Bridging the Gap in Digital Library Continuing Education

How Librarians Who Were Not "Born Digital" Are Keeping Up

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Continuing education (CE) for librarians is a ubiquitous topic in library literature. This is hardly surprising since, as professionals whose job it is to assist users with their knowledge needs, librarians recognize the necessity of remaining lifelong learners themselves in order to keep pace with the ever-expanding amount of available information. The area of professional practice experiencing the most rapid change over the last decade and a half has been information technology, especially the Web and its many applications. Librarians must not only know how to use these emerging technologies in their jobs, they must also decide which to implement in their libraries for today's users.

Many librarians with enough experience to have advanced to senior decision-making positions within their institutions, though, likely did not receive training in Internet-related technologies during their formal education in library and information science. Educated in the ways of traditional libraries yet practicing in the digital age, those librarians receiving their MLS degrees prior to 1996 are, in many ways, a "bridge generation." Library administrators often try to compensate for their own lack of technical knowledge by recruiting recent library school graduates or tech-savvy non-librarians, but this is not a complete solution, and could create even greater distance between themselves and the technology. As Tennant notes, all librarians do not need to know how to write computer programs, but they *do* need to know what those programs are capable of doing. They should know the technical skills needed and possessed by their staff and must have enough technological literacy to devise practical solutions to the problems libraries face.[1]

Library administrators, therefore, are presented with the dual challenge of maintaining not only their own technical literacy, but also that of the librarians they supervise, particularly those who received their library degrees before the widespread adoption of the Web. This study sought to find out more about the process by which librarians who received a pre-Internet library school education are coping with the need to enhance their digital library technology skills and knowledge. Specific topics covered in the study included:

- What CE activities have bridge generation librarians undertaken thus far to enhance their digital library skills?
- What was the source of the training (for example, informal discussions, conference programs, and so on)?
- Which of these activities were the most helpful in improving their understanding and skills?
- What further technology training do bridge generation librarians feel they need most?

Library administrators can use this information to identify CE needs, develop CE programs, and spend their CE funds in the most effective way possible.

Literature Review

There is a great deal of support for the notion that librarians have a deep commitment to professional development.[2] Previous studies have approached the topic of librarian CE activities from a variety of angles. Some have focused on specific types of libraries, with academic librarians being most heavily studied,[3] although there have been a few studies concentrating on public librarians and corporate librarians.[4] Other studies have examined the CE endeavors of librarians working in certain specializations, such as catalogers and reference librarians.[5]

Recent studies have also shown that there is a great desire for technology-related CE.[6] Many factors affect the level and kinds of CE activities librarians can undertake, and institutional support, along with release time and financial assistance, has been mentioned to be one of the most important.[7] The type of library may also affect the CE opportunities available to librarians.[8] Several studies have also shown that while some librarians spend more time on informal CE projects than formal ones,[9] others would prefer to take short courses or participate in structured activities.[10] Institutions of higher education are commonly

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cited as preferred providers of CE events for librarians.[11]

Since this study focuses on the CE efforts of a specific group of librarians (those who received their library education in the pre-Internet era) in acquiring a very specific set of skills (those related to digital librarianship), it is necessary to review how these concepts have been examined in the library literature as well. Library technology has been regarded as an important component of library school education as far back as the mid-1970s.[12] By the early 1990s it was widely recognized that technological change would be continuous, and that students must be prepared to adapt.[13] This recognition resulted in curricular change: in 1994, only 10 percent of library schools mandated some sort of library automation course, but by 2002 the figure was 73 percent.[14] Varlejs's 2003 review of fifty accredited library school websites found that all schools offered an array of technology courses, and quite a few offered courses in digital libraries and electronic resources and services.[15]

The concept of a bridge generation of librarians also needs definition. The Digital Library Federation was founded in 1995, but its original definition of the digital library was not developed until 1998.[16] That fact, combined with a review of the previously cited studies on digital library school curricula over the past several decades, led to the general conclusion that the earliest year library school students likely would have received any Internet-related training in digital library technical skills was 1996. The bridge generation, therefore, was defined as those librarians who received their MLS or MLIS in 1995 or earlier. Respondents were screened from this group and asked demographic questions pertaining to gender, age, type of library in which they worked, years of professional experience, and primary job responsibility. Information was collected about the kinds of institutional support they enjoyed (that is, financial assistance only, release time only, or both) and the amount of annual financial support received, if appropriate.

Since the primary focus of this study is to examine digital library technology-related CE activities, it is essential to define what that means. The concept of digital libraries encompasses a broad range of expertise, and many of the competencies necessary for digital library applications, such as search strategy, instruction, project management, and grant writing, are also pertinent to traditional library services. Others have been transformed, such as the evolution of traditional cataloging practices into metadata creation. The impact of the Internet on library operations, though, has also given rise to an entirely new and unique set of desired skills. Deciding which topics to include in the survey was guided by previous efforts to describe the universe of digital library skills and competencies.[17]

Finally, both formal and informal CE activities were included. The CE methods studied in this survey include (from most formal to most informal):

- credit course (in-class, online, or distance);
- non-credit course (in-class, online, or distance);
- professional association conference program;
- professional association workshop (in-person or online);
- teleconference or videoconference;
- webcast or Web conference;
- e-mail discussion lists;
- reading professional literature; and
- informal discussions with colleagues.

