. According to the source used, Peterson's: Distant Learning Web site, it appears that distance learning programs for engineering and technology are flourishing in all regions of the country. A comparison of a number of institutions surveyed and of the respondents in four geographical areas was made. The percentages for both the population and the respondents are shown in Table 1. Geographical areas were defined according to the *U.S. Bureau of Census County and City Data Book 1994*. It is also interesting to compare the proportion of the population and the respondents by the type of governance (public or private). The percentage of each are presented in Table 2. Finally, a comparison of the population and the respondents by type of degree offered was also done. A list of degrees offered was obtained from Peterson's: Distance Learning Web site. Table 3 shows the distribution of these percentages. These statistical results are an indication of the expansion of distance education programs for engineering and technology in America.

TABLE 1. Proportions of respondents by geographical areas

Area	Proportion of (%) Population	Respondent
NorthEast	18.57	19.44
MidWest	21.43	22.22
South	32.86	36.11
West	27.14	22.22

TABLE 2. Proportions of respondents br governance

Governance	Proportion of (%) Population	Respondent
Public	75.71	83.33
Private	24.29	16.37

TABLE 3. Proportions of respondents by degrees offered

Degree	Proportion of (%) Population	Respondent
Bachelor	9.09	8.91
Master	78.79	80.20
Other graduate degrees	12.12	10.89

Results

The fundamental question behind this study is about the services libraries are providing to distance learning programs in engineering and technology. These schools and programs reported in Peterson's Distance Learning Web site, and according to the respondents are not always entirely available through distance learning but a combination of remote learning and on campus teaching might occur. The first part of the questionnaire dealt with remote access to electronic resources. This section covers questions 2 to 7, see Table 4 and Appendix B. Having access to the school's online catalog is a very basic service for distance learning users. The responses indicate that 34 of the 36 respondents have available an online catalog or 94.44 percent. Why don't all schools have online catalogs? To answer this question we must understand that there are accredited institutions of higher learning which are solidly responsible for delivering the courses only. They expect the host institution - usually an corporate center - to provide the support. Question 3 investigates the availability of remote access to electronic indexes, 31 schools or 86.11 percent indicate having electronic indexes databases either mounted by the library, provided by a vendor or through other sources. Are electronic journals are available to distance learning users? The responses shows that 20 schools or 55.55 percent have this service, while more often - 85 percent of those with this service - a vendor provides them rather than being mounted by the libraries or by other sources. Full-text databases not including journals - for example patents or technical

reports - are made available by 13 institutions or 36.11 percent. Finally, 22 schools or 61.11 percent make available for distance learners packages of organized subject specialized Internet sites.

TABLE 4. PART 1
Remote Access to Electronic Resources

2. Online catalog	34 (94.44)
3. Indexes databases	31 (86.11)
4. Electronic journals (e.g. IEEE journals)	20 (55.55)
5. Fulltext databases (e.g. ASTM standards)	13 (36.11)
6. Subject specialized Internet sites	22 (61.11)
7. Other _____	0

Part two of the questionnaire is about services provided by libraries to assist students and faculty members of distance learning programs, see Table 5. This assistance could be in the form of, for example, answering reference questions or providing instruction on using library related paper or electronic materials. In this section libraries were asked to respond if this kind of service was available at remote locations such as satellite campuses, at remote classrooms, offices outside main campuses and users' homes. A library homepage is the main avenue where libraries made available their online catalog and an increasing number of other resources and services; 34 libraries or 94.44 percent of the respondent institutions have a library homepage. A reference hot line - such as an 800 number or other type of priority reference support - is available in 14 libraries which represents 38.89 of the responses. Question 10 is about electronic reference, this service is more common and is available in 26 libraries or 72.22 percent. Further, only 5 libraries or 13.89 percent have library video instruction for users in remote sites, while, in the question about interactive library web instruction, 10 libraries or 27.78 percent responded positively. Actual distance learning library instruction which in this case means using distance learning technology - such as video transmission to a remote classroom - to teach about library services was found in 7 libraries or 19.44 percent. Libraries were also asked about the participation of librarians in distance learning sites as part of a teaching or consulting team. A low 25 percent or only 9 libraries responded having librarians participating at such a level. Question 16 asked if there were handouts and bibliographies made in print or electronically (on the homepage) for remote users and 31 libraries or 86.11 percent say that they have made this kind of information available to distance learning users. Finally, in question 17 a formal agreement with a consortium to provide library assistance to distance learners in remote locations was reported by 14 libraries which represents a 38.89 percent of the responses; and, in the last question of this section 2 libraries indicated having other ways of providing assistance and instruction: one uses phone and e-mail assistance; the second one makes accessible through the library homepage course related materials such as course syllabi, schedules lecture notes, etc.

