GIS Mentoring

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Abstract

The implementation and development of effective mentoring is crucial to the growth and success of Geographic Information Systems (GIS) librarianship and staffing. Mentoring is necessary to fill the gaps for all staff members, especially students. I propose that mentoring can assuage many of the staffing obstacles to successful GIS programs. Effective mentoring will create a healthy and productive work environment as well as nurture future GIS librarians and staff members. Although mentoring within librarianship has been discussed in library literature, unfortunately work on the area of GIS mentoring is lacking. This article discusses the benefits of mentoring and demonstrates how the need for GIS mentoring is different from other library mentoring, specifically because of staffing. It also offers strategies for effective GIS mentoring.

Introduction

"To teach is to learn." This Chinese proverb embraces the cyclical nature of mentoring, in which knowledge is gained by everyone in the mentoring relationship—student and teacher, protégé and mentor. Unfortunately, it is not always easy to know how to teach and mentor effectively. While literature exists about mentoring in relation to libraries, this is not the case for mentoring in relation to Geographic Information Systems (GIS). As GIS is a relatively new discipline, circumstances regarding staffing, financial obligations, time obligations, and isolation set it apart from other areas of library mentoring. This article discusses these differences and offers practical strategies for implementing an effective GIS mentoring program.

MENTORING FOR LIBRARIES

Simply defined, a mentor is "someone who helps someone else learn something that he or she would have learned less well, more slowly, or not at all if left alone" (Bell, 2000, p. 133). This definition can be applied to everything that many of us, as librarians, do on a daily basis with all patrons, and it needs to be tailored to working with students and other assistants. A library is a business—to the extent that it has financial concerns, competition, and employees and offers services. Therefore, it is appropriate to embrace a business-oriented definition. Richard Luecke, author of *Harvard Business Essentials: Coaching and Mentoring: How to Develop Top Talent and Achieve Stronger Performance,* redefines mentoring as "a means of developing human resources" (2004, p. xi). Libraries, although not always thought of as such, are corporate entities and should be investing in ways to develop human resources. In order to offer high-quality services, attention must be spent on recruiting, developing, and keeping staff members. With students, mentoring plays a key role in demonstrating why librarianship is a good career choice, developing skills and knowledge, and creating a positive work environment that may reduce turnover.

The benefits of mentoring are numerous and diverse for the mentor and the recipient of the mentoring (referred to as the protégé in this article). Benefits, however, apply to more than just those involved in the mentoring relationship. In his book *The Mentoring Manager,* Gareth Lewis (1996) divides the beneficiaries into three categories: protégé, mentor, and organization (see Table 1). Gail Munde (2000) confirms and adds to Lewis's list of benefits in her article, "Beyond Mentoring: Toward the Rejuvenation of Academic Libraries."

> Positive outcomes for protégés have included higher salaries, promotions, overall career satisfaction, and satisfaction with their organizations. Benefits for mentors include a renewal of professional purpose, a briefing in new or emerging aspects of a profession, a sense of satisfaction that one has helped to influence the future of the profession, the loyalty and support of the protégé, and recognition for the mentor's ability to identify and advise promising employees who will contribute to the organization. Positive outcomes to organizations have included increased employee retention, reduced turnover, faster and more efficient introduction of junior employees to organizational norms and expectations, and improved coherence of leadership through the organization. (Munde, 2000, p. 172)

The organizational benefits—although commonly overlooked when considering mentoring—are the foundations of a successful library department or program.

GIS MENTORING VERSUS OTHER LIBRARY MENTORING

GIS librarianship is specialized and highly technical. Although mentoring is mentioned in library literature, a review of the literature did not find

Table 1. Mentoring Benefits Lewis Finds for the Protégé, Mentor, and Organization

Recipient	Type
For the Protégé	Greater understanding of the total organizational perspective
	Personal benefits that come from relationships
	Learning outcomes developing his/her own learning to learn skills
	Career benefits
	Learning problem solving and problem-solving approaches
	Self-analysis of strengths and weaknesses
For the Mentor	Widening the perspective of business functions
	Increases in personal satisfaction that come from relationships
	Role enhancement and the expansion of repertoire of skills
	Personal development
	Career enhancement
For the Organization	Better-trained staff
	Development of an organizational culture
	Effective management development
	A positive orientation to learning
	Empowered staff