Using definitions from adult learning research, formal professional development activities would be described as organized, structured programs that are usually sponsored by educational or academic institutions and professional associations,[18] whereas informal activities are those that happen outside of these types of organizations and typically occur opportunistically and without strict timetables.[19]

Methods and Results

The research was conducted by way of an electronically administered survey, with responses solicited by direct e-mail from persons selected by random number generation from the membership list of the Indiana Library Federation (ILF), the state's largest professional organization for librarians and media specialists. Survey content and layout were pre-tested with a few librarians. An initial screening question determined if each respondent fell into the desired group—an individual who received an MLS in 1995 or earlier. A total of 846 solicitations were sent over a period of two weeks in August 2007. There were 228 initial respondents, for a return rate of 27 percent (a relatively common total for an e-mail survey).[20] Of the initial respondents, 131 passed the screening question indicating they had received their MLS before 1996. This group of 131 is the final "N" for the analysis.

A matrix of topics and types of CE were presented to each respondent. However, it should be noted that the population and the method of delivery (e-mail) imply that the results may contain a slight bias in favor of individuals adept in electronic librarianship and CE. Likewise, only persons interested in a state library organization–level of engagement within the profession could have been among the respondents. That may limit the survey's generalizability, but it underscores some of the importance of individual findings from this relatively well-motivated group. The somewhat low response rate suggests that among the sampled population as a whole, this topic does not generate great enthusiasm.

Table 1 shows the demographic data for the respondents. By a significant percentage (83 percent), most were women. A few were in the age range of 35–45, and the rest were somewhat evenly divided in the ages of 46–55 (40 percent) and 56 and older (47 percent). Half of the respondents had more twenty-five years of library experience,

while only a small percentage (4 percent) had less than ten years. While the original survey contained twelve original categories of primary job responsibilities, the authors found it convenient and relevant to collapse these into four broad groupings. Slightly less than half identified their primary job responsibility as administrative (director/chief librarian, associate/assistant director, department head, and library consultant). Almost one-third were children's or school librarians, with public services jobs (reference, subject specialist, or circulation) and technical services jobs (technical services, government documents, or electronic/digital resources) accounting for considerably smaller percentages (14 percent and 8 percent, respectively) of the pool of respondents.

Table 2 shows a comparison of numbers for librarians working in particular types of libraries from the state as a whole; from the randomly solicited ILF members; and from qualified respondents. The population of ILF members closely mirrors the population of librarians in the state in regards to academic, public, and school librarians. Special and corporate librarians, however, are not well-represented in ILF, in part because Indiana has an active chapter of the Special Libraries Association. While the survey's population frame corresponds to the state library type of demographics, the group of respondents does not. Academic librarians, comprising 17 percent of the Federation's membership, are over-represented in the group of respondents by almost double, while school librarians and public librarians are under-represented, especially with regard to school librarians. This may indicate a greater interest in CE or digital librarianship among academic librarians. (Note: Since only nine respondents identified themselves as working in a special/corporate or other type of library, the original four library types were collapsed into three categories and those nine respondents were reclassified into another relevant category.)

The first major question in the survey was: *What digital library-related topics have respondents studied thus far?* Respondents were asked if within the previous two years they had participated in a CE activity involv-

Table 1. Demographic Data of Qualified Respondents

	Number	%
Gender:		
Female	109	83
Male	22	17
Age ranges:		
56 and older	62	47
46 to 55	53	40
35 to 45	16	12
Years of professional library experience:		
More than 25	65	50
21 to 25	23	18
16 to 20	19	15
10 to 15	19	15
Less than 10	5	4
Primary job responsibilities:		
Administrative	62	47
Children or school	40	31
Public services	18	14
Technical services	11	8

Table 2. Comparison of Indiana Librarian Populations by Type of Library

	Public Librarians	Academic Librarians	School Librarians	Other	Total (excluding other)
Number of librarians:					
Indiana*	1,364	538	963	n/a	2,865
Indiana Library Federation members solicited	394	138	292	42	824
Qualified respondents	52	39	31	9	122
% of librarians (excluding Other):					
Indiana*	48	19	34		
Indiana Library Federation Members solicited	48	17	35		
Qualified respondents	43	32	25		

*Data collected from Compare Public Libraries, Compare Academic Libraries, and Common Core of Data, National Center for Education Statistics (www.nces.ed.gov)

ing ten listed digital library-related topics. These topics were selected based on inventories of digital library skills identified in previous studies.[21] Table 3 shows that activities involving website design/information architecture and information retrieval had the highest rates of participation, while more technical topics like programming, markup languages, and database design had the lowest rates.

An examination of the individual topics by library type uncovers some differences in the level of interest in specific topics among librarians working in particular types of libraries (see figure 1). The degree of interest in topics like information retrieval, imaging and scanning, cataloging of digital resources, database design, and programming is fairly level across the spectrum. Academic and school librarians showed statistically significant (chi test at p < .05 level) greater tendency to pursue website design/information architecture training opportunities than did public librarians. Academic librarians also showed a greater pro-

pensity for undertaking CE activities involving the semantic Web, markup languages, and interface design than their public and school librarian counterparts. Information retrieval was a more popular topic for CE among school and public librarians. School librarians, however, were much less likely to seek information on metadata.

