

Beyond Locating Data: Academic Libraries Role in Providing GIS Services

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Within the information age, librarians and library patrons are looking for new and exciting methods for effectively presenting research data. Utilizing ESRI's ArcGIS software, patrons can manipulate various types of numeric and geospatial data to create a powerful visual representation known as a map. Successful GIS service requires that libraries provide patrons access to: GIS software, large format scanning and printing, instruction, data services, and technical support. Participants will discover how Miami University (Ohio) Libraries are providing GIS access, service, and support to a multidisciplinary user environment and how these elements can be applied within an academic library.

Keywords: geographic information systems (GIS); Library Services; GIS training and access.

Introduction

College and University campuses nationwide are encountering an explosion of interest in using Geographic Information Systems (GIS) to support faculty, staff and student research interests. The expanding interest has resulted in several departments providing access to GIS software and establishing coursework. As access expansion is occurring, four key issues are emerging: 1.) How can GIS access be promoted campus-wide? 2.) What instruction options are available? 3.) How can GIS software and data access be provided when departmental labs are closed or in-use? 4.) Who can GIS clients contact when they need assistance?

Libraries can work collaboratively with academic departments to bridge the GIS gap by promoting and expanding GIS access and support. From obtaining data, to providing assistance with class exercises, to creating maps questions will arise along the way and these questions can be answered by librarians and library staff. With libraries multiple disciplinary scope, GIS services and support can be provided for all students regardless of major.

As libraries continue to enhance information literacy instruction, oftentimes instruction is limited to the evaluation of print and electronic periodicals. Information literacy needs to be approached from a less confining viewpoint in order to promote numeric, geospatial, technological and information evaluation. By adapting this holistic approach to information literacy, libraries can help the academic community develop lifelong information evaluation skills.

Why Libraries?

Providing access to Geographic Information Systems (GIS) software within libraries is not a new trend but rather a continuation of the Association of Research Libraries (ARL) GIS literacy project. In the past, researchers, businesses and scientists utilized GIS software but today the software has been streamlined to allow even novice clients to create maps with minimal training. Due to the multidisciplinary applications for GIS, libraries can coordinate and provide access, training and data services to faculty, staff and students.

Several libraries have begun to add GIS software and geospatial data since the inception of the Association of Research Libraries (ARL) GIS literacy project in 1992 (Argentati, 1997). The ARL initiative to introduce GIS into libraries was developed in order to allow the public to have access to geospatial data in a meaningful format. By using a GIS, a client and/or librarian could create a map based on geospatial data to illustrate the data in a spatial context. Initially, only a few large academic libraries throughout the country offered GIS services but the number of libraries offering this service has been growing steadily. This expansion in GIS services is primarily the result of libraries promoting and improving client access to geospatial data. By integrating GIS services and data in the library environment, the academic community benefits from increased information access.

Software access

Libraries have seen the number of research workstations escalate as more library resources are being purchased in electronic formats such as e-books, e-journals, and subscription databases. Most library research workstations have the processing power and storage capacity to permit the installation of GIS software. In an era where libraries debate whether productivity software packages such as Microsoft Office should be installed on library workstations, the obvious research applications for GIS software should provide a clear example of why this software should be included. Libraries typically offer extended hours, when compared to departmental GIS labs, and provide equal access to library workstations thus providing introductory to advanced GIS clients access to the software.

GIS data resources

Libraries are excellent sources for GIS data in electronic and/or print formats. A client mapping various demographics worldwide may utilize a mix of electronic and print resources to locate the information needed. Map collections within libraries are yet another source of data. Government document and other library collections are treasure-troves of geospatial data sets and library collections provide the background material essential to establishing an understanding of the phenomenon being studied.

Network data access

GIS clients are in a never-ending quest for data related to their mapping needs. Typically this data exists somewhere on campus but, more often than not, the data is located on a professor's hard drive or on a departmental network drive with restricted access. Students and faculty campus wide would like to not only have access to this data but to also know what data is currently available. Without knowing what data already exists on campus, it is possible for multiple departments to create the same data sets. Libraries can serve as a geospatial data repository thus providing a centralized location to access all geospatial data on campus.