Source. Based on Lewis, 1996, pp. 13-15.

any mentoring models that fit the circumstances faced by GIS librarians and staff. For instance, the mentoring model used by the Louisiana State University Libraries, although successful, is not appropriate for GIS mentoring for two main reasons: goals and audience. The audience is librarians, and the goal is promotion and tenure. This is the case for the majority of mentoring articles that exist. When contemplating mentoring in relation to GIS, goals and audience must be taken into account.

The current literature is filled with general articles and those that address issues faced by other specializations such as minority librarians and academic librarians facing tenure. Although many GIS services are offered in academic libraries, because of the technical aspect of GIS, it was difficult to draw close comparisons between mentoring in these libraries and that which should be offered in relation to GIS. The closest relationship to GIS found was an article geared toward medical reference librarians in academic libraries. Hongjie Wang (2001), in "Academic Mentorship: An Effective Professional Development Strategy for Medical Reference Librarians," provides an excellent literature review of academic mentoring and captures the technical aspect of medical librarianship. Most relevant to GIS is mention of a 1990 national survey of 210 health sciences librarians affiliated with 70 academic medical libraries in the United States. The survey indicated that the specialized skills necessary for professional medical librarianship were acquired on the job. Wang writes, "This survey result supports the popular belief among information services professionals that, while an absolute prerequisite for the profession, a master's degree in library and information science is not equivalent to the skills of a competent medical reference librarian" (2001, p. 26). I believe that this is also the case for GIS librarianship. Although the foundation of librarianship, which includes

critical reference and database skills, is learned in library school, many skills required for a GIS specialization are not.

Unfortunately, the literature on medical librarianship does not completely apply. The most obvious difference is that medical librarianship is more established. Medical librarians are often in separate libraries that are more fully staffed. Although GIS librarians are often in map libraries, staffing numbers are not commonly equivalent. Adequate staffing of GIS services is vital. In his article "GIS Collection Development, Staffing, and Training," Karl Longstreth states, "For an academic library (indeed, any library) with spatial data from the government or other sources, the basic need for implementing a GIS will be to provide access to those data. The development of staff to provide this access is crucial" (1995, p. 270). Despite the critical need for staffing, GIS services are often given by a mélange of providers: students, nonlibrarian staff, and GIS professionals—in addition to librarians. GIS professionals are those individuals who have come from another job in which they worked in the field of Geographic Information Systems. These include managers, developers, consultants, data collectors, sensor and system developers, or academics and researchers (GIS Professional, n.d.). Staffing has been an important issue associated with GIS services since they began. In her 1995 article "Expanding Horizons for GIS Services in Academic Libraries," Carolyn D. Argentati asserts: "Development of GIS services has involved, and in some cases, transformed, the efforts of government documents librarians, map librarians, reference and subject specialist librarians, and others throughout the academic library organization. In this process, libraries have had to address many questions regarding staffing and management of these new services and the allocation of resources to support them (p. 463).

Although GIS technology and understanding has grown, issues regarding staffing have not changed significantly. At this point in time, I believe that staffing is the key difference between GIS librarianship and other technical forms of librarianship. Mentoring is a key way to develop staffing in order to provide a quality GIS program.

Issues Surrounding GIS Staffing

Demands on GIS staff are high. Argentati (1995) sets the stage for GIS staffing concerns when discussing "a series of developments [that] began to intensify the demands on GIS Team members" during the initial launch of GIS services at North Carolina State University (NCSU) Libraries.

