

# **AC 2009-387: LIBRARY AND INFORMATION USE PATTERNS BY ENGINEERING FACULTY AND STUDENTS**

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# **Library and Information Use Patterns by Engineering Faculty and Students**

## **Abstract**

This paper reports the results of a survey conducted at the Georgia Institute of Technology. The students and faculty of the schools of civil and mechanical engineering were asked about how they use the library. They were also asked questions concerning their information seeking habits. The responses from undergraduate students, graduate students and faculty are compared, revealing expected and unexpected patterns.

## **Introduction**

The library has traditionally been seen as the heart of a university with information flowing outward, sustaining the life of research and learning. In recent years libraries and the universities they serve have changed. Technology plays an ever increasing role in education. The Internet provides access to vast amounts of information both commercial and free. How have recent changes affected the “heart” of campus? Is the library building still important to the learning process? Or has its role become more virtual in the eyes of the campus community with the increasing flow of digital information?

Over the past several years, the Georgia Institute of Technology Library has stressed the library as a place. The Library has transformed from a place for books to an academic resources center by opening up two Information Commons with a computer productivity lab, multi-media lab, presentation studio, group study areas, class rooms, and a performance space. Students come to the library for activities related to their learning and research, and library gate counts have increased significantly. The transition to a learning commons environment has provided an invigorating atmosphere in which to study. Yet there is a sense that faculty usage of the facility is somewhat low.

The library has focused on providing digital access to as many resources as possible. The proliferation of electronic resources has enabled faculty and students to do quality research without setting foot in the library building. More electronic journals, e-books, and online databases have been added to the collections. Overall, electronic resources usage has increased sharply.

Given this situation, the authors asked several questions. How do the faculty and students from engineering schools use the library space? How do they approach information resources when conducting their research? How well do they acknowledge the major resources and services available to them? What effect has Google and Google Scholar had on their search for information? What are their preferences in using library resources? What are the barriers in using certain resources and services?

This article reports on a survey given to the student and faculty of two schools of engineering at the Georgia Institute of Technology. Participants were asked about their library and information usage habits. The questions were focused in two areas: the use of the library as a place and the use of information resources regardless of location. The survey shed light on how the importance of library as place changes for users from the time they enter college through their experiences as graduate students and faculty. Likewise, it shows how information usage changes throughout the university experience.

## Literature review

Many studies have been done on information usage over several decades. As the technologies change, the processes and patterns of information-seeking behavior change as well. These changes have been reflected in recent literature on the topic. Brown provides a sketch of information seeking behavior of scientists, and indicates that the “ultimate preferred source for information was ... the printed journal article.”<sup>1</sup> Hallmark presents a snapshot of academic researchers and their information needs in one area, and proves that “...journal articles, whether printed or electronic, continue to be their ultimate textual resource.”<sup>2</sup> Kwasitsu samples engineers in information use and discovers a “significant relationship between engineers’ level of education and library use,” pointing out that the higher an engineer’s level of education, the more likely he or she was to rely on libraries. This aspect needs broader study and further research.<sup>3</sup>

Finn and Johnston identify “the need to plan for better information literacy instruction” based on an engineering faculty and student survey.<sup>4</sup> Fidel and Green’s study emphasizes that in order “to successfully enhance engineers’ information-seeking, one needs to examine the specific factors that motivate an engineer to prefer one source over another;”<sup>5</sup> while Haglund and Olsson focus on user perspective through a case study and suggest that the following issues need to be considered when designing information seeking aids or search tools: “simplicity and consistency; accessibility; and individual solutions.”<sup>6</sup> Jamali and Nicholas’s study on information-seeking behavior of physicists and astronomers reveals differences among subfields of physics and astronomy.<sup>7</sup> Hemminger et al. study information seeking behavior of academic scientists and notice “significant changes in information seeking behavior, including increased reliance on web based resources, fewer visits to the library, and almost entirely electronic communication of information.” Their survey tools have been adopted by other universities.<sup>8</sup>

Energized by these findings, the authors wanted to find out how faculty and students at different academic levels, at an engineering focused research university, seek information and use library space for research and academic activities. One thing the authors observed from their experience is that students come to the library more often than before the library space transformation. Which students are coming in? How do they use the library space? How do they seek information using library-provided tools and services as well as the web resources? How do they use them differently? Answering these questions may help the library plan its future space and design effective library instruction and outreach programs to support research as well as teaching and learning on campus.