When digital library CE topics were analyzed by job type, there were few statistically significant correlations between topics and job types, with the exception of certain subjects studied by technical services librarians. Not surprisingly, technical services librarians were much more likely to engage in CE activities involving metadata (91 percent compared to an overall average of 48 percent) and cataloging of digital resources (82 percent compared to an overall average of 44 percent) than were other types of librarians. On the other hand, technical services librarians were much less likely than others to pursue training in information retrieval skills (55 percent compared to an overall average of 82 percent).

Another primary objective of the survey was to examine the types of CE activities that librarians have chosen to take part in, in order to keep up, so the question was asked: *What types of CE activities have been undertaken?* CE methods included both formal (credit and non-credit courses, professional association conference programs and workshops, teleconferences, videoconferences, and webcasts) and informal (e-mail discussion lists, reading professional literature, and discussions with colleagues).

Table 4 shows the total number of CE activities undertaken by respondents. The total of 1,855 activities divided by 131 respondents yields an average of slightly more than 14 digital-library related CE endeavors per respondent over a two-year period. Of these activities, an average of 9.4 was conducted by informal methods, and an average of 4.8 was conducted by formal methods. It is apparent, therefore, that respondents relied heavily on informal means of keeping current, primarily discussions with colleagues and professional literature, and to a lesser extent on e-mail discussion lists. This finding is consistent with other studies that have found that librarians are as much as three times more likely to engage in informal CE activities than formal ones.[22] The exception to the predominance of informal CE activities, though, are conference programs, which rank as the third most used CE activity, well below reading professional literature but just above e-mail discussion lists. Workshops rank fifth, followed by a sizeable drop-off in participation in other formal CE activities like non-credit

Table 3. Number of CE Activities by Topic

| CE Topic	Total CE Activities by Topic
Website design	424
Information retrieval	353
Imaging/scanning	224
Semantic Web	160
Metadata	155
Digital cataloging	151
User interface design	131
Markup languages	115
Database design	83
Programming/scripting languages	59
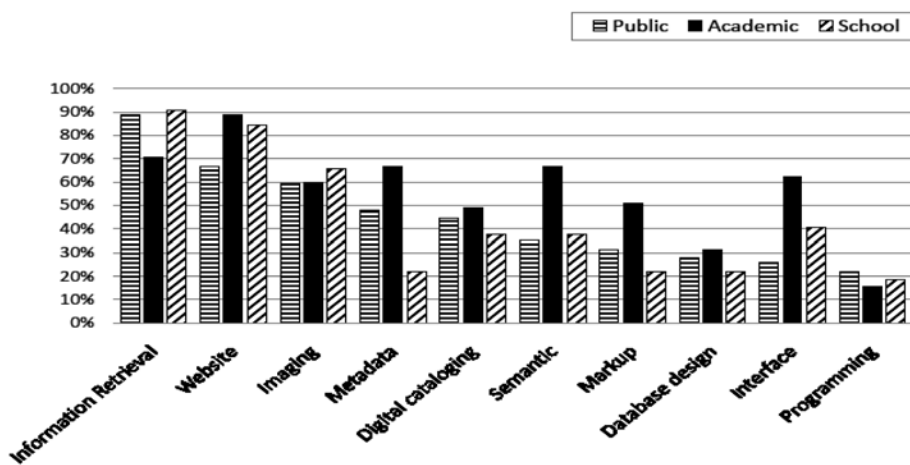
Figure 1. Topic Interest by Library Type

courses, teleconferences, videoconferences, webcasts, and credit courses.

Further grouping the types of CE activities into three categories–formal, costly, or free–yields some interesting results. Formal CE activities included all types *except* e-mail discussion lists, reading professional literature, and discussions with colleagues. Although some formal CE activities are free, for the most part the costly category contains all formal activities, including those that require personal and institutional expenditures, specifically professional association workshops, and credit and non-credit courses. Informal types of CE activities (e-mail, reading, and discussions) were categorized as free. These categories were further analyzed by the respondent's age and library type. Figure 2 shows the overall breakdown of formal,