> First, the number of GIS users on campus was increasing rapidly, partly because of campus licensing agreements with several major software vendors. Second, the software itself was continually evolving, and learning new GIS and data applications or staying up-to-date on changing functionality requires considerable time and effort. Finally, the proliferation of spatial data available to be collected, along with data-related

issues such as network storage infrastructure for multi-platform access and WWW-based documentation and retrieval mechanisms, demanded sustained attention and activity. (p. 464)

These basic issues have not changed. In fact, they have multiplied. Issues regarding GIS staffing are complex and include a number of factors: financial responsibilities, a diverse set of service providers, time obligations, lack of training, and isolation. In this article, the phrase GIS staffing refers to all staff (librarians, nonlibrarian staff, and students) that provide assistance with GIS. The first issue associated with GIS staffing is the high financial obligation associated with running a GIS program. In order to meet the other financial costs for hardware, software, and data programs, the costs of staffing are often minimized, which results in low total staffing numbers and low numbers of librarians. In addition, staffing of GIS programs is not always full-time. Staff members often have other responsibilities that are not related to GIS. Further, GIS services are fairly new. Although library literature began to discuss GIS with some frequency in the late 1990s, not all libraries offer GIS services. In fact, many libraries are just beginning to start GIS programs. Even those institutions with established programs have small programs and are faced with financial issues that may prohibit rapid growth. Lastly, because of the low number of GIS staff, the issue of isolation is common in GIS staffing.

There are five components to a GIS: hardware, software, data, people, and methods. Each component is critical and the first four require a level of financial obligation. Computer *hardware* consists of input devices such as keyboards, scanners, and digitizers; output devices such as monitors and printers; and processors. Libraries commonly have public computers, but computers with GIS may require extra devices such as scanners, digitizers, or color printers. In addition, GIS software may require higher processing speeds for the hardware. GIS *software,* which is commonly upgraded almost every year, can also be costly. Larger institutions with other departments on campus who use GIS may benefit from sharing the cost of a site license. This, however, is not always the case. Although geospatial *data* are distributed at no cost to Federal Depository libraries, it is not comprehensive. Most geospatial data that is distributed through the Federal Depository Library Program (FDLP) were created for a specific project and are not applicable for most general use. Therefore, purchasing commercial data for foundational purposes, such as boundary files, or to fill in gaps is common. Lastly, *people* are needed to use the GIS. Because using a GIS is sometimes very technical, people with GIS knowledge are needed to assist and teach others. As GIS services are not common enough yet, in many libraries there is not enough demand to justify libraries devoting finances to hire a full-time or multiple full-time GIS librarians or staff. As a result, GIS staffing is often filled by a diverse set of individuals with different backgrounds: full-time/part-time, and those with or without a geography/GIS background or
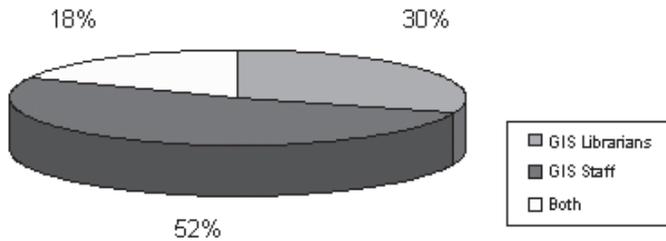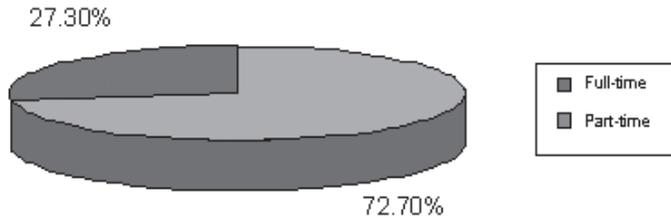
Note. Results from informal survey posted on GOVDOC-L 11/08/05

Figure 1. Breakdown of GIS Staffing in Federal Depository Libaries: Librarians and Staff

M.L.S. Many programs have a combination of all of these and rely heavily on students and volunteers.

In addition to the challenges of the financial obligations, GIS services and staffing are constrained by the concerns of sharing time with other responsibilities. Staffing issues for librarians and staff members trickle down to students who assist with GIS. In order to learn more about GIS staffing and libraries, I conducted an informal survey to depository libraries through GOVDOC-L, a "listserv-based discussion forum about government information and the Federal Depository Library program" (GOVDOC-L, n.d.). Although, as indicated above, GIS services and hence issues related to GIS staffing and mentoring pertain to libraries outside of the FDLP, this scope proved to be a good starting point.[1] The survey netted a 5 percent response rate (73 out of a possible 1,232 depositories). Of these, 33 of the 73 respondents indicated having GIS services. It is interesting to note that 6 of 43 libraries that responded they did not have GIS services mentioned that GIS services were planned for an undisclosed date in the future.