## Methodology

The Georgia Institute of Technology is primarily an engineering school with about 60% of the students majoring in an engineering discipline. The campus is served by a central library with one branch library for architecture. The engineering buildings are spread throughout campus with most being within a ten minute walk of the Library.

In the fall of 2008 two surveys were developed to measure the library and information use habits of engineering students and faculty at the Georgia Institute of Technology. The first survey was for faculty and the second was for the students. The two surveys were mostly the same with the following exceptions: faculty were not asked if they used the library basic computing needs (word processing, checking email, etc.) or when and where they study in the library; faculty were asked to list the two most important journals to their areas of research; and some of the demographic information collected differed for the two groups. Most of the questions were the same to allow for direct comparison of the two surveys.

A web-based survey mechanism was chosen for ease of distribution and analysis. The survey was conducted via SurveyMonkey, an online survey tool. Students and faculty in the School of Civil and Environmental Engineering and the George W. Woodruff School of Mechanical Engineering were sent email messages inviting them to participate in the survey. These schools were selected for the survey because they are two of the larger engineering schools on campus and the authors have liaison responsibilities for them. The survey was delayed until middle of November 2008 in order to obtain approval from the Institutional Review Board. This resulted in fewer respondents than hoped (216

undergraduate students; 58 graduate students; and 15 faculty). The survey was closed in early December 2008. Low response can most likely be attributed to timing. By the time the surveys were distributed, end-of-the-semester projects were in full swing. It was decided to reopen the survey to faculty members in late January and early February in order to get a larger sample size. Only fifteen faculty members responded to the initial survey request. Reopening the survey garnered ten additional responses bringing the total to 25 out of 201 faculty members (12% response rate). In an ideal setting the entire survey would have been completed in early spring semester, but publication deadlines made that impossible. Roughly two-thirds of the participants were from mechanical engineering with the other third from civil engineering, representing a proportional 8% student population from each school (see Figure 1). Almost 35% of the

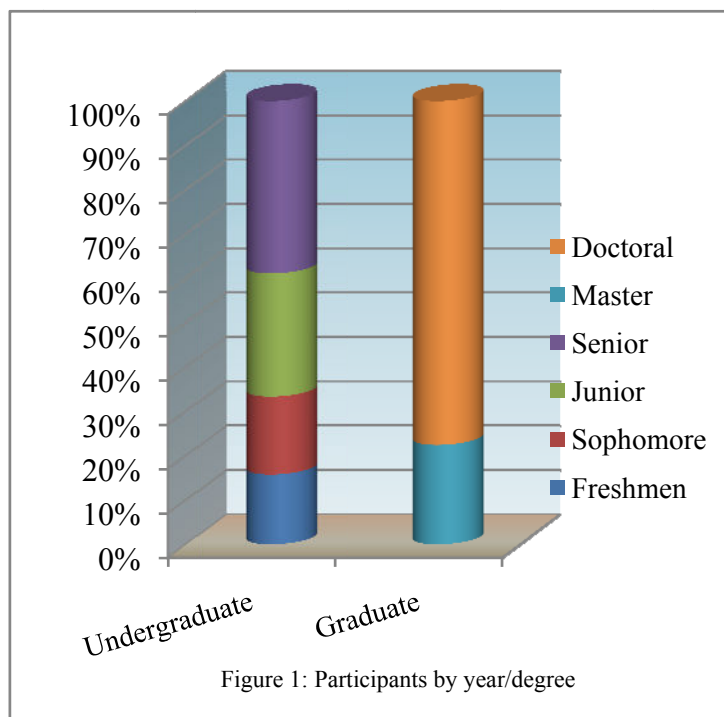


Figure 1: Participants by year/degree

respondents were female, and 8% were international students. Almost all of the international students were graduate students.

