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## A Decade of Digital Reference: 1991-2001.

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# A Decade of Digital Reference

1991–2001

Four surveys conducted over a decade provide insights about changes that have occurred in academic library reference services due to new and rapidly evolving technologies. Surveys were sent to the academic members of the Association of Research Libraries four times during the past decade: 1991, 1995, 1997, and 2000. The surveys contained both open-ended questions to gather opinions and factual questions to measure what libraries offer. Libraries adopted digital information sources and services at an increasingly accelerated rate in the 1990s due to the availability of the Internet, in particular the World Wide Web. Digital sources have brought about changes in the physical environment of the reference room, in the type and range of resources available, and in the attitudes and expectations of reference librarians and patrons. The Web is changing what resources are searched, how results are distributed, how instruction is delivered, and relations with faculty. Quality service is still highly valued by reference librarians. The reference librarians surveyed think that as the reference environment has changed, it has helped them to provide better services to patrons.

**T**here is no doubt that the Internet and, in particular, the World Wide Web has transformed university reference departments. Today we take for granted Web-based online catalogs, library-provided portals to quality Web sites, and a plethora of commercial online databases, the most popular of which are Web versions. Hundreds of workstations, complex internal and external network connections, and a mix of in-house and online resources define reference services of the twenty-first century.

Although automation has been a part of reference services for more than thirty years, the most profound changes occurred within the last ten years and were accelerated by the phenomenal growth of the Internet. The authors surveyed university libraries four times during the decade of 1991–2001

in order to track those changes in detail. During the past decade, automation of reference resources went from affecting a few librarians and specialized users to affecting everyone in the library, from an add-on service to the predominate service, from intermediary assistance to self-service. Our surveys revealed that expectations of both reference staff members and patrons changed profoundly during the last decade of the century as well. Now both groups believe that an answer to almost every question can be found if the right combination of resources and search strategies is chosen from the multitude of Web resources and online services accessible.

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## Previous Surveys

Both the Association of Research Libraries (ARL) and the American Library Association's Association of College and Research Libraries division (ACRL) regularly collect information from academic libraries, including some that helps track changes in reference departments throughout the 1990s.<sup>1</sup> Other organizations regularly survey libraries to gather general information. The National Center for Education Statistics has published data about academic libraries

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for more than a century and has surveyed academic libraries biennially for a decade.<sup>2</sup> Since 1979 ARL has issued a biennial report that includes trends and statistics of academic libraries, including expenditures, collections, and services. Lynch, of the American Library Association Office for Research and Statistics, summarizes these important surveys and other relevant reports.<sup>3</sup>

Lynch conducted a survey of electronic services in all types and sizes of academic libraries.<sup>4</sup> She found that by 1996 almost all academic libraries offered access to the Internet (especially the Web), commercial bibliographic online databases, and CD-ROM databases. A smaller percentage offered access to full-text electronic journals, but 71 percent of doctoral granting institutions did.

Data gathered over time by ARL were analyzed by Kyrillidou to provide insights into the changing conditions in reference libraries.<sup>5</sup> In research libraries, for example, the number of yearly "reference transactions" rose nearly every year from 1991, reaching a peak in 1996 with a median annual number of 157,275. Since then the median number of reference transactions has declined. Kyrillidou speculates on reasons for this decline and concludes that digital resources are at least part of the reason:

Many libraries are making a concerted effort to examine the changing user needs that impact reference services in general. Heavy users of library materials and services may make fewer trips to the library than was the case before the availability of online catalogs, remote access to indexing and abstracting databases, and electronic full-text resources.<sup>6</sup>

A decline in total reference transactions does not necessarily reflect a reference department that is less busy, however. All other reference services increased throughout the 1990s, including interlibrary loans, library instruction, and circulation. Kyrillidou believes reference librarians spend more time per transaction (and our research supports this finding) and have made changes in the way reference departments work, for several reasons:

Often, though, those people who do show up at the library or reference desk require more assistance than before. At the same time, electronic and e-mail reference are adding another dimension to the growing complexity of responding to reference questions. Libraries have instituted initiatives with a deliberate emphasis on direct contact between subject specialists and departments (shifting research consultation activity away from desk-based service.) Thus, a simple count where each reference question gets a single "tally" cannot capture the varying dimensions and growing complexities of reference services.<sup>7</sup>

An example of a more focused survey is the 2000 survey of electronic reference services in law libraries by Childs.<sup>8</sup> Sponsored by the American Association of Law Libraries, this survey found that nearly all law libraries that responded offer telephone and e-mail reference services in addition to face-to-face reference, but fewer offer reference via "Web page forms" or other electronic means. Nearly two-thirds of the librarians believe electronic reference services have not increased their workloads; three-quarters believe it has either not affected or has made their jobs easier.

This article compares a series of surveys conducted by the authors (Tenopir, first with Neufang and later with Ennis) from 1991 through 2001.<sup>9</sup> We began surveying university reference departments systematically at the beginning of the 1990s, continuing every three years through 2001. In the early years of the 1990s CD-ROM was the newest innovation that was causing changes (and some consternation) in reference departments.<sup>10</sup> Reference librarians reported spending more time keeping up with and teaching patrons about all of the new interfaces. CD-ROM search systems, and in many libraries stand-alone CD-ROM databases, were the first digital resources used by library patrons without intermediary assistance (with the exception of the library catalog). By the mid-1990s CD-ROM was well established (and more often networked) and the first end-user online services (led by OCLC's FirstSearch) appeared, empowering users to search for online information and formulate online searches independent of librarian assistance.<sup>11</sup>

Three years later the force of the Web was being felt, end users and library staff were more comfortable with a digital reference world, and network connections provided access to new resources and services.<sup>12</sup> By the beginning of the first decade of the new millennium there is no going back—reference departments are now transformed and sometimes reorganized, digital resources and related digital reference services are the rule, and the expectations of patrons and library staff continue to grow.<sup>13</sup>

Presented here are comparisons of these four surveys of university reference departments: 1991/1992, 1994/1995, 1997/1998, and 2000/2001. This side-by-side longitudinal comparison shows changes in the physical environment of the reference room, in the type and range of resources available, and in the attitudes of reference librarians and expectations of patrons.

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## Method

In each of the four surveys a questionnaire was sent to all academic library members of ARL. ARL today



is made up of 121 member libraries in the United States and Canada, a majority of which are libraries within research universities. (In 2000, for example, 110 of the members were academic research libraries.) Members share a focus on supporting scholarly research through collections, services, and policies. They typically have larger than average library budgets, consider themselves innovators and leaders in library automation, and attempt to provide leading-edge library services.