TABLE 5. PART 2
Assistance and Instruction

	YES
8. Library home page	34 (94.44)
9. Reference hot line	14 (38.89)
10. Electronic reference	26 (72.22)
11. Library video instruction in remote location	5 (13.89)
12. Interactive library Web instruction	10 (27.78)
13. Distance library instruction	7 (19.44)
14. Librarian instructs at remote site	7 (19.44)
15. Librarian part of a teaching/consulting team	9 (25.)
16. Handouts & bibliographies available in print/ electronically	31 (86.11)
17. Formalized agreement with a consortium library for assistance and instruction	14 (38.89)
18. Other _____	2 (5.56)

Part three of the questionnaire requests information about the kind of support libraries have on the delivery of actual materials to remote users, see Table 6. Question 19 asks for the capability of libraries to receive for example interlibrary loan requests: the results were: 9 libraries or 25 percent by phone, 21 libraries or 58.33 percent by fax, 18 libraries or 50.0 percent by e-mail, and 17 libraries or 47.22 percent by other methods. Several libraries offer multiple ways of providing this service, therefore, a total of 28 institutions or 77.77 percent offer this service. Electronic reserve - i.e., having materials downloaded to support courses and making them available to remote sites - was reported in 10 libraries or 27.78 percent, but the comments provided by the respondents indicate that a full electronic reserve systems does not always exist. Question 21 asks if library materials are delivered to the remote teaching sites and 20 libraries or 55.56 percent responded positively to this question. In addition, the results showed that 17 libraries or 42.22 percent deliver materials to the home or office of distance learners users. Furthermore, distance learners can have library materials on hold or renew them remotely in 26 libraries or 72.22 percent. Question 24 asked libraries if and how they provide the electronic delivery of the copy of journal articles: the results were: 16 or 44.44 percent use Ariel, 26 libraries or 72.22 percent use fax, 8 libraries or 22.22 percent use e-mail. Several libraries use multiple ways for delivering electronic copies of articles, therefore, a total of 27 libraries or 75. percent offer this service. Finally, 25 or 69.44 percent of responses say distance learning users in their institutions are able to obtain borrowing and usage privileges at a consortium member library.

TABLE6. PART 3
Delivery of Materials

19. Electronic Document Services (e.g. ILL forms electronically available) by:	
phone	9 (25.)
fax	21 (58.33)
e-mail	18 (50.)
other	17 (47.22)
20. Electronic reserve	10 (27.78)
21.Delivery of materials at remote location (e.g. books)	20 (55.56)
22.Delivery of materials at home or office (e.g. books)	17 (42.22)
23.Holds and renewals of materials remotely	26 (72.22)
24.Electronic delivery of journals articles by:	
Ariel	16 (44.44)
fax	26 (72.22)
e-mail	8 (22.22)
other	9 (25)
25. Walk-ins for usage and borrowing of materials in consortium libraries	25 (69.44)

Part four of the questionnaire tries to investigate the support at the institutional level that libraries are receiving to serve students and faculty members involved in distance learning academic programs offered by the same institutions, see Table 7. In each question participants have to select one of the three levels: Minimal, Medium, or High. In the area of manifested institutional support the highest count was for minimal support with 21 libraries or 58.33 percent. In the area of new funding being given to the Library to support distance learning programs the highest count was again for minimal support with 30 libraries or 88.24 percent and only one library responded having received high support. When asked about the level of awareness by colleges and departments the services the library provides to distance learning programs, the results were almost equally divided between minimal with 47.22 percent and medium with 41.67 percent. Finally, Library participation in the planning of distance learning programs is minimal for 69.44 percent of the respondents and medium for the other 30.56 percent, with 0 percent for high.

TABLE 7. Part 4
Institutional Support

	Minimal	Medium	High
26. Manifested Institutional support of Library Services for DL programs	21 (58.33)	11 (30.56)	3 (8.33)
27. New funding has been given to the Library for DL programs	30 (88.24)	3 (8.82)	1 (2.94)
28. Colleges and departments awareness of Library Services for DL programs	17 (47.22)	15 (41.67)	4 (11.11)
29. Librarians participation in the planning of DL programs	25 (69.44)	11 (30.56)	0 (0.0)

The previous aggregated analysis indicates the current status of library services offered to distance learning programs in engineering and technology but further analysis in relation to the level of degree programs offered indicates variances in responses. Other analyses according to geographical locations, and type of governance were not the focus of this study. Furthermore, what follows is an examination of responses to questions to identify differences in the kind of services offered by libraries to different levels of programs: bachelor (B), master (M) and other graduate programs (OGP) (graduate certificate or doctoral), as defined by *Peterson's Distance Learning*. See Appendix B.