## Library as place

The first few survey questions dealt with the library as a place. Since the Georgia Institute of Technology Library opened its two Information Commons areas, gate counts have been high. The study areas feel full, but the authors wanted to obtain statistical data on who uses the library and how. The survey showed that 60% of undergraduate students visit the library at least once a week with an additional 32% using the library once or twice a month. Freshmen visit the library most often with 75% coming to the library at least once a week. Only 36% of graduate students visit the library at least once a week, but an additional 45% come to the library once or twice each month. Even though only two of the faculty surveyed responded that they visit the library each week, 68% of them visit at least once a semester (see Figure 2).

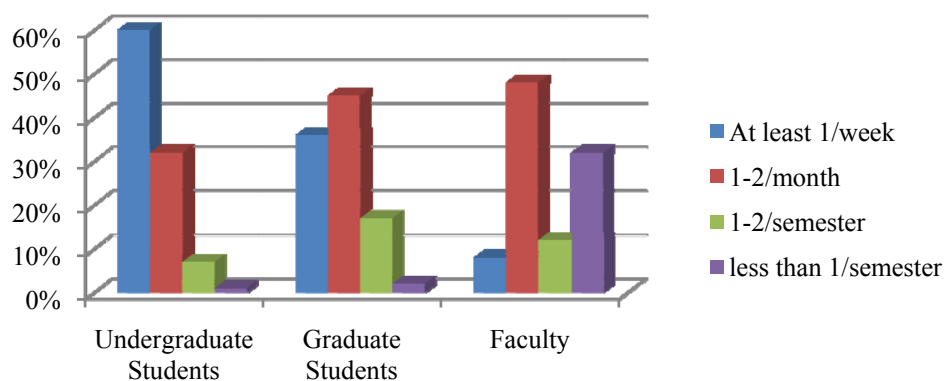


Figure 2: Attendance at Library

Participants were asked why they go to the library. The reasons given differ greatly among the various groups (see Figure 3). Undergraduate students came to study individually, study in groups, check email, use word processing programs, and to get something to eat, in that order. Printing was not one of the choices listed in the survey, but 24% entered it under the other category. Accessing literature and checking out books, some traditional library functions, were listed 7<sup>th</sup> and 10<sup>th</sup> on the list. The library is definitely considered a place for the undergraduate students. About twice as many undergraduate students use the library for individual and group study than for the next choices (email, word processing, and food).

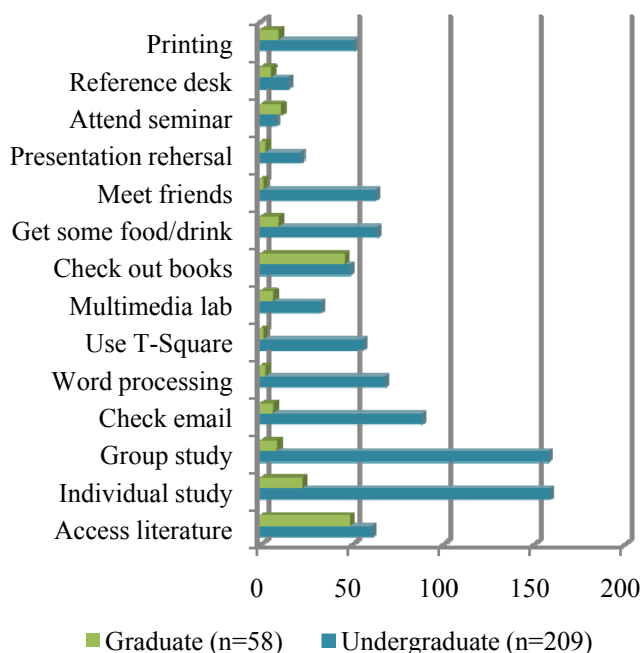


Figure 3: Reason for library usage

Graduate students' top five reasons for going to the library are accessing literature (85%), checking out books (79%), individual study (40%), attending seminars (19%), and printing and getting something to eat (17% each). The changing focus of library usage from undergraduates to graduates students makes sense. The focus in many undergraduate engineering programs is on learning from textbooks and in laboratory assignments. Graduate students focus more on using literature for their research. The main reasons for faculty coming to the library were accessing literature (72%) and checking out materials (44%).