Table 4. Number of CE Activities by Type

Type of CE Activity	Total CE Activities by Type
Discussion with colleagues	511
Reading professional literature	469
Conference programs	257
E-mail lists	248
Workshops	156
Non-credit courses	75
Webcasts	61
Teleconference	32
Videoconferences	24
Credit courses	22
Total	1,855
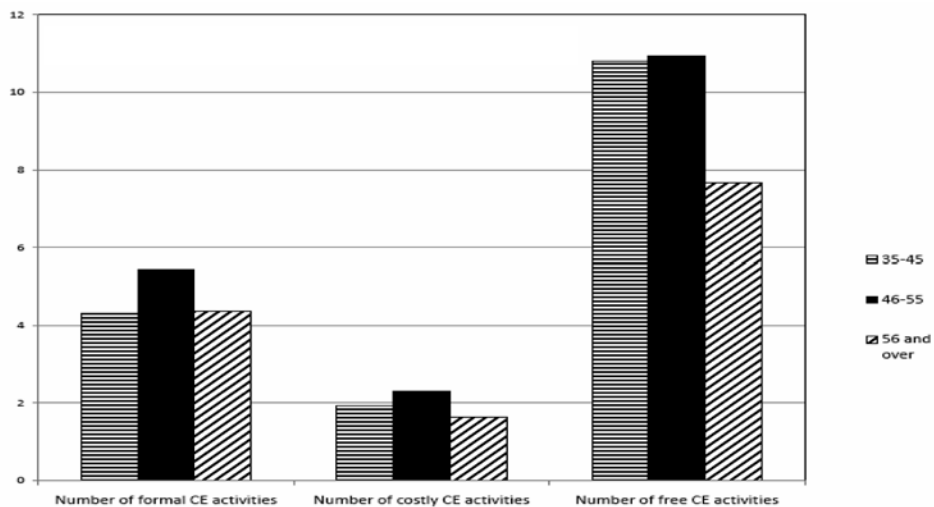
Figure 2. Average Number of Formal, Costly, and Free CE Activities by Age Group

costly, and free CE activities by age group. The 46–55 age group was the most likely to participate in any type of CE activity, while respondents who were 56 or older were considerably less likely to participate in free activities.

Figure 3, which analyzes formal, costly, and free CE activities by library type, includes some surprises. Academic librarians engaged in the greatest number of CE endeavors overall. They were also significantly more likely to participate in free CE activities, followed by school librarians. School librarians were the most likely group to take part in costly CE pursuits. Public librarians participated in the fewest number of CE activities, although their involvement in costly CE activities was slightly higher than academic librarians.

There were no statistically significant relationships involving formal and informal CE methods among the four major job types (administrative, public services, technical services, and school/children/other). There was, however, a statistically significant difference between public services librarians and other librarians when costly CE activities were considered; public services librarians engaged in fewer of these types of activities than any other group.

While informative, the figures do not tell the whole story of the digital library CE experiences of bridge generation librarians. What is most important is not how many total CE activities librarians have participated in, but how many of those activities have been helpful in improving their understanding of digital library resources. Thus, respondents were asked to not only indicate what types of CE activities they had engaged in for each topic, but also to rate the helpfulness of each on a five-point Likert scale ranging from "very helpful" to "very unhelpful." Consequently, the effectiveness of both the topical instructions that librarians received and the methods that were employed were analyzed to determine which produced the greatest benefits. In the following analysis, the concept was streamlined by defining it in two ways: *helpful* (which includes responses of "somewhat helpful" and "helpful") and *very helpful* (which includes only the "very helpful" responses).

Table 5 shows how respondents rated each of the CE topics. Programming, the least studied CE topic, nevertheless received high marks for helpfulness. Information retrieval, imaging/scanning, and cataloging of digital resources also appear in the top five of each category of helpfulness. Website design, despite being the most heav-

ily studied topic, received only middling reviews of helpfulness. Metadata also ranks towards the middle in each category, however, data not shown in the table illustrate that formal methods of this instruction had the second highest percentage in the very helpful category. The implication may be that this topic is best handled by formal methods. Database design and markup languages, both of which were among the least sought topics, were also deemed to be the least helpful.

Table 6 illustrates the overall helpfulness of the different types of CE activities. Conference programs received the highest percentage of overall helpfulness, but dropped to sixth in the "very helpful" category. Informal methods of discussion and reading, both of which topped the list of most used types of CE activities, also ranked in the top five of the helpful and very helpful categories. Interestingly, credit courses, the least often used method and ranked as the least helpful overall, placed second in the list of very helpful CE activities, suggesting that although few librarians used this method, many of the ones who did were very pleased with the training they received. Two other formal methods, conference workshops and non-credit courses, were also positioned in the top five of each list. When considering just the formal CE activities, the more intensive experiences like courses and workshops were more often noted as very helpful than other formal methods. E-mail, although a heavily used method, ranked in the bottom five of both lists, as did the less frequently used methods of webcasts, teleconferences, and videoconferences.

The formatting of the survey also provided the ability to analyze the helpfulness of combinations of CE topics and methods. Table 7 ranks the most helpful groupings of topics and formal CE methods that had more than ten responses. As previously, the more intensive and formal CE types, workshops and non-credit courses, were rated more often as very helpful.

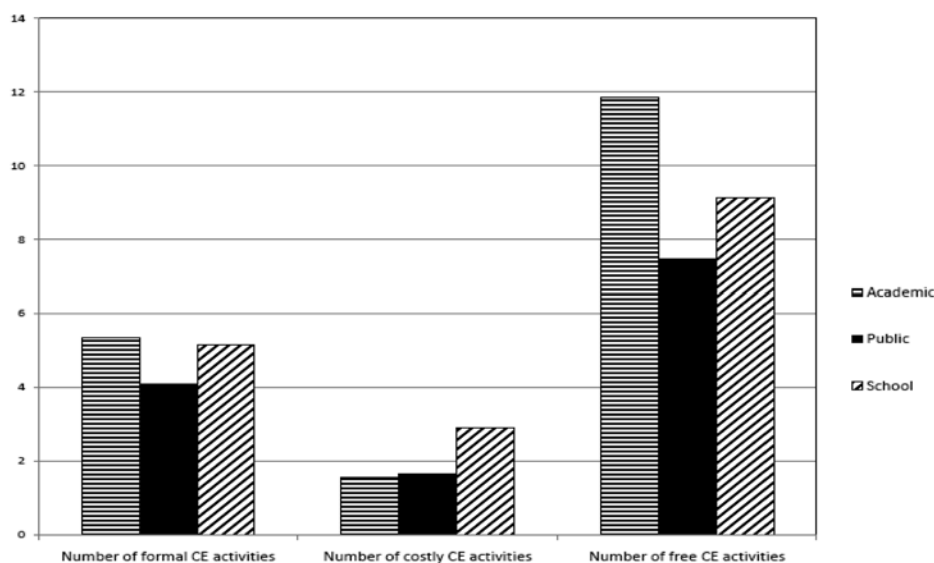To gauge the likelihood of future participation in CE