GIS and beyond help

Providing research assistance to the academic community is the mission of every academic library and adding GIS services is a natural fit. Reference librarians have been assisting with locating demographic data for years but oftentimes the data is more meaningful when depicted visually. Library clients may also need assistance with scanners and image manipulation software to prepare and/or modify data for use in a GIS. Librarians can provide clients with assistance on creating a map using GIS software, scanning, and using image manipulation software.

The three tiers of GIS Instruction

One of the major issues with integrating GIS services is instruction. To ensure the success of GIS services within the library, the basic strategies that librarians have applied to information literacy instruction can be adapted. While students are instructed to critically evaluate print and electronic resources, typically minimal, if any, attention is devoted to evaluating the credibility of maps. To help students better appreciate the value of evaluating information regardless of format, GIS instruction combined with hands-on exercises can bridge the geographic literacy divide.

To promote geographic literacy efforts, libraries should provide workshops that balance background information with GIS hands-on exercises. In order to address every potential participant's skill level, GIS instruction must be provided in a three-tier approach: introductory, intermediate and advanced.

Introductory level instruction

Within the introductory level, participants become immersed in the essentials of geographic literacy including the basics of map projections, scale, legend construction, data classification, and color usage. To provide examples of why maps should be critiqued, participants are shown three maps produced from the same data that employ different classification methods. By using examples, it becomes obvious how maps can be misleading and why information evaluation

methods must be applied to maps. Participants then learn the basics of ESRI's ArcGIS software and complete a hands-on exercise. The exercise requires the creation of a five-range choropleth map portraying the data provided. Upon completion of this workshop, the foundation of geographic literacy has been established and allows for further GIS instruction.

Intermediate level instruction

Once participants have completed an introductory level GIS session more time can be devoted to learning the ArcGIS software. To meet the needs of the intermediate GIS clients, sessions include a quick software refresher and then provide guided in-depth instruction on such topics as georeferencing, data preparation, and shapefile creation, to using ArcGIS extensions. Each session includes hands-on exercises and time for questions.

Advanced level instruction

For advanced clients, GIS instruction methods must be altered from a passive to an active learning methodology emphasizing point-of-need instruction. Advanced instruction, typically one-on-one, involves anything from preparing a GIS map for printing to assistance with modifying datasets and boundary files. The key to successful advanced level instruction is the instructor must have a comprehensive understanding of the software and a willingness to seek assistance from other GIS experts.

Throughout each of the three levels of instruction, GIS clients should be provided access to ESRI's virtual campus. The ESRI virtual campus provides clients access to various learning modules that balance textual background with exercises to teach GIS software packages. By combining virtual campus access with workshop instruction, clients can continue to develop GIS skills beyond the classroom.

This three-tiered approach to instruction allows libraries to address the needs of all current and potential GIS clients on campus. In general, hundreds of students on campus interested in GIS have minimal if any access to the software and/or instruction. This untapped market affords libraries an excellent opportunity to provide these services due to their centralized location, extended hours of operation, availability of print and electronic data sources, accessibility regardless of major and most importantly knowledgeable staff to provide assistance.

GIS at Miami University Libraries

GIS services at Miami University Libraries are an extension of the Libraries mission and goals to "establish and maintain a range of high quality services which support, enhance, and promote the academic programs of the University" (Miami University Libraries Mission and Goals, 1993). In accordance with the Libraries goals,

GIS services provide access to electronic and print data sources while ensuring that clients have opportunities for instruction and assistance to promote client satisfaction. To promote GIS usage within academic programs, Miami University Libraries finances the ESRI software site license, provides all on-campus software technical support, manages the license server, purchases GIS data and offers instruction opportunities to the academic community.

Miami University Libraries began providing GIS services in 1998. Since then GIS software access has grown from a few library research workstations to one hundred workstations. This incredible increase in the number of library GIS workstations is the result of improvements in computer hardware, the expansion of instruction opportunities, increased campus wide demand, availability of assistance, and the availability of non-GIS software for pre and post processing maps within the Center for Information Management.