All questionnaires except in 1997/1998 were first sent to the library director of each university member of ARL. (In 1997/1998 we sent the questionnaire directly to the head of reference services in each library.) In each year, follow-up reminders were sent to either the director or the head of reference to increase the response rate. The first three surveys used a paper questionnaire sent through the mail; in 2000/2001 we e-mailed the cover letter with an embedded link to a Web-based questionnaire, hoping this would be more convenient for respondents. Paper questionnaires sent directly to the director of each library yielded the best response rates, which varied from a low of 62 percent in 1997/1998 to a high of 85 percent in 1994/1995. (The response rate in 1991/1992 was 81 percent, and in 2000/2001 it was 64 percent.) Although some questions were added or changed each year, mostly in response to new media and the growing emphasis on the Web, most questions were kept consistent to allow comparison over time. Maintaining similar questions over a decade of such change has some interesting consequences—one respondent to the latest survey complained that the questions seemed “dated—particularly the emphasis on CD-ROM databases, which are dying (and should be).”

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## ARL Libraries

The libraries that responded to our surveys serve thousands or tens of thousands of students. In 2000/2001 more than 90 percent of the respondents served 10,000 or more full-time equivalent (FTE) students, a number that remained high throughout the decade (81 percent in 1991, 86 percent in 1995, and 91 percent in 1998).

Most of these universities maintain many libraries on their main campuses. Only one respondent in 2000 reported just one library on the campus, while almost one-third of the libraries report more than ten branches. This, too, has not changed much over time, remaining at approximately two-thirds with ten or fewer branches, and one-third more than ten.

The environment for digital reference has changed, however. In 1994/1995 only 59 percent of

the libraries had more than one hundred terminals or workstations for public use; by 1997/1998 that had increased to 74 percent; and by 2000/2001 nearly 86 percent of the libraries reported more than one hundred workstations. Although we didn't ask, surely the nature of these workstations has changed, shifting from dumb terminals connected to a mainframe computer to a network of client workstations connected to multiple servers.

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## Digital Reference Options

The heart of change in university libraries centers on the options available for digital resources. The predominant digital medium changed from CD-ROM in the early 1990s to the Web (an option that didn't even exist in 1991) by the end of the decade. Still, in most libraries, the predominance of one medium over another does not exclude older choices. CD-ROM, although being phased out, is still used in university libraries along with locally loaded databases and dial-up online services, not to mention print and microforms (figure 1).

The Web of course does not serve a single purpose—it is used as a platform for in-house databases and catalogs as the format of choice for commercial (fee-based) online databases and for accessing alternative (and often free) sources through Web search engines. The predominance of the Web as both a platform and a source of information creates some confusion when we ask libraries to identify what options they offer for reference services. The Web as a platform may be used in any of the other options; when we define “Web” as an option we mean access to nonproprietary, no-fee Web resources. To keep responses as consistent over time as possible, we define the five options as:

1. Locally loaded, a combination of loading reference databases locally on a computer on your campus and providing access to reference databases loaded on another library's computer, such as a consortium
2. CD-ROM databases (networked or stand-alone)
3. Intermediary online searching (where a professional does the searching)
4. End-user online search services (where the patron performs searches on a commercial online system)
5. Patron access to the Web (other than to Web versions of commercial database services)

Figure 1 shows the percent of libraries that offer each of these five options for digital reference. (All exclude databases or resources used only by tech-



nical services staff.) Although a majority of ARL libraries still offer all of these options, the emphasis is clearly shifting away from mediated search services and CD-ROM to self-service searching both on Web versions of fee-based (commercial) online services and on free Web sites.

Libraries are consciously and enthusiastically making this shift, which was first reported in the 1997/1998 survey. According to one respondent in 2001,

databases becoming Web-based has changed everything. Students know how to use the Web, so they need somewhat less instruction on how to use a database. They still need assistance in selecting the appropriate database and in using it properly, but they are now less intimidated by its appearance: it looks like (and is) a Web page, so they feel comfortable with it, even if they don't yet know how to search it in the most efficient manner.

This library "put full Web access on all of our public computers very early on. . . . Now that most of the databases that we offer are Web-based, I see that it was all worth it." The surveys also asked details about each option.

### Locally Loaded Databases

Locally loading databases goes beyond the library's catalog to provide access to reference resources such as bibliographic databases like ERIC or PsycLIT. Local loading is actually one of the earliest digital reference options—going back to the 1960s and predating online or CD-ROM options—and it had a

renewed popularity due to library-automation software that often includes local loading modules, increased storage capacity in modern hardware, and the cooperation between libraries with consortia. Currently, two-thirds of the respondents load databases on their computers, and more than half (52.9 percent) provide access to reference databases loaded on another library's computer (such as through a consortium). In the earlier surveys we did not ask about providing access to databases on another library's computer.

The number of database titles locally loaded has increased dramatically over the decade. Nearly three quarters (thirty-six libraries) of the libraries that offer locally loaded databases in 2000/2001 have more than ten titles, and nearly half offer more than twenty-five titles. Only 36.5 percent of libraries offered any locally loaded titles in 1991/1992, and most of these offered only one or two titles. When databases are loaded locally they are most often bibliographic (all forty-seven of the libraries that load databases locally offer bibliographic databases) and full-text (83 percent of the libraries offer full text.) Approximately half (twenty-three libraries) of those that load databases locally offer directory databases. Full-text offerings are the biggest addition to this option—in 1991/1992 the most popular locally loaded databases were Medline and bibliographic databases from H. W. Wilson.

The thirty-seven respondents that now offer access to reference databases on a consortial library's computer offer fewer titles (29.7 percent of the libraries offer less than five databases this way, and only 37.8 percent have more than twenty-five titles). These are also most commonly bibliographic (91.9 percent), full-text (73 percent), and directory (45.9 percent).