Students were asked when they usually use the library. Even before the survey the authors knew that students valued being able to use the library twenty-four hours a day. Undergraduate students prefer the evening hours (73%). Their least favorite time is the morning (19%). About one-third of the undergraduate students regularly use the library during the late night/early morning hours. Graduate students prefer the afternoon hours (69%) with the late night/early morning hours being their least favorite (10%). A significant number of students can be found in the library at any given time.

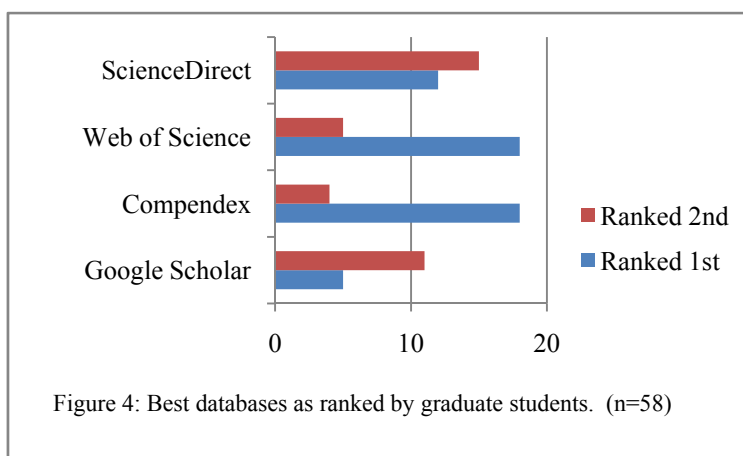
### Information usage patterns

Several questions on the survey dealt with the information usage patterns of engineering students and faculty. These questions were meant to be separate from the ones that focused on the library as a place in that as information usage becomes more electronic in nature, information usage becomes more independent of the library building. Some of these questions measured the effect that the Internet has had on the way engineering students and faculty research.

What is the "Google effect" in research? Over 60% of undergraduate students either agreed or strongly agreed that Google is sufficient to meet most of their research needs. Fifty-three percent go to Google first to meet their academic information needs. (Freshmen went to Google first 68% of the time.) The next most popular choice was classmates or friends (27%). A database "such as Compendex or Google Scholar" was the first choice only 11% of the time. These numbers change drastically for graduate students and faculty. Graduate students agreed or strongly agreed that Google is sufficient to meet most of their research needs only 22% of the time. Faculty agreed or strongly agreed only 7% of the time. Graduate students go to databases first to meet their academic information needs 66% of the time while faculty choose databases first 77% of the time. The next most popular choice was Google (21% each). Six percent of faculty members go to colleagues first to meet their academic information needs.

The surveys asked participants to rank the top five databases in their fields. An option of "no knowledge" was also available if the participant was unfamiliar with a particular database. Undergraduate students ranked Google Scholar as the top database. It may have received top choice by default. Many of the top databases were relegated to "no knowledge". Over 80% of the undergraduate students had "no knowledge" of Compendex and Web of Science. Over 90% claimed "no knowledge" of INSPEC and Science Direct. It is understandable that incoming freshmen were not familiar with any of these databases, but the numbers didn't improve much for seniors who still chose Google Scholar as the top database with Compendex coming in second. Of senior respondents, 66% had "no knowledge" of Compendex. They also had little

recognition of Web of Science, ScienceDirect, and INSPEC (73%, 81%, and 91% respectively). Graduate students ranked Web of Science and Compendex as the top databases followed by ScienceDirect and Google Scholar (see Figure 4). The faculty ranked Compendex as the best index followed by ScienceDirect and Web of Science.