Software access

With the continual improvement in computer hardware speed and capacity has come the ability to expand the capabilities of library workstations. With more resources moving to a web accessible interface, library workstations have few programs installed locally. This presents an excellent opportunity for the installation of research software programs like ArcGIS. At the Libraries, all of the electronic classrooms and the Center for Information Management have GIS software installed. In all, Miami University Libraries has 100 publicly accessible library research workstations with ArcGIS ArcMap software installed.

Instruction

Instruction is a critical component to the success of any GIS service and Miami University Libraries provides several instruction opportunities. Clients interested in furthering their GIS knowledge have access to workshop, individual, small group, classroom and virtual campus instruction within the Libraries. All instruction sessions utilize a three-tiered approach to meet the needs of all clients.

Technology and Information Management Workshops

Each semester, the Technology and Information Management (TIM) Workshop series at Miami University Libraries offers two GIS workshops: one providing introductory and the other intermediate level instruction. The TIM GIS workshops are free, open to the public, and provide hands-on experience utilizing the software. Upon completing the workshop, participants interested in further instruction can enroll in one of ESRI's virtual campus courses.

Individual instruction

Due to the multi-disciplinary aspects of GIS, most instruction time is devoted to providing guidance and instruction to individuals. This point of need instruction provides an excellent opportunity to discover current research interests and allows for more in-depth coverage. This type of instruction typically involves multiple instruction sessions scheduled at the clients discretion. This method is by far the most labor-intensive for the instructor but arguably, also the most rewarding as you see a project evolve.

Small group instruction

Due to the complexity of some GIS projects, multiple clients may work as a team to complete a project. This team approach allows for an additional opportunity to provide point-of-need instruction on using GIS software. Primarily team members have taken GIS coursework but need a refresher and/or assistance with creating and editing shapefiles, manipulating datasets and the essentials of computer cartography. If the GIS maps are to be presented, additional time is spent on computer cartography ranging from layout and labeling to colors.

Classroom instruction

Within the Interactive Media Studies (IMS) program at Miami University, the Information Studies in the Digital Age (201) course exposes undergraduate students to topics ranging from library research to web publishing to GIS. Within this course, students receive a brief overview of GIS with possible applications. During the hands-on portion of the session, students are provided scenarios that require GIS to find the answer (typically utilizing US Census data). By the end of the session, students create GIS maps illustrating a demographic value for each county in Ohio. The IMS course includes three sections with twenty-five students each. Of the seventy-five students within the IMS courses none have previous experience with GIS software.

Virtual Campus instruction

As part of the ESRI site license, Miami University has an unlimited number of seats within the ESRI virtual campus. The ESRI virtual campus provides online module-based instruction for clients interested in obtaining additional GIS instruction. The virtual campus is an excellent supplement to traditional instruction and is a great option for providing background and software specific instruction. The virtual campus is an integral part of the instruction provided within the Libraries due to the quality and applicability to introductory through advanced clients. Figure 1 provides a diagram of how ESRI's virtual campus has been included within the Libraries GIS instruction framework.