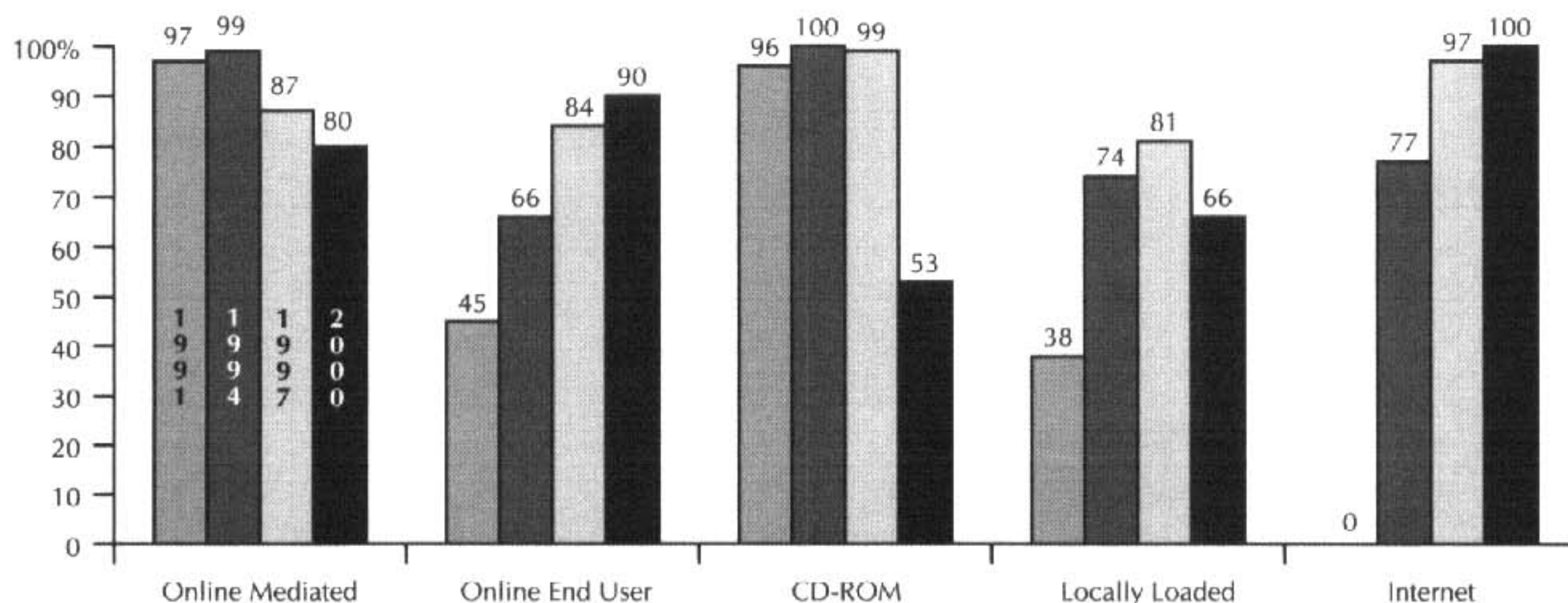


Figure 1

*Electronic Reference Options, 1991–2001*



## CD-ROM

In 1991 searching CD-ROM databases, typically offered free to users, was replacing mediated online searching, which often carried a charge. Some comments from 1991 show this shift: "CD-ROM availability has virtually eliminated online searching—but not completely"; "the availability of end-user CD-ROM databases has all but eliminated the need for mediated online searching"; and "as recorded CD-ROM uses skyrocket, online searching for library users has plummeted." The medium of delivery was not the issue; instead CD-ROM threatened online use in 1991 because for the first time it allowed fixed-fee database searching by large numbers of novice end users. Online for mediated or end-user searching was still dominated by connect-time pricing agreements and complex command-driven systems, two factors that inhibited widespread use by library patrons. The libraries raced to embrace end-user searching on CD-ROM databases, and the number of titles offered on CD-ROM rose during our first three surveys (figure 2).

Most of the CD-ROM titles in 1991/1992 were available on stand-alone workstations—then only 38 percent of the libraries offered networked CD-ROMs. Today more than 85 percent of the respondents (60 libraries) network some of their CD-ROM databases, but only a bit more than a third (24 libraries) allow access from outside the library.

When end-user online systems came onto the scene later in the 1990s, particularly with end user-friendly Web versions, university libraries began to once again change the balance between online and CD-ROM—this time hoping to replace CD-ROM versions. By 2000/2001 respondents now call CD-ROM a "dinosaur breed" and report policies deciding "not to purchase some databases that are only

available on CD-ROM, opting to focus instead on what we can obtain through Web subscriptions." For the first time in the decade the number of titles offered on CD-ROM has begun to decline, even though all responding libraries still offer some databases on CD-ROM and likely will continue to for specialized titles and niche products. Fourteen of the libraries hope to eliminate CD-ROMs within the next two years, twice the number of libraries that hope to eliminate locally loaded databases (seven libraries) and more than three times the number that hope to eliminate mediated search services (four libraries).

## Intermediary Online Searching

Only one other digital option has as yet declined in university libraries. Mediated online search services were the only digital option in most libraries in the 1970s and early 1980s. Reference librarians who were experts in searching powerful online systems such as Dialog, DataStar, and BRS offered customized online search services, usually for a fee, most often to faculty or graduate students. These services were always labor intensive (one librarian may spend more than an hour doing a search for one patron), costly, and affected only a small percentage of the library's staff and customers. Even in 1991/1992 mediated searching was a specialized service, mostly used by faculty and graduate students with grant funds, and almost all libraries charged for the service. Mediated services were a necessity due to still inadequate CD-ROM and locally loaded collections, and, as one respondent explained in 1991, these services were popular because users who want access "to particular databases unavailable through other avenues are still willing to pay for online services."