In Part 1 of the questionnaire, differences occur in relation to vendors as providers of services. Question 3 asks if vendors are the providers of electronic journals, see Appendix B. The results are: for bachelor programs 84.62 percent, 58.33 percent for the aggregated data, 58.62 for masters programs, and 54.5 percent for other graduate programs. In the question about vendors as providers of electronic journals there are also differences: for bachelor programs it is 61.54 percent, 47.22 percent for the aggregated data, 44.83 for the masters programs, and 36.44 for the other graduate programs. There are also differences in the related question of vendors as providers of full-text databases (not including journals) the responses are: 46.15 percent for bachelors programs, 27.78 percent for the aggregated data, 20.69 percent for masters programs, and 18.18 percent for other graduate programs. Finally, in subject specialized Internet sites provided by vendors there are differences as well: 23.10 percent for bachelors programs, 16.64 percent for the aggregated data, 20.70 percent for masters programs, and 36.4 percent for other graduate programs.

There are also differences in Part 2 of the questionnaire. Question 9 asks about the availability of a reference hot line, for the bachelors programs - it is 53.85 percent, while for the aggregated data and the two other groups it varies between 34.48 and 38.89 percent. On the question about library video instruction available in remote locations the results are: 30.77 for bachelors programs, while for the aggregated data and the other two groups it varies between 13.89 to 18.2 percent. For interactive library Web instruction bachelors programs it is 53.8 percent, the aggregated data is 27.78 percent, other graduate programs is 36.4 percent, and for the masters programs it is 20.7 percent. Question 13 deals with the availability of distance library instruction. Other graduate programs came out with 0.0 percent while the aggregated data and the other two groups varies between 19.44 and 23.1 percent. Furthermore, there are differences in the other three questions of this section. On the availability of librarians instructing at remote sites the result for the bachelor programs is 30.8 percent, the aggregated data is 19.44 percent, for the masters programs it is 20.7 percent, and for other graduate programs it is 27.27 percent. When participants were asked about librarians being part of a teaching/consulting team for bachelors the programs it is 46.2 percent, for the other graduate programs it is 45.5 percent, the aggregated data is 25.0 percent, and for the masters programs it is 24.14 percent. Finally, on the question about agreements with a consortium bachelors programs it came out with 46.2 percent, while for the aggregated data it is 38.89 percent, for the masters programs it is 34.5 percent and for the other graduate programs it is 27.3 percent.

Part 3 of the questionnaire asks about the ways materials are delivered. In question 20 (electronic reserve) the major difference is for the other graduate programs with only 9.09 percent, the aggregated data is 27.78 percent, for the bachelors programs it is 30.8 percent, and 24.7 for the masters programs. In this section the other differences are found in question 24 (electronic delivery of journals articles). As was noted above libraries

were asked to indicate the form of delivery (*Ariel*, fax, e-mail, other), *Ariel* as a form of delivery is 61.5 percent for bachelor programs, while for the aggregated data and the other two groups, they fluctuate between 37.93 and 45.5 percent. Fax as a form of delivery is 92.31 percent for bachelor programs, the aggregated data is 72.22 percent, and it is 65.52 percent and 63.6 percent for masters and other graduate programs respectively. E-mail as a form of delivery for the bachelors programs is 30.80 percent, while for the aggregated data and the other two groups they fluctuate between 18.2 and 24.1 percent. In other forms of delivery the results are: 38.5 percent for bachelors programs, the aggregated data is 25.0 percent, and it is 24.1 percent and 45.5 percent for masters and other graduate programs respectively.

In Part 4 there are also some differences on the level of institutional support perceived. In the area of manifested institutional support at the medium level, 53.8 percent is for bachelor programs, the aggregated data is 30.56 percent, for masters programs it is 31.03 percent and for other graduate programs it is 45.5 percent. In relation to new funding given, the responses for minimum level are: 100.0 percent for other graduate programs, the aggregated data is 88.24 percent, it is 91.67 for bachelors programs, and for masters programs it is 88.89 percent. Finally, for the awareness of library services at the medium level is 27.27 for other graduate programs, the aggregated data is 41.67 percent; for bachelors programs it is 46.2 percent , and for masters programs it is 44.83 percent. Results in this section appear to be consistent with the perception of the library role, for example, Hellen-Ross has stated that the library often is not an integral part when developing distance education programs and made suggestions on creating a successful partnership with the teaching faculty (Hellen-Rose, 1996). There are good exceptions: Schiller's paper offers an example of successful cooperation between several departments of the university and the library at the State University of New York at Buffalo (Schiller, 1996), and a paper by Starrat and Hosteller describes the central role the library has taken in another distance learning program at Southern Illinois University (Starrat & Hosteller, 1997).