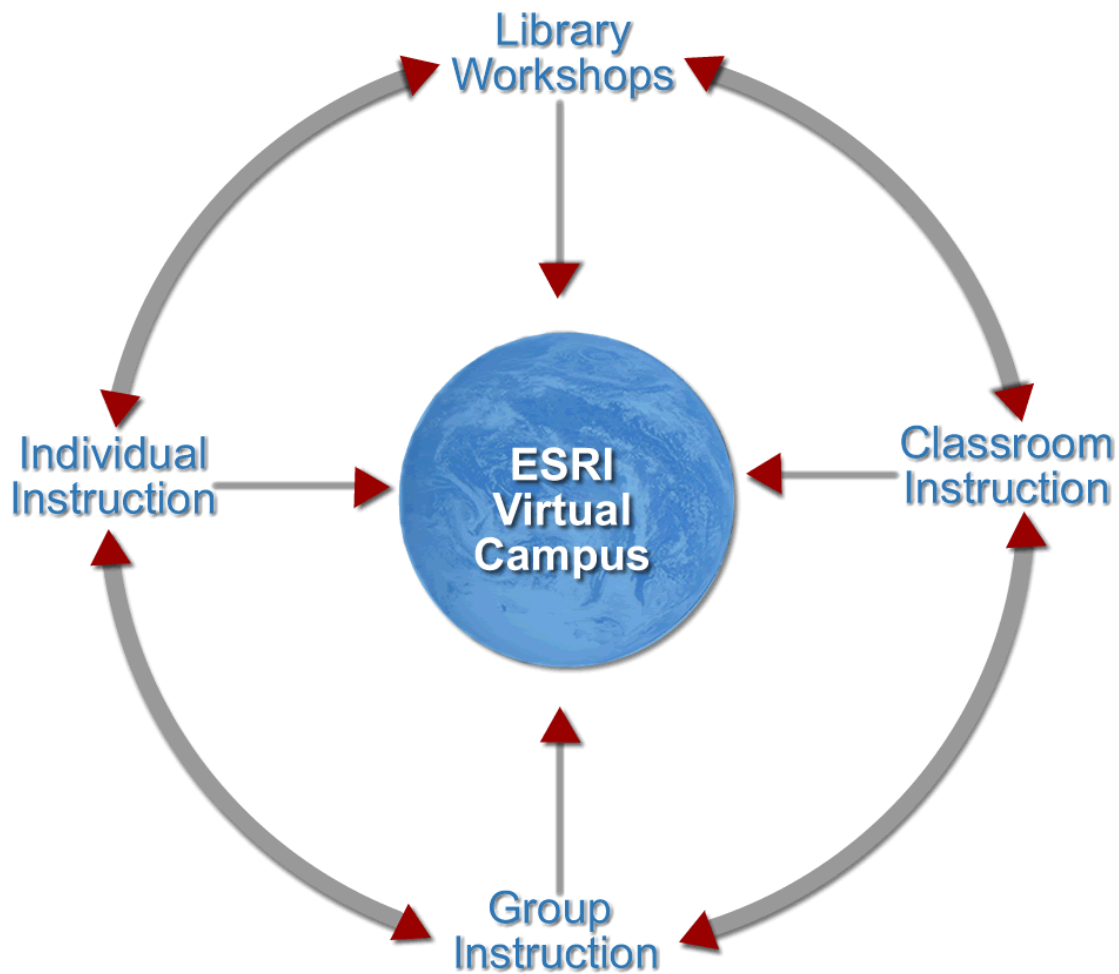


Figure 1: Miami University Libraries GIS Instruction Options

Assistance and Support

GIS clients regardless of skill level will need assistance periodically. Providing assistance is the key piece of the GIS puzzle that clients need and is commonly the portion overlooked. At Miami University Libraries, GIS assistance is provided via telephone, e-mail, and in-person consultation services. The GIS Librarian handles GIS software questions while scanning and other software questions are supported by the Center for Information Management.

The key to success with minimal staffing is to provide fast, efficient support and to work collaboratively with GIS faculty on campus. GIS service includes all librarians, as subject expertise is a crucial part of creating effective maps therefore enabling non-GIS librarians to provide assistance. Even with minimal staffing, it is possible to provide GIS support. Any public services librarian with an interest in GIS should be able to

provide a minimum-level GIS service after about twenty hours of work either in a hands-on workshop or through self-paced tutorials (Hyland, 2002). Through an established liaison network with academic departments, librarians have been the critical link to making faculty aware of GIS services available within the Libraries at Miami University.

Center for Information Management (CIM)

An integral part of the Miami University Libraries GIS service success is the result of the Center for Information Management (CIM). The CIM is a multimedia laboratory/classroom that offers a collection of software and hardware with assistance from highly trained and technological students, staff and librarians. The Center supports the research and teaching mission of the University by providing an environment where acquiring, organizing, preserving, and transforming information coalesce. Knowledge creation is fostered through the array of media types and levels of assistance. The transformation may be a DVD made by a marketing student to advertise a product, the creation of a conference research poster by a microbiology faculty, a World Wide Web home page designed by a first year education major, or a political science student's map illustrating an total votes cast throughout a school district. Other types of technology range from digital video creation and editing, image manipulation and scanning (flatbed, large format, and film), web publishing, CD and DVD creation, and large format printing.