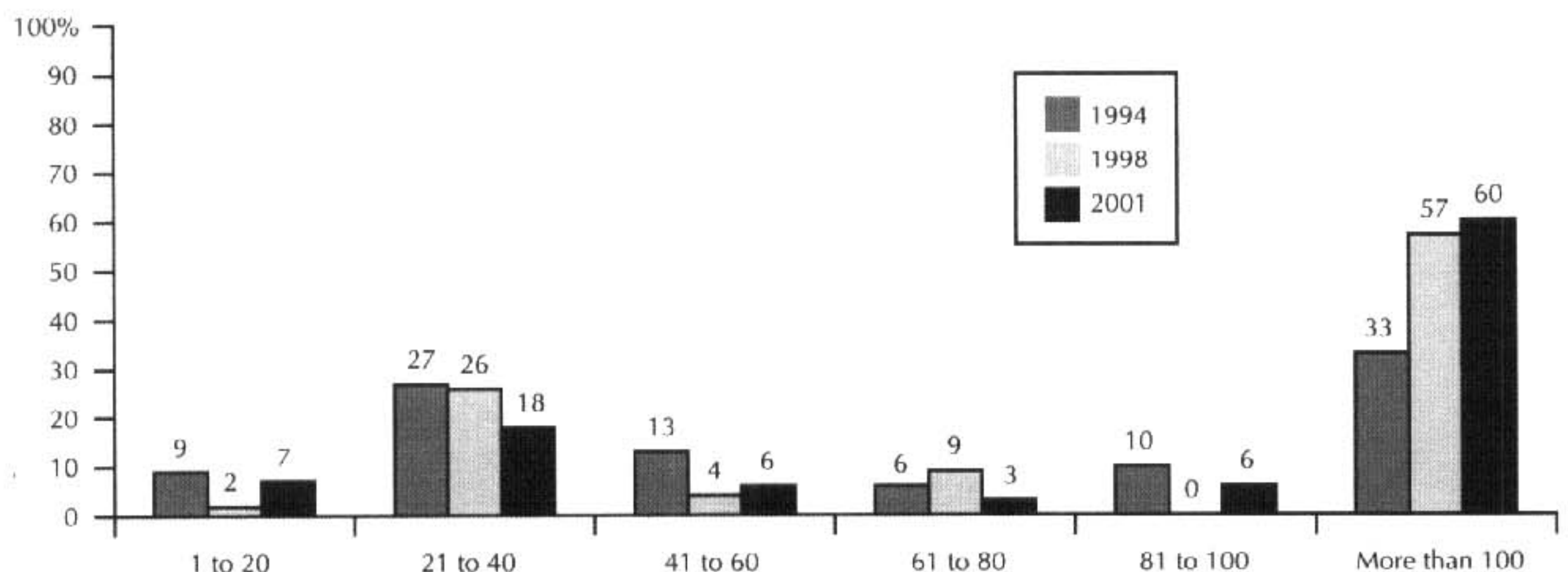


Figure 2

CD-ROM Titles, 1994-2001



## End-User Online Search Services

When satisfactory (from both a cost and ease-of-use perspective) end-user options came along, university libraries were quick to shift their emphasis from mediated to end-user searching. By 2000/2001, 79 percent of our respondents still offer intermediary search services (down from 87 percent in 1997/1998 and 97 percent in 1991/1992), but most report a steady decline in the number of searches conducted, and an additional four libraries (19 percent) plan to completely eliminate intermediary search services in the next two years.

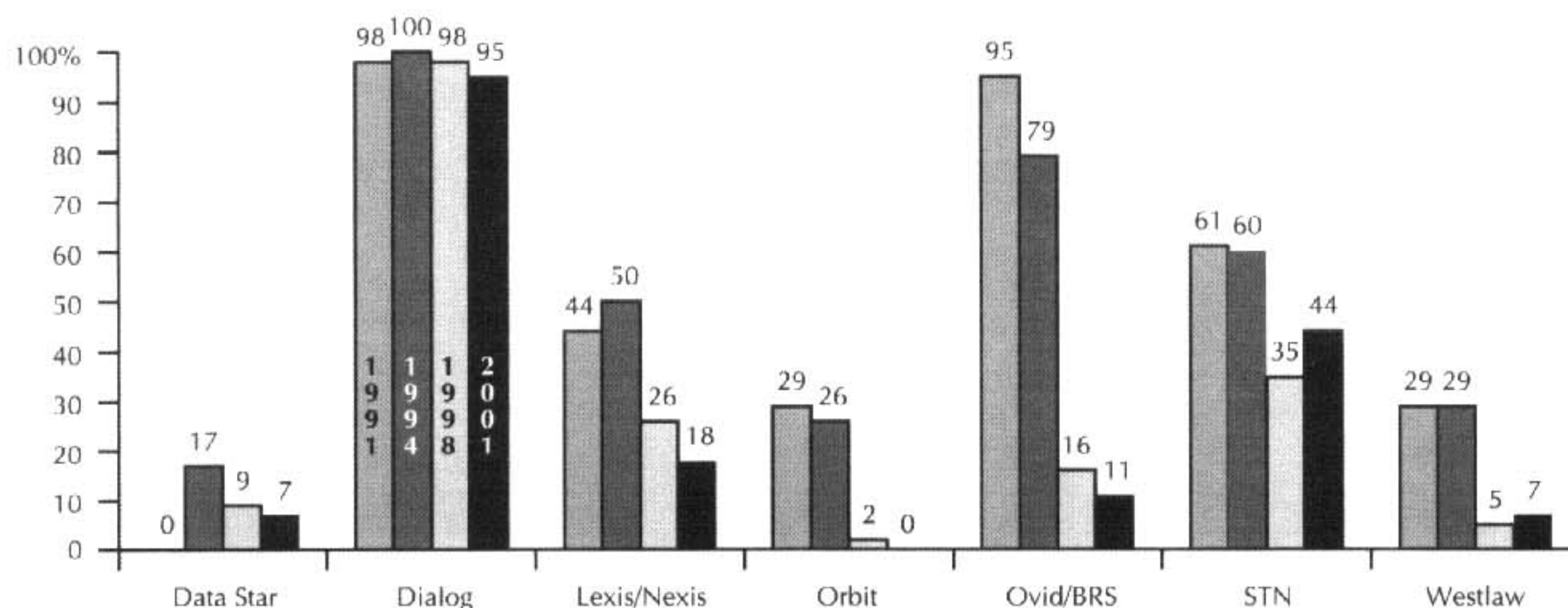
The most popular systems for online searching have changed somewhat over the decade, but Dialog remains by far the most popular for the few mediated searches that still take place (figure 3). In most academic libraries, the number of such searches is small indeed and the services are no longer perceived as important. According to one respondent in 2001, the library "still maintains a Dialog account, although it is rarely used, likely due to the large number of databases accessible through [our system] and free information on the Internet. Library users do not ask for access to commercial services anymore."

Many of the popular online services at the beginning of the 1990s no longer exist and so were omitted from figure 3. BRS (used by 95 percent of libraries in our 1991 survey) was purchased by Ovid and Wilsonline (used by 67 percent), and OCLC/EPIC (used by 59 percent), Medlars (used by 56 percent), and Vu/Text (used by 44 percent) have either folded or have been replaced by their parent companies with more up-to-date systems. The death of so many systems that were embraced by academic libraries only a decade ago may tell more about the future of intermediary online services in academia than other comments.

Online systems aimed at end users have experienced steady growth throughout the decade. As demonstrated by the rapid adoption of CD-ROM databases at the beginning of the decade, university librarians were eager and ready to embrace a digital medium that provides high-quality research information at a reasonable cost with a search system easy enough for novice end users. The inconveniences of CD-ROM (difficulties in networking, slow response time, inconsistent interfaces, hassles with replacing CD updates, in-house maintenance) made an online alternative very attractive. When OCLC introduced their end-user online system (FirstSearch) it was an immediate success and paved the way for many competitors. From only 45 percent of libraries that offered end-user online searching in the pre-FirstSearch days of 1991/1992, now 90 percent of our respondents offer end-user online searching of commercial online systems. More than 95 percent of these libraries never charge patrons for this access, while more than half (57.5 percent) of the libraries that offered end-user online searching in 1991/1992 charged all or some of the users.