Comments and Discussion.

The results of the survey are informative and give a descriptive analysis of how engineering and technology librarians are responding to the increasing needs of supporting distance learning programs in American institutions of higher education. Further insight to the current status of this aspect of science-engineering librarianship can be found in some of the comments of participants libraries and by examining another survey conducted recently (and other research papers). It is evident from the above analysis that the corner stone of library services for distance learning are the online catalog and the Library homepage. This is well understood since library homepages are becoming the center of accessing electronic library resources. In fact one respondent states: "A lot of this will change in the next year (with the new state-wide catalog)". This comment is in relation to the entire Part 1 of the questionnaire on 'Remote Access to Electronic Resources'. The new generation of Windows based online catalogs is making possible the integration of these two elements of electronic information resources.

Several surveys were conducted in the eighties by librarians trying to identify the needs for distance education support. A good number were conducted in countries where distance education programs have been serving students in remote geographical locations. Distance education in America has also been an important aspect in higher education, but as in other countries, it is necessary to understand that most research done is about

traditional distance education while the inclusion of new telecommunication and computer technology in the nineties might have a significant effect on library services. A recent survey for American universities, was conducted by Snyder, Logue and Preece (1996) and published as a *SPEC Kit* by the *Association of Research Libraries, Office of Management Services*. The survey attempted to define distance learning initiatives in ARL Libraries and identify among others: library involvement, support and role in distance learning programs. This survey is not geared to a discipline oriented approach, nevertheless besides being one of the few attempts at studying services for distance learning in the nineties its findings give some basic information on the direction libraries are taking to support this new form of delivering education. They asked questions about the administrative role of the library in the university's distance learning programs. They also asked questions about network management and technical support. More related to the scope of this study is their sections on Instructional Support and their section on Library Services. They found that 93.47 percent of respondents have the library catalog accessible online to remote users. Other results from the ARL survey are: the circulation of library materials are allowed in 69.56 percent, interlibrary loan services is 76.08 percent, E-mail requests of interlibrary loans is 47.82 percent, Web requests of interlibrary loans is 26.08 percent, telephone charging of interlibrary loans requests 17.39 percent. Reference services by telephone is 73.91 percent, by E-mail is 78.26 percent, by Web homepage is 32.61 percent, by other methods is 15.21 percent. Electronic reserve is 10.86 percent, traditional reserve service is 39.13 percent, and no reserve service was provided by 47.86 percent of the respondents. In addition, reciprocal agreements with other libraries is 65.21 percent. Finally on the question about receiving new funding for developing distance learning programs 28.26 percent of the respondents have received new funding, and 16.67 percent of libraries have a permanent budget for distance learning (Role of Libraries in Distance Education: a SPEC kit, 1996).

Other comments related to Part one of the questionnaire for engineering libraries reveal that FirstSearch and Carl Uncover are databases used in remote locations as well as IAC and that some of these services are provided as part of the online public access catalog. Instructors web pages and librarian-mediated searches on request were mentioned as other resources.

Comments about Part 2 of the questionnaire indicate that E-mail is used in reference services. One library is testing a mode for interactive library Web instruction, another library has distance library instruction for some of the courses, another reported having some bibliographies available for distance learning courses. A respondent elaborated on how the library with a grant funding has developed a prototype web service which makes accessible course related materials such as course syllabi, lecture notes, homework, etc. These comments are indicators of libraries working on projects to support the newly developed distance learning programs.

In Part 3, respondents indicate that the Web homepage forms is used, in 12 libraries (n=36). In order to provide electronic document services, other libraries used *FirstSearch*, or *Current Contents* interfaces for the request documents made by users. Electronic reserve exists in 4 libraries as pilot projects. In the area of electronic delivery of journals articles, it was reported that *CarlUncover* and *UMI* databases are used for this purpose. Another librarian commented upon receiving support from the campus Office of Educational Technology and added: "The grant for $85,000, which was shared among the three grant partners. Here, we are trying to keep the services alive (since grant funding ended in February) by submitting a proposal to the Provost asking that the university help fund its continuation. Without funding from the University, we will not be

able to offer this service in the Fall. In addition, The University Libraries have been absorbing the costs of sending materials -- books and copies of journal articles (not reserve readings but articles individual students identify during the course of their research and request) -- but this has proven to be quite expensive and without additional funding from the University, it won't be able to be continued either, except on a very limited basis". Which is another indication of the challenges engineering libraries have in order to create and maintain these kind of services.