Students were asked what types of training in library resources they preferred (see Figure 5). They were given the choices of training classes, one-on-one consultation with subject librarian, online tutorials, and information packets. They were also able to choose more than one option, and many of them did. Online tutorials were the method of preference for both undergraduate (67%) and graduate students (63%). Librarians need to develop web based training methods to reach students when and where they want to learn. Another interesting result from this question

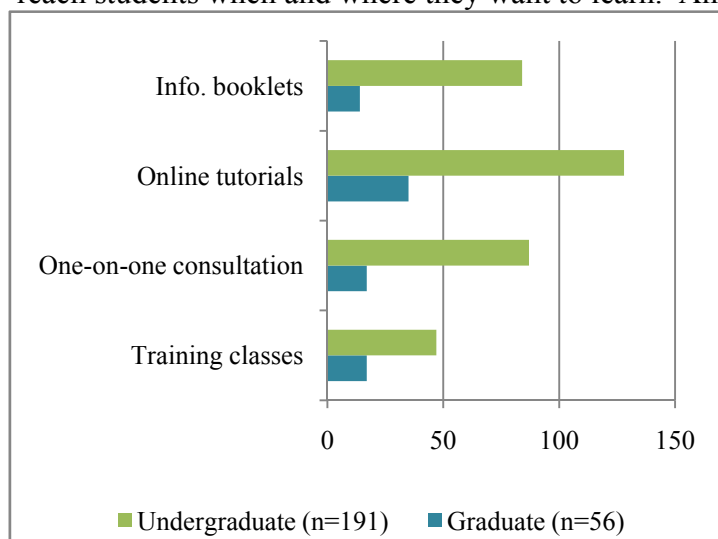


Figure 5: Preferred methods of training in library resources

was that there did not seem to be a truly bad method. Even though more students favor online instruction, a significant number of students liked each method listed. Even the least favorable training methods were still “preferred” by one in four students. (These were training classes for undergraduate and information packets for graduate student.) The results suggest that using only one method for information literacy training may not produce the desired outcome. Online instruction paired with traditional methods might be ideal.

Faculty and students were asked how they seek research help from the library. With students, both graduate and undergraduate, the overwhelming preference was to go to the Information Services Desk, followed by contacting subject librarians directly, emailing through the “Ask! Us” link, calling the Information Services Desk, and chatting through the “Ask! Us” link in order. The top choices for faculty members were going to the Information Services Desk and directly contacting their subject specialists (43% each), but they did not like the chat option either (only 5%). The results justify staffing the reference desk with subject librarians since over 87% of undergraduate students and 75% of graduate students seeking research help there. The effectiveness of chat reference has also been called into question. Another interesting fact about this question is that it was the one most often skipped on the survey. Nineteen percent of undergraduates and 17% of graduates chose not to answer this question. Does that imply that they could not see themselves asking for research help from the library?

Participants were asked how often they use interlibrary loan. Three-fourths of undergraduate students had not ordered anything in the past twelve months. Over half of graduate students and faculty ordered three or more articles through the service in the past year.

Another question measured user satisfaction regarding electronic, full-text access to journal articles. Undergraduate students were the least satisfied (10% were not satisfied). Thirty-eight percent of undergraduate students had never even accessed articles electronically. None of the graduate students or faculty selected the “not satisfied” option. Twenty-nine percent of graduate students and 52% of faculty answered that they were “very satisfied” with access.

## Conclusions

The survey provided substantive data regarding the library and information usage patterns of engineering students and faculty. The data supported many anecdotal accounts. For example, undergraduate students use the physical library building more often than graduate students and faculty. Why is this important to know? Well, when designing or redesigning library space, it is important to understand that concentrating on the needs of undergraduate students may provide a better used facility. Study space is crucial, but having printing, word processing, and food makes the library even more student-friendly. About a third of the undergraduate students usually use library in the late night/early morning hours. Libraries may want to consider adding hours at these times if they don’t already. Also, in times of budget cuts, it would be wise to think twice before cutting back on these hours.