Figure 3. Average Number of Formal, Costly, and Free CE Activities by Library Type

Table 5. CE Topics Ranked by Helpfulness

CE Topic	Number Helpful	Percent Helpful	Number Very Helpful	Percent Very Helpful
Information retrieval	287	81	112	32
Programming/scripting languages	52	88	17	29
Imaging/scanning	177	79	61	27
Digital cataloging	125	83	41	27
Website design	326	77	111	26
Metadata	110	71	41	26
User interface design	91	69	31	24
Semantic Web	128	80	37	23
Database design	58	70	16	19
Markup languages	70	61	21	18

NOTE: "Number helpful" and "number very helpful" refer to the number of respondents, across all CE methods, who studied each topic; i.e., one person using e-mail, discussion, and a course for metadata would count as three for Metadata. "Percent helpful" and "percent very helpful" refer to the total number of persons rating any CE method "helpful" or "very helpful" divided by the total number of persons engaging in any CE method for that topic.

Table 6. CE Types Ranked by Percent Very Helpful

Type of CE Activity	Number Helpful	Percent Helpful	Number Very Helpful	Percent Very Helpful
Discussion with colleagues	400	78	188	37
Credit course	13	59	7	32
Non-credit course	57	76	20	27
Reading professional literature	125	83	41	27
Workshop	118	76	38	24
Conference program	205	80	58	23
Webcast	45	74	12	20
E-mail lists	179	72	48	19
Teleconference	23	72	4	13
Videoconference	15	63	2	8

NOTE: "Number helpful" and "number very helpful" refer to the number of respondents, across all CE topics, who participated in each type of CE method; i.e., one person who participated in workshops on metadata, information retrieval, and the Semantic Web would count as three for Workshop. "Percent helpful" and "percent very helpful" refer to the total number of persons rating any CE topic "helpful" or "very helpful" divided by the total number of persons studying any CE topic by that method.

Table 7. Topic/Formal CE Method Groupings Ranked by Percent Rated Very Helpful

CE Topic	Type of CE Activity	Number of Respondents	Percent Helpful	Percent Very Helpful
Imaging/scanning	Non-credit course	10	90	40
Metadata	Workshop	16	75	38
Information retrieval	Conference program	57	86	33
Digital cataloging	Workshop	13	85	31
Information retrieval	Webcast	13	92	31
Imaging/scanning	Workshop	21	76	29
User interface design	Conference program	15	80	27
Website design	Non-credit course	24	70	25
Website design	Workshop	42	78	24
Information retrieval	Workshop	34	74	24
Imaging/scanning	Conference program	30	80	23
Digital cataloging	Conference program	23	78	22
Website design	Conference program	59	84	20
Metadata	Conference program	27	67	19
Semantic Web	Conference program	26	77	15
Information retrieval	Non-credit course	15	80	13
Website design	Videoconference	15	60	13
Website design	Teleconference	17	70	12
Website design	Webcast	25	68	12

activities involving digital library-related subjects, participants were asked: *How likely are bridge generation librarians to seek digital library-related training in the near future?* They were presented with the ten original topics plus an additional one (digital archiving and preservation), and for each topic, were asked how likely they would be to take part in a related CE activity during the next two years. Table 8 ranks the average likelihood of future participation

for each topic in terms of "likely to study" and "very likely to study." The adage "the best predictor of future behavior is past behavior" generally holds true in this case. There were few dramatic shifts between the findings in table 8 and those of the most studied topics in table 3. The topics in the top three spots in each table virtually mirror each other–information retrieval, website design, and imaging.

The survey examined the impact of age and library type on likely future CE participation. Table 9 shows a breakdown by topic of the responses of three broad age groups, 35–45, 46–55, and 56 and older. The middle group, 46–55, is the most likely to do any CE activity on any topic, especially those involving information retrieval and digital cataloging. Interestingly, and maybe somewhat surprisingly, the 56 and over group is more likely to pursue CE opportunities than the youngest group in over half the subject areas. When all three age groups are compared using chi-square at the $p < .05$ level, only digital cataloging shows a statistically significant difference. Studying the impact of age on CE behavior raises questions on whether there are sub-generations within the bridge generation, or might the beginning date of the bridge generation be more fluid than specified for these analytical purposes.