Most libraries now offer multiple commercial online systems to their patrons. Some, like FirstSearch, have remained popular from the beginning while other favorite titles have changed since the mid-1990s. Figure 4 shows the end-user online systems offered by the greatest percent of libraries in our surveys over time.

Some end-user services associated with systems that were popular with intermediaries no longer exist. In 1991 the two most popular end-user services were BRS/AfterDark (used by 23 percent of



**Figure 3**

*Most Popular Mediated Systems, 1991–2001*



libraries) and Dialog/Knowledge Index (used by 22 percent). Both services disappeared years ago. Specific interfaces and databases offered by the systems that have survived have, of course, changed over the course of the decade. The biggest change is the addition of Web-based versions of almost all of these systems—from nexis.com to SilverPlatterWeb. Many, such as OCLC FirstSearch, say they will only support Web versions in the future, as customers prefer the Web as the single online platform. Students and faculty are now accustomed to the look and feel of Web products, and the client-server architecture is now a standard. Ironically, Web versions of fee-based research services can create some confusion on the part of library patrons because they fail to differentiate between free Web resources with the fee-based content libraries subsidize.

### Internet and the World Wide Web

It may be hard to remember that when these surveys began in 1991 the World Wide Web did not exist and the Internet was mostly used in university libraries by staff members and for e-mail. None of the libraries in our first survey supported end-user access to the Internet, although some were in the early stages of planning such access. Today all of the respondents offer patron access to the free Web in addition to the wide range of Web-based commercial online and locally loaded databases. They provide links to high-quality Web sites, create their own Web resources, teach patrons about Web search engines and search strategies, and use the Web for library instruction.

It is impossible to exaggerate the impacts the Web has had on university libraries, faculty, and students. Because the authors saw the beginning of this trend, starting with the 1994/1995 survey, they added a series of questions that focus on the Internet's impacts on library instruction. These included questions on whether the library offered Internet access to patrons and if so, what types of instruction classes they offered. Today almost all of the respondents (97 percent) provide training classes on how to use the Web for on-site users (figure 5) and nearly two-thirds (63.8 percent) offer training for remote users (figure 6). Libraries use a variety of methods to teach users about the Web. In many of these cases today the Web is both the subject of the training and the means by which the training is delivered.

Several respondents in 2001 commented on how the Web makes instruction tasks both easier and more difficult. It is easier in that students and most faculty members feel comfortable in the Web environment and feel free to experiment. It is more of a challenge because many students tend to over-rely on the Web. As one respondent summarizes: "more and more faculty are unhappy with the Internet resources their students are using and have come to the librarians to help instruct students on reliable resources." Another echoes this feeling: "We have found in the last couple of years that too many students, because they know how to use the Web, are using *only* the Web itself to find material for their assignments, rather than trying the periodical indexes that we offer via the Web. We've had to change our instruction efforts to address this problem. We don't discourage them from searching the Web for material on their subject *in addition* to using the indexes, but we talk a lot about the quality of what