Respondents were also encouraged to make general comments about distance learning at their institutions. What follows is a collection of written comments about a number of issues related to distance learning and library services. These comments have been correlated to recent research publications on distance learning.

"Wide spread advertising of library services (is) available. Professors have been slow to incorporate into courses. Demand is building. As students use the services, the word spreads."

"Distance Learning has increasing importance for the state. Some services mentioned in the survey are just coming online; the state university system has a committee set up to provide library instruction in a variety of formats. We are looking at an interactive web-based tutorial for our online catalog. We are also considering CD-ROM, video, and other multimedia presentations."

"The University is developing a support program who want to explore distance learning as an option. We've proposed that a librarian be part of the team." These first three comments convey an understanding of the many activities happening at state, campus and library level and two articles supporting these ideas are the one by Boettcher and Conrad in which the authors using a list of FAQs answers basic questions with the purpose of helping faculty members setting up distance learning initiatives (Boettcher & Conrad, 1997), while the paper by Rees and Safford describes the efforts of the *Iowa Communications Network* (Rees & Safford, 1995).

"The number of online full-text electronic journals is increasing. We've been looking at standards and other products of concern to Engineering."

"A 1-800 Reference/Referral Center has been proposed which will provide service for the state university system and community colleges across the state. This is currently under consideration and the location for the service is being determined."

"Courses offered through.... (for Engineering) are available on videotape for review at the Library Media Center." The three comments above show the increased interest to automate libraries services using the most up to date technology and resources. The paper by Jones and Moore represents the results in this direction obtained by a university with extensive commitment in distance learning (Jones & Moore, 1997).

"Our bachelor Eng. program is sold to corporate (3M, Intel, etc) institutions and is a videotape/text package. The students do come on campus for a 2 week lab seminar at the end of the program. The students do use their own corporate libraries, but we provide full access to our campus lib. services as well. Including web access to our OPAC, ILL services, reference access, & Compendex, etc. Print Library Guides are mail each

semester, too. When the students are on campus, they have complete & free access to all library services."

"The services shown above are regular library services. Nothing has ever been set up or requested specifically for the DL program. The program is marketed primarily to companies for their employee participation, rather than to individuals. Only the participants who contact the library or their own know about the available services. The program is based in large part on sales and rentals of videotapes with snail mail and electronic communication with instruction."

"We provide an independent study program; at this time, our students use library resources in their home communities."

"There have been few requests for library services for DL programs." The last four comments are in agreement and in part justify Goodson's findings about the low usage of Library services by distance learning students (Goodson, C, 1996 p.6)

"There has been a lot of ongoing discussion and research on campus concerning distance education. Our Library is in the process of determining what we need to do better support distance education programs." As noted above, libraries are in the process of identifying needs or planning services. Riggs' article made excellent suggestions on how to approach the implementation of library support services (Riggs, 1997).

"We have not put as much effort into instruction as other areas of service. The focus of the grant I am project director on has been on the delivery of course materials via the Internet to students enrolled in distance education courses through (the university), which is one component of a whole program of services needed to provide for the information needs of distance learners." Previous studies like the one by Steffen & Marshall indicates that library instruction for electronic resources increase the use by students of these resources (Steffen & Marshall, 1993) which is related to the use of library services mentioned above. This is an indication that more efforts are needed to educate users. The second part of these comments agrees with Schiller's paper. Furthermore, Heller-Ross stressed the importance of user library instruction: "Information literacy is a critical issues in this fast-paced social, economic, and political environment. Librarians have traditionally offered tours, training sessions, and research instruction to assist students with locating and using library resources. Distance learning programs are designed and heavily marketed for adult and returning students. These students frequently lack library research skills, may never have used an academic library, or may never have used computerized research databases." (Heller-Ross, 1996).

"The University has been involved in various forms of distance learning for many, many years. Until recently it was accomplished via video tapes shipped to students (mainly military personnel). We have been using interactive TV for a number of years, and now have faculty located in at least two remote sites in state for graduate programs in various fields of engineering and education. We also have faculty who commute to remote sites on a regular basis. We do have one librarian designated as the 'Extended Campus Librarian' who works directly with these students. We also maintain an 800 phone number so they can contact the librarians more readily. One of my responsibilities for years has been contact and support of faculty in remote locations - agricultural and engineering mostly." The first part of this comment reflect the historical development institutions

have gone through in distance education in this country. The second comment relates to the availability of a librarian on some campuses to serve distance learning programs. The article by Godson again discusses some of the present challenges in this area (Godson, 1996).