Given the raw data in table 9, it seems that the answers to both questions are not so simple. The lack of statistically significant differences among the three age groups makes it difficult to distinguish between the bridge concept itself (that is, trained in one era of librarianship and working in another) and the simple effect of age. Even the most senior members of the profession have spent a considerable portion of their careers working in the digital age, and they show no less interest in pursuing digital library CE activities than their younger bridge generation colleagues.

Table 10 presents a rundown of the future topic areas of pursuit by type of library. Academic librarians are the most likely to pursue activities on any topic in the future, while public librarians are the least likely. School librarians, on the other hand, demonstrate interest in particular topics, most notably information retrieval and technical skills like website design or imaging/scanning. Of all the topics, only the semantic Web, website design, and programming differ significantly, with academic librarians preferring the first and school librarians preferring the latter two.

Survey takers were asked: *What support for CE activities do bridge generation librarians receive from their employers?* Ninety-two percent reported that they received some form of help, whether financial assistance, release time, or both. Seventy-seven percent of respondents who received some support got both financial assistance and release time, while 13 percent received only release time and 3 percent received only financial assistance. Of those librarians who received some level of financial support, the largest group (37 percent) received less than $500 per year. Thirty-four percent received between $500 and $1,000 per year, 10 percent received between $1,001 and $2,000 annually, and 14 percent enjoyed financial support of more than $2,000 per year.

Exploring connections between job responsibility and financial support discloses that there are some statistically significant relationships between these two variables. All technical services librarians and 85 percent of administrators received some level of financial support, compared to lower percentages of public services librarians (78 percent) and school/children/other librarians (68 percent). Comparing the level of financial assistance and the number of CE activities undertaken also reveals that there is no statistical significance between these variables. More financial support does not necessarily result in a greater degree of CE participation. This is true for formal, costly, or free/informal CE activities. While these findings seem counterintuitive, they are in keeping with the conclusions of previous studies.[23]

Discussion

The rapid pace of technological change has forced library administrators to think of ways to help the librarians they supervise remain up to date in digital library issues. This is especially important for those librarians who received

Table 8. CE Topics Ranked by Percent Rated Most Likely to Be Studied in the Future

Topic	Percent Likely to Study	Percent Very Likely to Study
Information retrieval	62	20
Website design	47	13
Imaging/scanning	43	8
User interface design	38	11
Digital archiving	36	8
Semantic Web	32	9
Database design	31	3
Digital cataloging	28	15
Metadata	27	11
Programming/scripting languages	21	6
Markup languages	16	8

their formal training in the pre-Internet era, a group that will remain significant and influential for years to come. Studying the digital library-related CE habits of these bridge generation librarians can help library managers make effective use of the CE resources at their disposal.

Library administrators who wish to support their bridge generation librarians in acquiring more technologi-

Table 9. Likelihood of CE Topics to Be Studied in the Future by Age Group

| | Percent by Age Range | | |
CE Topic	35–45	46–55	56+
Website design	44	55	40
Information retrieval	44	74	56
Imaging/scanning	38	45	42
User interface design	31	47	32
Digital archiving	31	40	35
Semantic Web	31	36	29
Database design	25	34	31
Metadata	19	38	19
Digital cataloging*	19	43	18
Programming/scripting languages	13	28	16
Markup languages	6	21	15
Average	**27**	**42**	**30**

* Differences between the groups are statistically significant at p < .05

cal skills should be encouraged by a number of the findings in this study. A large majority sees training in digital library skills as important; more than 50 percent think of it as either very important or most important. Although librarians generally are self-motivated in their professional development, organizational support is a key factor in creating a culture to encourage participation in CE activities.[24] An overwhelming majority of the librarians who responded to this survey receive at least a modest amount of institutional support for CE activities, and a large percentage report that they receive both financial assistance and release time. Furthermore, they have demonstrated a considerable willingness to participate in digital library-related CE activities, as respondents reported engaging in an average of slightly more than fourteen digital library-related CE activities over a two-year period. Considering that the topics surveyed are only a subset of possible CE pursuits available to librarians, it seems that they are making digital library skills a professional development priority.

Overall, bridge generation librarians have found digital library CE activities to be very helpful, so it appears that library managers can be confident that the resources they have devoted to these activities have been well-spent. As has been found in previous studies, this survey's results revealed a heavy reliance on informal CE methods, which outnumbered formal ones almost two to one; inexpensiveness and convenience undoubtedly account for the appeal of informal methods. The high degree of attendance at conference programs and workshops shows that formal CE methods remain important, too. Although others have concluded that librarians attend conferences primarily for professional rejuvenation and social networking, this study

Table 10. Likelihood of CE Topics to Be Studied in the Future by Library Type

CE Topic	Academic Librarians (%)	Public Librarians (%)	School Librarians (%)
Information retrieval	67	52	72
Semantic Web*	51	24	19
Digital archiving	47	37	22
Website design*	44	35	69
User interface design	42	39	31
Imaging/scanning	38	46	44
Metadata	36	26	16
Database design	33	26	38
Digital cataloging	29	26	31
Markup languages	20	15	13
Programming/scripting languages*	18	13	38
Average	**39**	**31**	**36**

* Differences between the library types are statistically significant at p < .05.

indicates that conferences are perceived as valuable for CE purposes.[25] Formal CE methods, including credit and noncredit courses in addition to conference programs and workshops, also received high marks for helpfulness, especially the more intensive experiences such as courses and workshops, which require librarians to commit to exerting themselves.