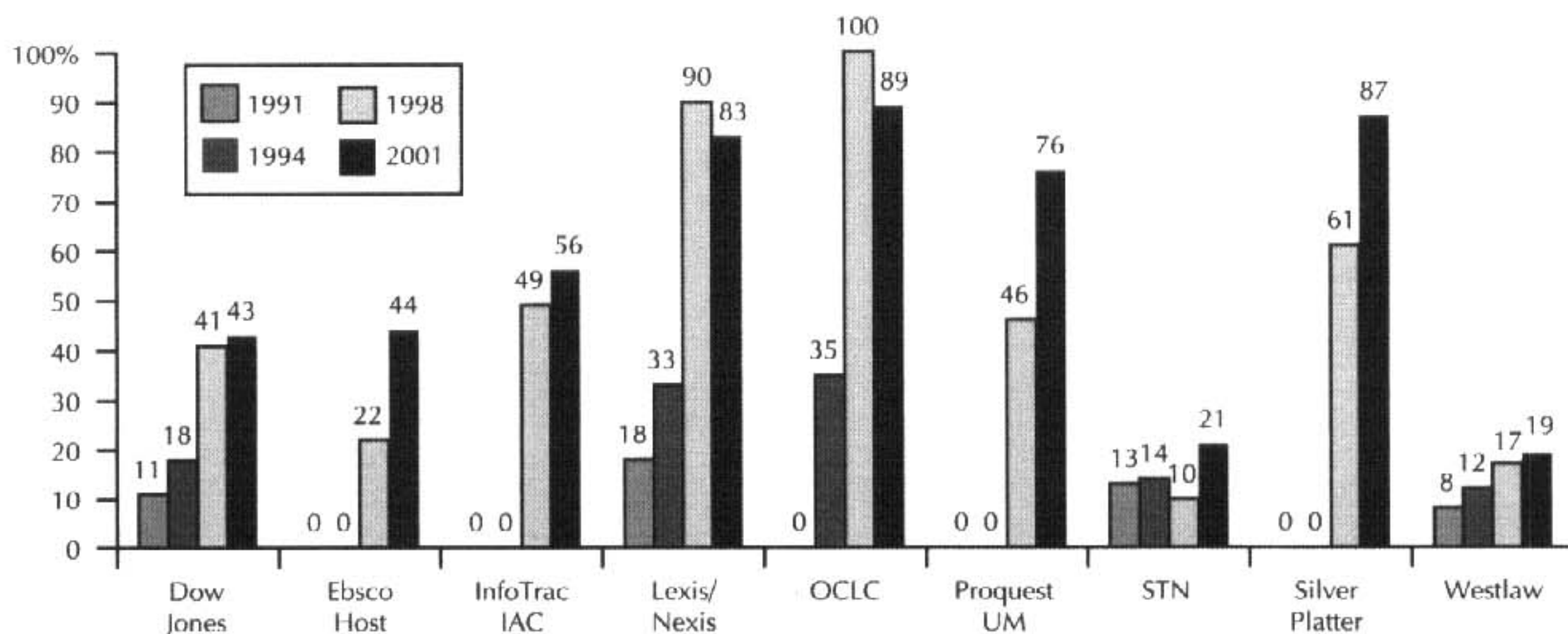
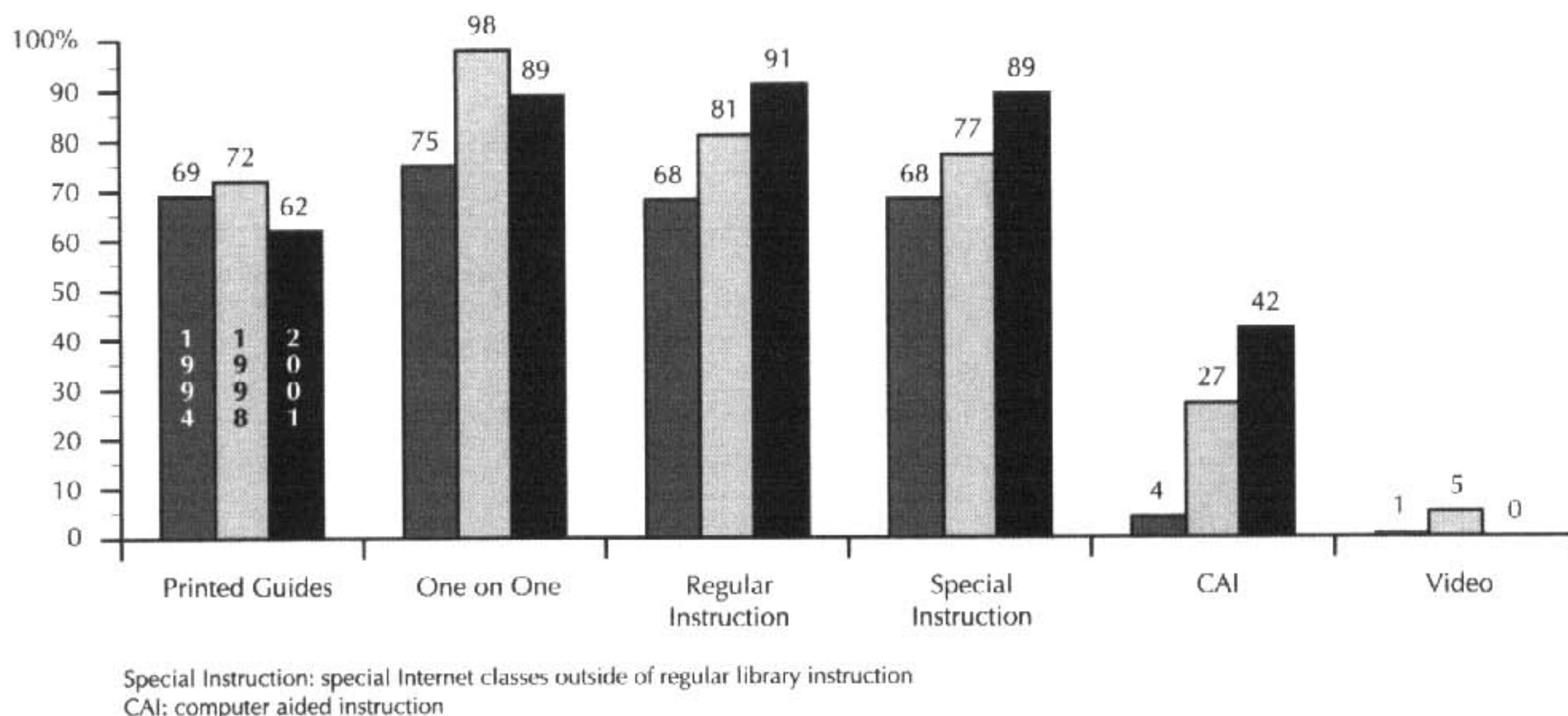


Figure 4:

End User Databases Offered by the Greatest Percent of Libraries, 1991–2001





**Figure 5**

*Onsite User Training for Internet Use, 1994-2001*

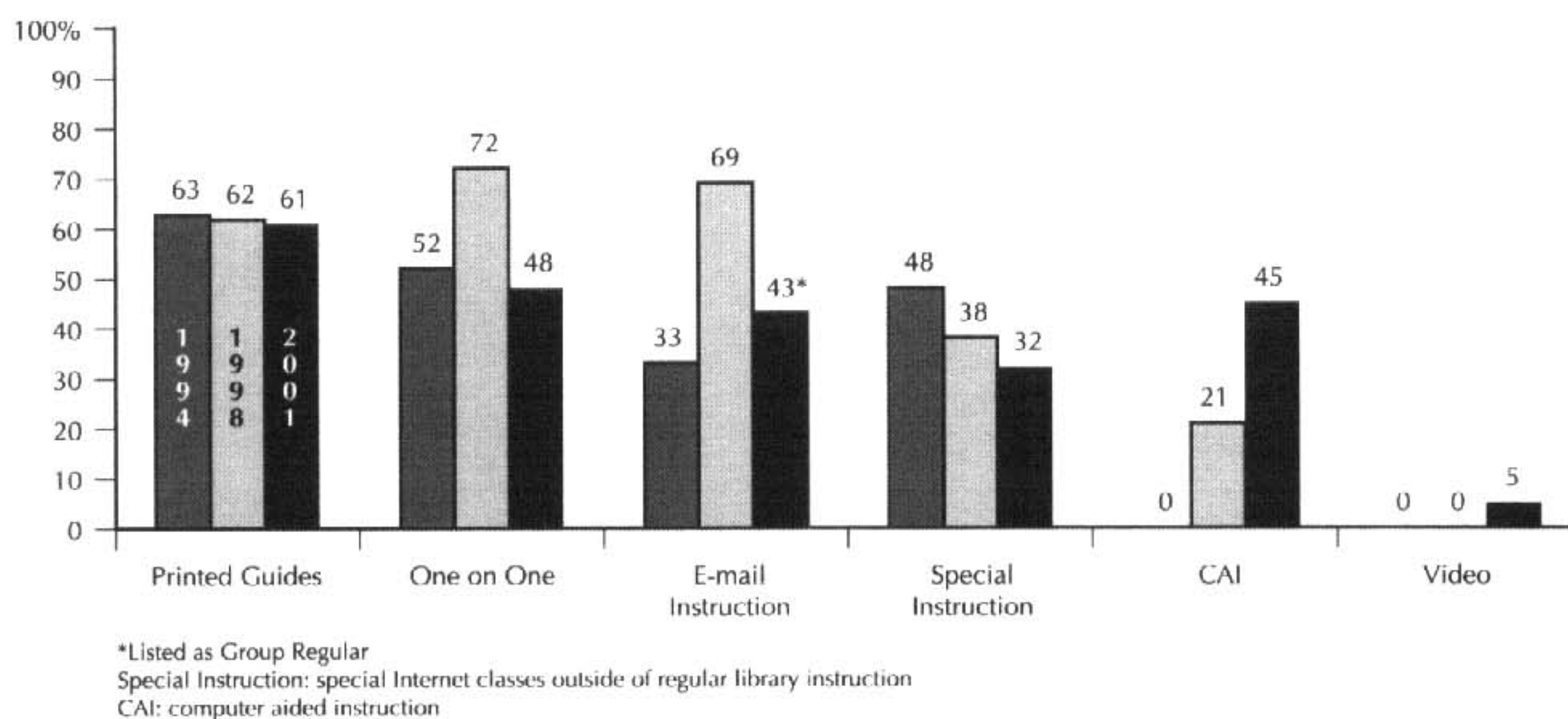
they find on the Web—the quality and the provenance.” Research by Ko, Duggan, and others supports these observations.<sup>14</sup>