For graduate students, the value of the library as a place is slowly replaced by the value of the library as a resource for scholarly information. Individual study space is used, but access to information is more important. A pleasant surprise is that faculty members come into the library as often as they do. The Georgia Institute of Technology Library offers a delivery service for faculty so they do not need to come to the library to retrieve materials. Student use of interlibrary-loan and electronic journal articles increases as they progress toward degrees. The virtual nature of these services seems to be appreciated.

The survey validated what many librarians have come to know anecdotally: Google is the information finding tool of choice for undergraduate students. But it is interesting to note that as users become more familiar with scholarly databases they are less likely to choose Google instead of scholarly databases for their academic pursuits. Part of the reason why Google is chosen so often may simply be that users aren’t familiar with other options. Graduate students are better than undergraduate students, but they still have room to improve. Over one-fifth of graduate students feel that Google is usually sufficient to meet their research needs. Over one-fourth of graduate students still have no knowledge of Compendex. Librarians must do a better job of information literacy education.

Information literacy efforts need to be reviewed. A single method is no longer sufficient to reach all of our students. Traditional methods work, but they are not enough. Students prefer online tutorials for library training. It is evident that students are not familiar enough with resources.



Librarians must be creative in finding ways to reach and educate them. Adding online tutorials to augment traditional training methods is a promising method to reach more students.

The library is still the heart of the university. Faculty and students alike value the services that the library provides, but the “heart” is expected to pump information and services beyond the walls of the library building. And yet, those same walls perform an important function besides housing books and journals.

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## Student Survey Questions

- [illegible]

All journals are online ☐ ☐ ☐ ☐ ☐ ☐

and I can access all of them free

- Where do you go to meet your informational needs? Please list your 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> choices.

- ☐ Google (or other web search site)
- ☐ Professor
- ☐ Colleagues/Friends/Classmates
- ☐ Professional Society
- ☐ Literature index (such as Compendex or Google Scholar)
- ☐ Other web site

- What are the best indexes to the literature in your field? Please rank choices 1, 2, and 3.

	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	no knowledge
<input type="checkbox"/> Elsevier ScienceDirect	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Google Scholar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Compendex	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> INSPEC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> GeoRef	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Web of Science	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> NTIS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> TRIS Online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Knovel or ENGnetBASE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Materials Sciences with METADEX	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- How do you seek reference help from the Library? (check all that apply)

- ☐ Go to the Information Services Desk in the Library
- ☐ Email the Library through the “Ask! Us” link on the web page
- ☐ Chat with a librarian through the “Ask! Us” link on the web page
- ☐ Contact your librarian/information consultant directly
- ☐ Other \_\_\_\_\_

- How many articles/books have you ordered through Interlibrary Loan (ILLIAD) in the past year?

- ☐ None
- ☐ 1-2
- ☐ 3-4
- ☐ 5 or more

- How satisfied are you with obtaining journal articles electronically through the Georgia Tech Library?

- ☐ Not satisfied  
☐ Somewhat satisfied  
☐ Satisfied  
☐ Very satisfied

If not satisfied, please explain: \_\_\_\_\_

- What one thing would you recommend to change to improve your access to, or use of, library subscribed resources (journals or databases)?

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- How would you categorize your level of familiarity with using the following Library resources?

	<u>No Knowledge</u>	<u>Beginner</u>	<u>Intermediate</u>	<u>Advanced</u>	<u>Expert</u>	<u>N/A</u>
Compendex	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GeoRef	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Web of Science	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NTIS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- What types of training in Library resources use do you prefer? (Check all that apply)

- ☐ Training classes  
☐ One-on-one consultation with subject librarians/information consultants  
☐ Online tutorials  
☐ Information booklets/packets  
☐ Other \_\_\_\_\_

- What is your current status at Georgia Tech?

- ☐ Doctoral Student                      ☐ Masters Student  
☐ Senior                                      ☐ Junior  
☐ Sophomore                              ☐ Freshmen

- What is your major?

- ☐ Civil & Environmental Engineering                      ☐ Mechanical & Nuclear Engineering

- What is your gender?

- ☐ Female  
☐ Male

- Are you an international student?

☐ Yes

☐ No