CIM assistance is an ethos for learning. The Center is designed to foster independent learning and experimentation. Students may work alone or in groups to define their information needs, locate and use appropriate information tools, and develop possible solutions. Assistance takes place at a variety of levels from basic troubleshooting, to one on one tutorial sessions, to a customized workshop requested by an instructor. Quick start guides, user manuals, and electronic information technology books also help to supplement the array of client's learning styles. This form of walk-in, or on-demand learning, is a unique characteristic that provides a client with fast and efficient support. Large format scanning and printing, web design tools, GIS software, support staff and a wide range of clients reinforces the synergy between learning and knowledge creation.

Proposing Collaborative GIS Services

Libraries considering the addition of GIS services for their clients are often unsure where to start. Ideas for integrating successful GIS services in the library environment are numerous. With academic libraries leading the way in the integration of GIS service, it is essential to analyze how academic libraries are proposing these services.

Princeton University serves as the model for academic library GIS service proposals. According to Ronald Jantz's (1997) article, Princeton University Libraries proposal contained a few important items to consider when proposing a GIS service within any academic library.

- 1.) A GIS service should be made broadly available to students.
- 2.) Encourage professors to include GIS capacity into a course.
- 3.) Support individual research, which would utilize the GIS software.
- 4.) Provide GIS in a specific department that has continuous and demanding needs for mapping capabilities.
- 5.) Create partnerships among local industries and academic departments for utilizing the GIS service.

The key to proposing additional library services is to generate interest in the technology. Interest in GIS services can be generated by providing examples of current research utilizing the technology by displaying posters within the library and providing live demonstrations to faculty and students. One essential step when proposing GIS services is to collaborate with other departments offering GIS courses to promote resource sharing. With this cooperative approach, libraries and academic departments can share geospatial data and costs while at the same time bargaining collectively with vendors to negotiate pricing for data sets and software.

Providing GIS Services: Issues to Consider

Providing a successful GIS service requires not only software but also geospatial data, instruction and most importantly, clients must be able to obtain help. Collaboration is the key to the success of newly established GIS services. Academic departments that currently offer GIS courses can provide libraries with assistance and work collaboratively to provide instruction and data.

Requests for GIS services can be labor intensive, requiring extensive assistance and monitoring during the client's interaction with the system. Providing GIS service can be demanding, therefore libraries that are considering offering services may need to increase the number of staff available to provide assistance with this service. Several academic libraries currently offering GIS services stress, "Continued promotion of GIS literacy around campus is essential to any future plans" (Suh, 1999). Marketing of GIS and geographical literacy is the key to a successful GIS services program.

Presently, GIS software is still costly (for individuals), thus libraries can provide public access to this invaluable resource. In the past, United States census data was analyzed mainly with statistical software but with GIS, today anybody can make a meaningful map based on US Census data with proper instruction. The integration of GIS services within libraries may help to level the playing field for community groups and researchers. By collaborating to analyze local problems using GIS, community and student groups can study a problem without relying on the sometimes misleading work of others.

It is important that librarians, designing and implementing GIS services assess client needs for accessing geospatial information. Availability of data, instruction and

software will directly affect GIS service satisfaction. Libraries seriously need to contemplate adding and expanding GIS services in order to adhere to the mission of libraries in general, which is to provide access to information.

Conclusion

In order to have thriving GIS services, it is essential that libraries and academic departments work collaboratively to provide access to the software and to promote instruction opportunities. Instruction requires a tiered approach with introductory level instruction, intermediate and advanced level workshops to meet client needs. Due to the complexity of GIS software, it is essential that libraries work with faculty to provide clients access to appropriate levels of instruction and assistance. Libraries should also provide GIS clients with access to large-format scanning, color printing (both letter and large format sizes) and image manipulation software.

Within libraries, the past, present and future have always been and will remain an 'information age'. It is essential that libraries define 'information' broadly, with the continuum running from raw data through information (processed data) to actual knowledge (analyzed and contextualized information), in order to view information as one form of knowledge (Boxall, 2003). While libraries exert extensive effort to promote information evaluation, we must remember to include geographic literacy as one of the core components of information literacy.

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