## Changes in Reference Services

All of the additions and changes to information resources in the libraries are bound to also change reference services. Changes in modes and content of instruction are one manifestation, but digital

resources are also changing basic question-answering services.

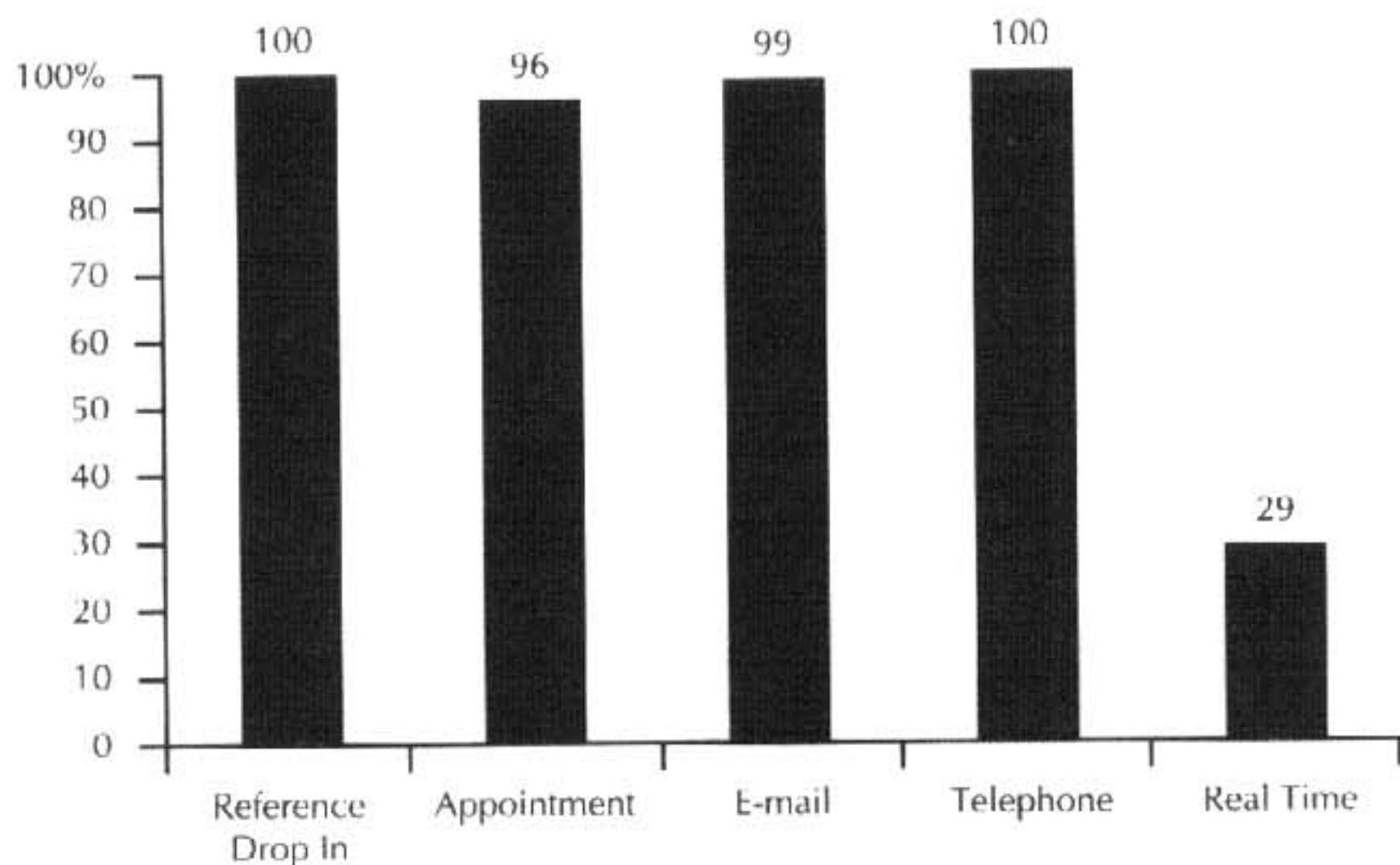
In addition to regular drop-in reference desk services and telephone reference, all but one of our respondents now offer e-mail reference and all but three do reference service by appointment (figure 7). The newest option is real-time online reference—mostly through synchronous text chat—now offered by more than 28 percent (twenty libraries) of our respondents. Additional respondents say they plan to look into or begin offering real-time online reference services. Still, coming in to the reference desk is the



**Figure 6**

*Remote User Instruction, 1994-2001*





**Figure 7**

*Reference Options, 2001*

most heavily used form of reference services in all of the libraries that responded to that question.<sup>15</sup>

Although many reference departments do not keep track of what resources or media they use to answer a specific question, we asked our respondents to guess. Fifty-eight of the seventy libraries took the challenge (figure 8). These reference librarians use a wide variety of resources to answer reference questions but speculate that the library's own online catalog and fee-based (commercial) online databases result in the greatest number of reference answers. This question was not asked in earlier surveys, but we suspect that the third-place finish of "print" is a decline over the decade. Indeed, several respondents commented that they are using print much less than even three years ago. According to one, "We use the print collection relatively lightly now. We are answering reference questions by an expanded number of electronic means. Dependency on electronic sources is virtually total."