Although GIS services are staffed by librarians, nonlibrarians that include GIS professionals, and students, the survey only asked for a distinction between librarians and nonlibrarians (see Figures 1 and 2). Of the libraries indicating GIS services, 30.3 percent (10 libraries) had GIS librarians, with the responses divided equally between full-time and part-time. 51.5 percent (17 libraries) answered yes to GIS services and no to a librarian. The remaining 18.2 percent (6 libraries) indicated that they have GIS services provided by both a GIS librarian and a staff member in some capacity. For the libraries who did not have a librarian, the majority (17 libraries or 77 percent) had one part-time staff member. Many respondents specified that they are only able to designate a portion of time to GIS as they are responsible for the map collection or other duties. Although GIS services are being

27.30%

72.70%

Figure 2.   Full-time versus Part-time Staffing of GIS Services in Federal Depository Libaries

more widely offered, 72.7 percent (24 libraries) have one librarian or staff member working only in a part-time capacity as compared with 27 percent (9 libraries) that have full-time GIS staffing. While these percentages are by no means indicative of GIS services on the national or international levels, they display a pattern of disjointed GIS staffing that I believe to be true for libraries in a broad sense. As the survey shows, many staff members responsible for GIS have other duties and obligations.

Learning and maintaining the skills necessary to manage GIS software is very time intensive. If staff resources are spread too thin there is not adequate time to manage GIS duties. Although this is changing with institutions now hiring GIS-specific technicians and librarians, many of those currently responsible for GIS services had these responsibilities added to already existing duties. Because the area of GIS is technical, time must be spent gaining personal knowledge and honing software skills. "A library should establish a set of goals specifically for GIS implementation. . . . Including a goal for training is important; as GIS software and databases are sufficiently different from other library resources, most staff and users will not effectively use GIS without instruction" (Longstreth, 1995, p. 271).

In addition to the scarcity of time, many librarians or staff may feel they are not adequately trained. Longstreth lays out these areas of knowledge and skills needed to provide GIS services:

> Library staff need to understand, and be proficient in, several areas. Training implies learning to use GIS software, but it is important to have a conceptual understanding and knowledge of real GIS applications in order to make training useful. Staff must know more than how to operate the GIS software; they need instruction in the issues of GIS theory, GIS databases, and GIS applications in a discipline. This instruction is necessary because the ability to add, manipulate, and analyze data in a GIS intelligently requires understanding; the inputs and processes

> needed to yield a meaningful result are a function of employing a GIS
> in an intellectually appropriate way. (1995, pp. 271–272)

Even those who have a strong background in geography or another field using GIS may feel challenged by new developments in software and resources. Because in many libraries there is only one person with knowledge of GIS, current librarians and staff may also experience isolation. Mentoring may feel like the last thing one has the resources to do successfully. There are a few things that can be used to resolve these problems. The following section discusses additional roles to be included in the definition of mentoring and suggests strategies for effective mentoring.