"Survey does not reflect (our university). All our students are full-time employees of sponsoring organizations. These organizations provide library facilities and access for their technical staff." Non-traditional universities are also an important component of institutions responsible for the training of engineers and technical personnel. Some of the schools listed in *Peterson's Distance Learning* Web site are non-traditional accredited institutions, their inclusion in this survey obeys to the standards of services expected according to *The Association of College and Research Libraries (ACRL), Guidelines for Extended Campus Library Services* that specify the kind and the level of library services to the extended campus community. While Rodrigues discussed accreditation standards and their influence in distance education and asserted that the role of the library "remains unchanged as the provider of information resources to the curriculum." (Rodrigues, 1996). Riggs' article also argues for appropriate support for distance learners and adds: "The distance learner has to be perceived in the same value structure as the on-campus learner. If this is not the case, then distance education could be viewed as a stepchild", (Riggs, 1997).

Conclusion

This study was conducted to gain some insight into the services engineering libraries are providing to distance learning programs in engineering and technology. As is stated above, a list of distance learning programs obtained from Peterson's Distance Learning homepage was the base for the selection of libraries (the population), these are institutions that offered distance learning programs in engineering or technology. The return rate is below the expected level for this kind of library survey, therefore, caution must be taken when interpreting any of the results. The findings of this survey might have some relevance to university officials responsible for the administration and planning of distance learning programs, as well as, to librarians who are responsible for providing library services to faculty, staff and students involved in those distance learning programs. It is evident that libraries are providing and planning a number of services to support distance learning users.

Responses indicate that there is a lack of opportunity to offer library instructional services to distance learners. This situation is more obvious for libraries of institutions offering graduate degree programs than for those offering undergraduate degrees. Availability of full-text databases not including full text journals is low but respondents did not give comments on this matter. This suggests that libraries are concentrating more in having databases of bibliographic information and making available full-text journals.

In very basic areas such as providing reference assistance and providing copies of materials, the results are not as high as expected, around 75 percent in both cases, which suggests that academic libraries in some instances are not providing the support required by the *ACRL Guidelines for Extended Campus Library Services*. On the other hand, as indicated before the online library catalog and the library homepage is widely available.

Perhaps some provocative results in this study are obtained when comparing library services for three different degree levels. For instance, there is a remarkable tendency of higher percentages for bachelor's degree programs in the area of Assistance and Instruction, Part 2 of the questionnaire, as compared to masters and other graduate programs. A similar pattern can also be identified in Section 3 of the questionnaire on the Delivery of Materials. Additionally, in the last part of the questionnaire the minimal level of support is consistently higher for bachelor's programs than to the other two levels of degrees offered. As further research is conducted in this new field of library services, some of it should focus on the specific kind of information users need in distance learning programs for engineering and technology. This study provides some basis for more extended research.

Appendix A. Questionnaire.

A Survey About Library Services for Distance Learning Engineering/Technology Programs.

1. Engineering/Technology degrees granted by your Institution via distance learning.

a. Assoc. 1 b. Bachelor 13 c. Master 29 d. Graduate Certificate 6 e. Doctoral 6

PART 1
Remote Access to Electronic Resources

	Library Mounted	Vendor	Other
2. Online catalog	34 (94.44)	1 (2.778)	0
3. Indexes databases	21 (58.33)	21 (58.33)	5 (13.89)
4. Electronic journals (e.g. IEEE journals)	5 (13.89)	17 (47.22)	3 (8.33)
5. Fulltext databases (e.g. ASTM standards)	6 (16.67)	10 (27.78)	2 (5.55)
6. Subject specialized Internet sites	16 (44.44)	6 (16.67)	3 (8.33)
7. Other _____	0	1 (2.78)	2 (5.56)

PART 2
Assistance and Instruction

	YES
8. Library home page	34 (94.44)
9. Reference hot line	14 (38.89)
10. Electronic reference	26 (72.22)
11. Library video instruction in remote location	5 (13.89)
12. Interactive library Web instruction	10 (27.78)
13. Distance library instruction	7 (19.44)
14. Librarian instructs at remote site	7 (19.44)
15. Librarian part of a teaching/consulting team	9 (25.)
16. Handouts & bibliographies available in print/ electronically	31 (86.11)
17. Formalized agreement with a consortium library for assistance and instruction	14 (38.89)
18. Other _____	2 (5.56)