The findings related to coursework also suggest that there is a potentially greater role that library schools, already acknowledged by other studies as a preferred professional development provider, could play in the CE arena.[26] In looking ahead to future training, bridge generation librarians seem interested in continuing to pursue CE in the topics they have studied most in the past, especially information retrieval, website design, and imaging. Professional associations should also be heartened by the findings that show how helpful respondents have found their CE activities and would do well to continue making digital library topics a staple of their program and workshop offerings. Administrators would do well to find ways to help their librarians participate in these types of formal CE offerings.

The type of library where a librarian works in seems to have some relationship to the digital library topics that are studied and the CE methods employed. Academic librarians were more likely than others to study certain topics and participate in a greater number of CE activities, especially free ones. They are also more likely to study any digital library–related topic in the future. Possible explanations for this include a greater expectation imposed on them by their employers to engage in a regular program of professional development.

School librarians, along with academics, were more likely to study website design but were much less likely than peers in other library types to study metadata. Per capita, school librarians were also the most likely group to engage in costly or formal CE activities, and also had very specific interests in future training topics, especially those involving technical skills. This possibly suggests that school librarians enjoy less information technology (IT) support than their colleagues and must seek training elsewhere. Finally, public librarians did the fewest number of CE activities but did participate in slightly more costly CE activities than academic librarians. Public librarians are the least likely to study digital library–related topics in the future.

Primary job responsibility was associated with only a few aspects of CE: technical service librarians were understandably more likely to study metadata and digital resources cataloging than other librarians, while public services librarians engaged in significantly fewer costly CE activities than other librarians. Technical services librarians and administrators were more likely to receive financial assistance than other librarians.

Age factors were also considered. Librarians between the ages of 46–55 were the most likely to participate in CE activities and the most likely to seek training in the future. It appears that this group is striving to build on its considerable knowledge and experience, recognizing that it likely has many more years ahead in the profession and that these years will continue to be times of change and challenge. Furthermore, librarians in the 56 and older range continue to show a commitment to professional growth. Not content to merely ride off into the sunset, this group is as likely to participate in digital library-related activities as the 35–45 set, and library managers should not be tempted to neglect their CE needs or misjudge their interest in digital library topics.

Although bridge generation librarians were not born in the digital era, they seem to realize that in order to provide the best service to their users, they must continue to reinvent themselves. It is apparent from the findings that bridge generation librarians are making an effort to keep their technical skills up to date. It is also apparent that they realize there is much more to learn. Professional associations and library schools have an important role to play in providing this training, since bridge generation librarians find the intensive learning opportunities that these organizations can supply among the most helpful. Bridge generation librarians, though, do not seem to be as interested in learning highly technical skills such as programming, markup languages, and database design. Library administrators may have to consider the possibility of recruiting greater numbers of newer librarians trained in digital library technology to add more technical capability to their institutions, or consider hiring what James Neal calls "feral professionals": non-librarians with technological expertise.[27] This study suggests some potential directions of future research. One is a comparison of the CE habits of librarians receiving their library degrees post-1995 with those of the bridge generation. Another is to build upon the by-age analyses in this study and establish at what age or career point CE generally becomes most desirable.

References

1. Roy Tennant, "The Digital Librarian Shortage," *Library Journal* 127, no. 5 (Mar. 15, 2002): 32.
2. W. Michael Havener and Wilbur A. Stolt, "The Professional Development Activities of Academic Librarians: Does Institutional Support Make a Difference?" *College & Research Libraries* 55 (1994): 25–36; Donna C. Chan and Ethel Auster, "Factors Contributing to the Professional Development of Reference Librarians," *Library & Information Science Research* 25 (2003): 265–86; Philip Hider, "A Survey of Continuing Professional Development Activities and Attitudes Amongst Catalogers," *Cataloging & Classification Quarterly* 42, no. 2 (2006): 35–58; Skye Hardesty

and Tammy Sugarman, "Academic Librarians, Professional Literature, and New Technologies: A Survey," *Journal of Academic Librarianship* 33, no. 2 (2007): 196–205.

3. Havener and Stolt, "The Professional Development Activities of Academic Librarians," 25–36; W. Michael Havener and Philip Worrell, "Environmental Factors in Professional Development Activities: Does Type of Academic Library Affiliation Make a Difference?" *Library & Information Science Research* 16 (1994): 219–39; Chumchit Saechan, "The Needs of Continuing Education for Academic Librarians in the South of Thailand," *Malaysian Journal of Library & Information Science* 10, no. 2 (2005): 25–36.

4. Chan and Auster, "Factors Contributing to the Professional Development of Reference Librarians," 265–86; Ethel Auster and Donna C. Chan, "Reference Librarians and Keeping Up-to-Date," *Reference & User Services Quarterly* 44, no. 1 (2004): 57–66; Ana Arias Terry, "Continuing Education in the Scholarly Continuum: Back to School with Publishers, Librarians, and Vendors," *Serials Review* 27, no. 3/4 (2001): 62–78.