Suggested Strategies and Structure

The definition of mentoring must be molded to fit overall goals of GIS programs and the appropriate audience. At this time, I believe the goals of GIS staffing are to build future GIS librarians and professionals and gain assistance in providing services. The audience (protégés) for GIS mentoring is primarily students. Strategies presented here can be modified for others, however, based on goals for the relationship and amount of time invested. Taking into consideration the goals and audience for GIS staffing, the standard definition of mentoring is too vague. For GIS, coaching and training should be part of the mentor role in order to train assistants in necessary skills for the job. Luecke states, "Coaching is about your job; mentoring is about your career" (2004, p. 78). Similarly, in "Formalizing an Informal Process: Developing a Mentoring Program in a University Library," Catherine Wojewodzki, Linda Stein, and Tommy Richardson state, "Technical, teaching, and management skills are obtained with time on-the-job and guidance from a supervisor, but professional development is a different, more personal process that can be accelerated by mentoring assistance from experienced colleagues" (1998, p. 442). These definitions of mentoring assume that the protégé is invested in a career already. For GIS, although many students/staff are devoting time to GIS, it may be on a more temporary basis. The initiative in mentoring comes from the person seeking greater understanding. "That person—the protégé—must take responsibility for his or her own growth and development" (Luecke, 2004, p. ix). Although many students, especially graduate students, take their jobs seriously, their main priority is completing their education. It is incorrect to assume that they have decided on GIS as their chosen career and that they will take the initiative to learn both GIS and library skills on their own. In the case of GIS services, which can be very technical, I believe that a combination of many roles addressing job and career development—including both mentoring and coaching—should be taken. In addition, the roles of process advisor and consultant should be added as well. A mentor should take on these roles to help the learner set objectives, manage time, monitor progress, and check skills (Lewis, 1996, pp. 90–93). While coaching is

very specific, the roles of advisor and consultant examine the larger role that the protégé fulfills.

With turnover a natural part of using student assistants, many people may question the efficacy of investing time and resources in mentoring. This is an issue for all jobs. Mentoring is most time-consuming in the beginning stages of development. Once a structure and plan are formed, time is more pleasantly spent developing a relationship with the student(s). Demonstrating that working with GIS is challenging, rewarding, and fun will reduce turnover and address staffing issues for the future. The long-term goal is for students to realize that the library is not simply a place for part-time employment but a possible, and very rewarding, career option.

A ten-point framework for mentoring is presented below. This has been developed and implemented over the past year and a half at the University of Maryland with graduate assistants, student assistants, and volunteers. I have found it particularly effective.

Set Goals

When faced with the task of offering GIS services with limited staffing, it is important to look beyond a growing list of small everyday jobs that need to be fulfilled. While this list can be helpful in designing a plan, it is crucial to look at the overall picture of what the protégé will be accomplishing both for the library and personally. For example, if it is a priority to offer GIS instruction for the campus, it is important to envision what role the protégé will play in it.

Have Regular Meetings with an Agenda

It is necessary to have regular meetings to answer questions, get feedback, and check on the progress of the protégé. In order to make meetings easier to remember, plan them for a set time and day of the week. To be productive, these meetings should have an agenda with a plan, future tasks with deadlines that are mutually agreed upon, and a rough plan for the next meeting. For instance, set an agenda for meeting A that has a plan for training or discussion for that meeting and a list of tasks outlined clearly with specific deadlines. It makes sense to have the deadlines set for meeting B or a day or two before meeting B so you have time to look over the results of tasks, for example, a list of GIS Internet resources. The agenda could also have an estimated plan for the next meeting. This allows you to look ahead. For instance, if you are using a book like Getting to Know ArcGIS (Burke et al., 2004) for training, meeting A would discuss/demonstrate components covered in chapters 1–3 as a preview, assign the task of reading chapters 1–3 with a deadline of meeting B, and plan for meeting B to preview chapters 4–6. Allow for flexibility. You may find that the agenda needs to be revised if demonstrations or questions run longer or if the protégé has been working through the instructional material faster than originally planned. After the meeting give the protégé a final agenda

for the next meeting. It helps to create a long-term adaptable plan before beginning work with the protégé. While advance planning takes a considerable amount of time, keep in mind that it will make creating productive agendas easier and cut down on time in the future when developing training for new students or protégés. When planning, remember to keep the goals you have set in mind. This will cut down on time lost to ideas outside of what you want to accomplish.