PART 3
Delivery of Materials

	YES
19. Electronic Document Services (e.g. ILL forms electronically available) by:	
phone	9 (25.)
fax	21 (58.33)
e-mail	18 (50.)
other	17 (47.22)
	YES
20. Electronic reserve	10 (27.78)
21. Delivery of materials at remote location (e.g. books)	20 (55.56)
22. Delivery of materials at home or office (e.g. books)	17 (42.22)
23. Holds and renewals of materials remotely	26 (72.22)
24. Electronic delivery of journals articles by:	
Ariel	16 (44.44)
fax	26 (72.22)
e-mail	8 (22.22)
other	9 (25)
25. Walk-ins for usage and borrowing of materials in consortium libraries	25 (69.44)

Explain: _____

Part 4
Institutional Support

	Minimal	Medium	High
26. Manifested Institutional support of Library Services for DL programs	21 (58.33)	11 (30.56)	3 (8.33)
27. New funding has been given to the Library for DL programs	30 (88.24)	3 (8.82)	1 (2.94)
28. Colleges and departments awareness of Library Services for DL programs	17 (47.22)	15 (41.67)	4 (11.11)
29. Librarians participation in the planning of DL programs	25 (69.44)	11 (30.56)	0 (0.0)

Appendix B. Questionnaire with detail data about bachelor (B), doctoral (D), and other graduate programs (OGP).

A Survey About Library Services for Distance Learning Engineering/Technology Programs.

1. Engineering/Technology degrees granted by your Institution via distance learning.

a. Assoc. 1 b. Bachelor 13 c. Master 29 d. Graduate Certificate 6 e. Doctoral 6
PART 1

Remote Access to Electronic Resources

2. Online catalog
3. Indexes databases
4. Electronic journals (e.g. IEEE journals)
5. Fulltext databases (e.g. ASTM standards)
6. Subject specialized Internet sites
7. Other _____

	-B-						-M-						-OGP-					
	Lib-M		Ven.		Oth.		Lib-M		Ven.		O		Lib-M		Ven.		Oth.	
2.	92.31	12	7.69	1	0.	0	93.1	27	3 .45	1	0.	0	90.91	10	9.09	1	0.	0
3.	53.85	7	84.62	11	23.08	3	55.17	16	58.62	17	13.8	4	63.64	7	54.5	6	0.	0
4.	15.38	2	61.54	8	15.4	2	17.2	5	44.83	13	10.34	3	27.27	3	36.4	4	0.	0
5.	23.1	3	46.15	6	15.4	2	17.2	5	20.69	6	6.90	2	27.3	3	18.18	2	0.	0
6.	46.2	6	23.1	3	15.4	2	41.38	12	20.7	6	6.9	2	45.45	5	36.4	4	9.09	1
7.	0.	0	7.69	1	0.	0	0		0.	0	6.9	2	0.	0	0.	0	9.09	1

PART 2
Assistance and Instruction

		B YES		M YES		OGP YES	
8.	Library home page	92.31	12	93.1	27	90.91	10
9.	Reference hot line	53.85	7	34.48	10	36.4	4
10.	Electronic reference	61.54	8	68.97	20	63.64	7
11.	Library video instruction in remote location	30.77	4	13.79	4	18.2	2
12.	Interactive library Web instruction	53.8	7	20.7	6	36.4	4
13.	Distance library instruction	23.1	3	20.7	6	0.	0
14.	Librarian instructs at remote site	30.8	4	13.8	4	27.27	3
15.	Librarian part of a teaching/consulting team	46.2	6	24.14	7	45.5	5
16.	Handouts & bibliographies available in print/ electronically	84.62	11	82.76	24	81.82	9
17.	Formalized agreement with a consortium library for assistance and instruction	0	0	6.9	2	9.09	1
18.	Other _____						

PART 3
Delivery of Materials

			B YES		M YES		OGP YES
19.	Electronic Document Services (e.g. ILL forms electronically available) by:						
	phone	15.38	2	24.1	7	18.2	2
	fax	61.5	8	58.62	17	63.6	7
	e-mail	53.8	7	48.28	14	54.55	6
	other	38.46	5	44.83	13	27.3	3
20.	Electronic reserve	30.8	4	24.1	7	9.09	1
21.	Delivery of materials at remote location (e.g. books)	61.5	8	51.72	15	45.5	5
22.	Delivery of materials at home or office (e.g. books)	46.2	6	48.28	14	54.5	6
23.	Holds and renewals of materials remotely	69.23	9	68.97	20	72.73	8
24.	Electronic delivery of journals articles by:						
	Ariel	61.5	8	37.93	11	45.5	5
	fax	92.31	12	65.52	19	63.6	7
	e-mail	30.8	4	24.1	7	18.2	2
	other	38.5	5	24.1	7	45.5	5
25.	Walk-ins for usage and borrowing of materials in consortium libraries	76.92	10	72.41	21	63.6	7