5. Hider, "A Survey of Continuing Professional Development Activities and Attitudes Amongst Catalogers," 35–58; Chan and Auster, "Factors Contributing to the Professional Development of Reference Librarians," 265–86; Auster and Chan, "Reference Librarians and Keeping Up-to-Date," 57–66.

6. Saechan, "The Needs of Continuing Education for Academic Librarians in the South of Thailand," 25–36; Auster and Chan, "Reference Librarians and Keeping Up-to-Date," 57–66; Hider, "A Survey of Continuing Professional Development Activities and Attitudes Amongst Catalogers," 35–58; Shaheen Majid, "Continuing Professional Development (CPD) Activities Organized by Library and Information Study Programs in Southeast Asia," *Journal of Education for Library and Information Science* 45, no. 1 (2004): 58–70.

7. Havener and Stolt, "The Professional Development Activities of Academic Librarians," 25–36; Saechan, "The Needs of Continuing Education for Academic Librarians in the South of Thailand," 25–36; Chan and Auster, "Factors Contributing to the Professional Development of Reference Librarians," 265–86.

8. Havener and Worrell, "Environmental Factors in Professional Development Activities: Does Type of Academic Library Affiliation Make a Difference?" 219–39.

9. Chan and Auster, "Factors Contributing to the Professional Development of Reference Librarians," 265–86; Auster and Chan, "Reference Librarians and Keeping Up-To-Date," 57–66; Jana Varlejs, "On Their Own: Librarians' Self-Directed, Work-Related Learning," *Library Quarterly* 69, no. 2 (1999): 173–201.

10. Saechan, "The Needs of Continuing Education for Academic Librarians in the South of Thailand," 25–36; Hider, "A Survey of Continuing Professional Development Activities and Attitudes Amongst Catalogers," 35–58.

11. Saechan, "The Needs of Continuing Education for Academic Librarians in the South of Thailand," 25–36; Varlejs, "On Their Own," 173–201.

12. International Federation of Library Associations, "Standards for Library Schools," www.ils.unc.edu/daniel/IFLA/standards76.html (accessed May 4, 2007).

13. Raymond F. Vondran, "Rethinking Library Education in the Information Age," in *Library Education and Employer Expectations*, ed. E. D. Cluff (New York: Haworth Pr., 1990), 27–36.

14. Ray Irwin, "Characterizing the Core: What Catalog Descriptions of Mandatory Courses Reveal about LIS Schools and Librarianship," *Journal of Education for Library and Information Science* 43, no. 2 (2002): 175–84.

15. Jana Varlejs, "Professional Competencies for the Digital Age: What Library Schools Are Doing to Prepare Special Librarians," *Education Libraries* 26, no. 1 (2003): 16–18.

16. Digital Library Federation, "A Working Definition of Digital Library," www.diglib.org/about/dldefinition.htm (accessed May 4, 2007).

17. David Bawden, Polona Vilar, and Vlasta Zabukovec, "Education and Training for Digital Librarians: A Slovenia/UK Comparison," Aslib Proceedings 57, no. 1 (2005): 85–98; Youngok Choi and Edie Rasmussen, "What Is Needed to Educate Future Digital Librarians: A Study of Current Practice and Staffing Patterns in Academic and Research Libraries," *D-Lib Magazine* 12, no. 9 (2006), www.dlib.org/dlib/september06/choi/09choi.html (accessed May 4, 2007).

18. D. W. Livingstone, "Exploring the Icebergs of Adult Learning: Findings of the First Canadian Survey of Informal Learning Practices," *Canadian Journal for the Study of Adult Education* 13, no. 2 (1999): 49–72.

19. Raymond A. Noe, Steffanie L. Wilk, Ellen J. Mullen, and James E. Wanek, "Employee Development: Issues in Construct Definition and Investigation of Antecedents," in *Improving Training Effectiveness in Work Organizations*, ed. J. Kevin Ford et al. (Mahwah, N.J.: Lawrence Eribaum, 1997), 153–89.

20. Don A. Dillman, *Mail and Internet Surveys: The Tailored Design Method*, 2nd ed., (New York: Wiley, 2007).

21. Bawden, Vilar, and Zabukovec, "Education and Training for Digital Librarians," 85–98; Choi and Rasmussen, "What Is Needed to Educate Future Digital Librarians."

22. Varlejs, "On Their Own," 173–201.

23. Ibid.; Elizabeth W. Stone, *Factors Related to the Professional Development of Librarians* (Metuchen, N.J.: Scarecrow Pr., 1969).

24. Chan and Auster, "Factors Contributing to the Professional Development of Reference Librarians," 265–86.

25. Robert D. Vega and Ruth S. Connell, "Librarians' Attitudes Toward Conferences: A Study," *College & Research Libraries* 68, no. 6 (2007): 503–15.

26. Saechan, "The Needs of Continuing Education for Academic Librarians in the South of Thailand," 25–36; Majid, "Continuing Professional Development (CPD) Activities Organized by Library and Information Study Programs in Southeast Asia," 58–70.

27. James G. Neal, "Raised by Wolves: Integrating the New Generation of Feral Professionals into the Academic Library," *Library Journal* 131, no. 3 (2006): 42–44.