Challenge the Protégé

We often learn best and enjoy our jobs more thoroughly when challenged. Give the protégé the confidence that you believe that he/she is able to complete the tasks and challenges that you have assigned him/her. This said, however, take care not to push the protégé beyond what he or she can accomplish. Keep in mind that with students, the number one priority is for them to earn a degree. Have an open dialogue about tasks and a flexible agenda. It is ideal to incorporate tests or demonstrations into the agenda. For instance, after previewing chapters 1–3 and assigning reading chapters 1–3 in meeting A, have meeting B begin with questions about chapters 1–3 and then have the protégé demonstrate for you key items from the chapters that you have already laid out in the agenda. In addition, after a certain period of time have a more comprehensive test. This is to determine what areas need more training and give the protégé confidence in what he/she has learned. Give the protégé a list in advance of what will be covered so he/she has a way to prepare. It is helpful to have tests allotted in the plan you have created. This way the protégé will be clear of the overall goals for training and that the tests are not the result of how you feel about how he or she is progressing.

When You Learn, Teach Them

Mentoring is a learning process, for both the protégé and the mentor. As stated earlier, many GIS staff may feel as if they do not know enough to train a protégé. This is an ideal time for the mentor to learn, both in advance of training and with the protégé. Share new concepts and resources that you have learned and encourage the protégé to do the same. Working in a library, there should be no shortage of print and electronic resources for training. In addition, many academic campuses have site licenses for software, which include free training through resources like the Environmental Systems Research Institute (ESRI) Virtual Campus.

Take the Protégé to Meetings

I highly recommend attending professional meetings and conferences, especially those that are informal (and less costly) and that deal with GIS. The content is extremely useful and creating friends and contacts in the fields of GIS and libraries is invaluable. Take your graduate and undergraduate students and staff with you to appropriate meetings. In some cases this may

be difficult because of finances. If possible, work with your library to get additional funds for graduate assistants. If this is not possible, informal meetings, like ESRI user group meetings, are free. Training students creates the opportunity and structure to learn new things and hone skills. Mentoring "is a means of developing human resources . . . The mentor acts as a trusted guide, offering advice when asked and opening doors to learning opportunities when possible and appropriate" (Luecke, 2004, p. xi). In addition to learning new things, the protégé will be able to make contacts in the field, which is valuable if he/she is considering GIS librarianship as a career.

Be Patient

Mentoring is not a quick process. It involves developing a relationship. Be patient with both the protégé and with yourself. As you gain more experience as a mentor, it is possible to re-use the templates already created. Keep in mind, however, that each protégé is an individual and that his or her learning style may differ from yours or other protégés. Be flexible and modify your plan to accommodate the way that he or she learns best.

Give Protégés Room to Develop Their Own Areas

As long as it fits into the overall goals, allow the protégé to develop an area of interest. For instance, if one of the program goals is to develop GIS instruction and she is interested in history, encourage her to find literature or other resources relating to GIS and history and develop ideas for incorporating it into campus instruction.

Provide Group Training Sessions

Create a staff training session for people who are not GIS-designated staff but may have to provide some assistance with the GIS computers in your absence. This session should not be comprehensive but rather address common issues that they may need to deal with without your help. Make sure you provide a handout for their reference.

Be Available for Questions

Whether it is related to the library or to GIS, there is a plethora of new things that the protégé will be learning. It is crucial for you to be available—and make it known that you are available—to answer any questions. This will strengthen the relationship and make the learning process proceed more smoothly.

Be Actively Involved

Mentoring is a relationship. In the end, "the development of a working relationship requires the active participation of both its parties" (Portner, 2002, p. 5). While you cannot always rely on the active participation of the protégé, you can encourage it and provide a good example with your dedication to the relationship.

Conclusion

Mentoring geared toward GIS is severely needed in order to combat staffing shortages and nurture a positive learning and working environment for the department. More importantly, GIS mentoring is crucial for the survival of GIS services in the library. GIS mentoring has not been previously discussed in library literature. Although literature about mentoring in relation to health sciences or libraries in general is helpful, these examples are limited in their relevancy to GIS. The strategies provided are ones personally developed at the University of Maryland and are presented in hopes that they will begin a dialogue on effective GIS mentoring. Comments are welcome and encouraged.

Acknowledgements

Notes

1. The questions included on the survey were (1) Does your library have GIS services (yes or no?); (2) Does your library have a GIS librarian (yes or no); and (3) What is the total number of staff devoted to GIS at your library?

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