Many of the reference librarians surveyed believe their libraries are offering better reference services with the increase in options for patrons to find a librarian in person or virtually and with the growth in the number of digital resources. They point out that the odds of finding an answer are increased, and "what used to be an impossible question . . . can be fairly speedily answered." This perception of better service is supported by research by Stalker and Murfin.<sup>16</sup> They analyzed the Brandeis University main reference department, which scored higher than other libraries taking the Wisconsin-Ohio Reference Evaluation Program. Use of electronic resources is not the only factor in high-quality reference services, but the authors conclude "clearly skill with computerized sources and bibliographic databases contributed greatly to high success."<sup>17</sup>

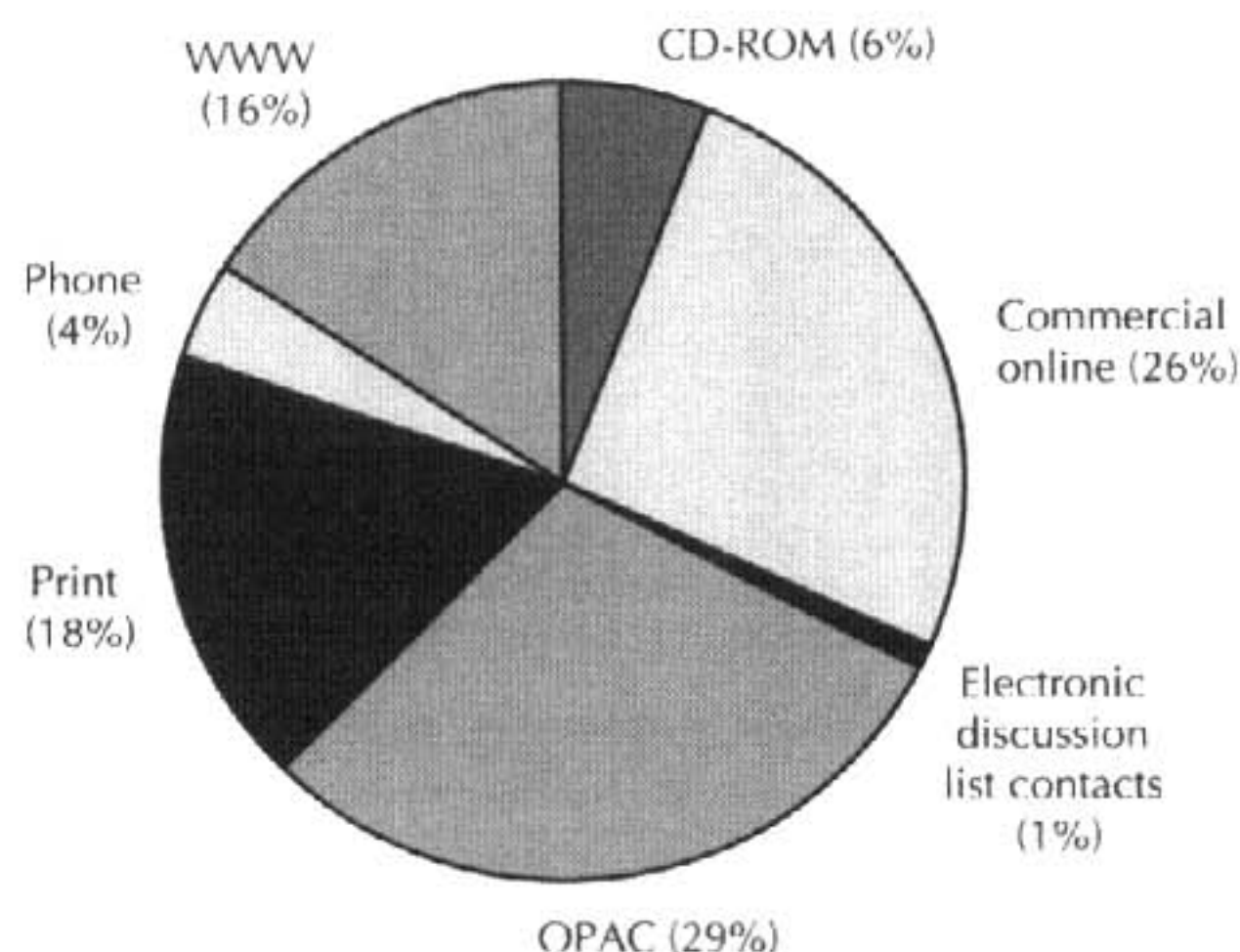
## Conclusion

There is no doubt that digital-information sources have had profound effects on university reference departments over the last decade and have changed libraries forever. Libraries add new media options as they become available; add workstations and networking capabilities; and add hundreds of new electronic titles. Although the exact number of reference questions seems to be declining in most libraries, the nature of the questions and the modes used to receive and answer questions have increased in variety and complexity. As one librarian

responded: "Some information is easier to find now that we have the Web, but the totality of the job is more complex." After answering content and technology questions "on the desk," the librarian "returns to an office where there is other work waiting: collection development, instruction, maintenance of Web pages, etc."

Although print materials are still an important part of reference services in 2001, their relative importance has declined as new electronic sources become available and as the expectations and preferences of patrons and staff change. Librarians and patrons expect to find answers in digital form these days, and these resources are often the first place they look.

These changes in expectations and attitudes ultimately may be the most important ones in a decade



**Figure 8**

*How Reference Questions Are Answered, 2001*



of change. Although one respondent sees more "burnout" now than in the past, most report that the impacts that digital resources have brought to their jobs in the last decade are, by now, mostly positive. They provide a greater probability that answers will be found, are popular with students, extend the reach of the library outside its walls, and greatly increase the collection.

As one librarian summarized her feelings for us: "I would say that the job of the reference staff hasn't changed dramatically in the last ten years. Yes, we have more electronic reference services, but the same attention to personal interaction, whether online or in person, is still important. Librarians do, I think, spend more time collaborating with faculty now, especially in putting together useful Web resources. Although the addition of new resources has grown dramatically, we were already used to incorporating them and have adjusted to new formats."

The Web as the format and delivery medium of choice is now changing what resources are searched and, in addition, how results are distributed, how instruction is delivered, and how extra services are offered to faculty. This ultimately is the main theme of changes in the 1990s.

Although these surveys only examined university research libraries, the changes reported by them parallel many of the changes found in other types of academic libraries (and summarized by Lynch).<sup>18</sup> Smaller libraries that can make decisions with fewer layers of bureaucracy and have smaller budgets may experience even more changes in reference service with the proliferation of Web sources and new agreements with multitype library consortia that bring digital resources smaller libraries could not afford alone. The reliance on electronic sources and services that begins this decade is not limited to a single type or a single size of library. ■

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