Explain: _____

Part 4
Institutional Support

		Minimal		Medium	B High		
26.	Manifested Institutional support of Library Services for DL programs	38.5	5	53.8	7	0.	0
27.	New funding has been given to the Library for DL programs	91.67	11	8.33	1	0.	0
28.	Colleges and departments awareness of Library Services for DL programs	46.2	6	46.2	6	7.69	1
29.	Librarians participation in the planning of DL programs	61.54	8	38.5	5	0.	0

			M				OGP.				
		Min.		Med.		H		Min		Med.		H
26.	55.17	16	31.03	9	10.34	3	54.5	6	45.5	5	0.	0
27.	88.89	24	7.41	2	3.7	1	100	11	0.	0	0.	0
28.	41.38	12	44.83	13	13.79	4	36.36	4	27.27	3	36.36	4
29.	68.97	20	31.	9	0.	0	63.6	7	36.4	4	0.	0

References

Boettcher, J. V., & Conrad, R.-M. 1997. Distance Learning: A faculty FAQ. *Syllabus*, June, 14-17 & 54-55.

Goodson, C. 1996. A continuing challenge for librarians: meeting the needs of distance education students. *MC Journal: The Journal of Academic Media Librarianship*, 4, 1, Summer, 1-9 [Online]. Available HTTP: http://wings.buffalo.edu/publications/mcjrnl/v4n1/.

Heller-Ross, H. 1996. Librarian and faculty partnerships for distance education. *MC Journal: The Journal of Academic Media Librarianship*, 4, 1, Summer, 57-68 [Online]. Available HTTP: http://wings.buffalo.edu/publications/mcjrnl/v4n1/.

Jones, M. & Moore, T. 1997. Providing library support for extended learning programs: A partnership model. In Snyder C. A. & Fox J. W. (Eds), *Libraries and other academic support services for distance learning* (pp. 1-15). Greenwich, CN: Jai Press.

McCormack, T. 1996. Understanding the true cost of distance learning. *MC Journal: The Journal of Academic Media Librarianship*, 4, 1, Summer, 116-119 [Online]. Available HTTP: http://wings.buffalo.edu/publications/mcjrnl/v4n1/.

Kascus M. A. 1994. Library support to distant students as a Library Education and Continuing Education issue. *Journal of Education for Library & Information Science*, 33, 4, Fall, 344-347.

Peterson's: distance learning. 1997 [Online]. Available HTTP: http://www.petersons.com/dlearn/.

Peterson's distance learning, 1997. 1997 Guide to distance learning. Princeton, NJ: Peterson's.

Rees, F., & Safford, B. 1995. Iowa's approach to distance learning. *T H E Journal*, 22, Jun., 63-66.

Riggs, D. E. 1997. Distance education: Rethinking practices, Implementing new approaches. *College & Research Libraries*, 58, 3, 208-209.

Rodrigues, H. F. 1996. The role of the library in distance education. *Microcomputers for Information Management: Global Internetworking for Libraries*, 13, 1, 21-30.

Role of libraries in distance education: a SPEC kit. 1996. Compiled by C. A. Snyder, S. Logue, B. G. Preece. (SPEC kit: 216). Washington, DC: Association of Research Libraries, Office of Management Services.

Rosenquist-Buhler, C. 1996. New partners in distance education. Linking up to libraries. *Library Administration & Management*, 10, 4, 220-225.

Schiller, N. 1996. World Wide library support for distance learning at the State University of New York at Buffalo. *MC Journal: Journal of Academic Media Librarianship*, 4, 1, Summer, 25-37 [Online]. Available HTTP: http://wings.buffalo.edu/publications/mcjrnl/v4n1/.

Starrat, J. & Hosteller, J. C. 1997. Distance learning and library affairs: technology development and management at Southern Illinois University at Carbondale. In Snyder C.A. & Fox J. W. (Eds.), *Libraries and other academic support services for distance learning* (pp. 17-30). Greenwich, CN: Jai Press.

Steffen, S. S., & Marshall, J. A. 1993. The Schaffner model of library services. In C. J. Jacob (Ed.). *Off-campus Library Services Conference. The sixth Off-campus Library Services Conference proceedings* (pp. 273-281). Mount Pleasant, MI: Central Michigan University.

Walsh, J., & Reese, B. 1995. Distance learning's growing reach. *T H E Journal*, 22, Jun., 58-62.