

LESSONS LEARNED:

How College Students Seek Information in the Digital Age



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PROJECT INFORMATION LITERACY PROGRESS REPORT

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Abstract: A report of findings from 2,318 respondents to a survey carried out among college students on six campuses distributed across the U.S. in the spring of 2009, as part of Project Information Literacy. Respondents, while curious in the beginning stages of research, employed a consistent and predictable research strategy for finding information, whether they were conducting course-related or everyday life research. Almost all of the respondents turned to the same set of tried and true information resources in the initial stages of research, regardless of their information goals. Almost all students used course readings and Google first for course-related research and Google and Wikipedia for everyday life research. Most students used library resources, especially scholarly databases for course-related research and far fewer, in comparison, used library services that required interacting with librarians. The findings suggest that students conceptualize research, especially tasks associated with seeking information, as a competency learned by rote, rather than as an opportunity to learn, develop, or expand upon an information-gathering strategy which leverages the wide range of resources available to them in the digital age.

Welcome to college in the digital age. Students are entering the world of higher education at a time when the entire digital information universe is expanding at an unprecedented rate — six-fold each year.¹

This dramatic proliferation of available information coincides with young adults being asked to receive, access, evaluate and deliver more information than most have ever had to process in their lives. It is a challenging task some may never be called upon to do again at quite the same pace and level.

Introduction

Project Information Literacy (PIL) is a national research study based in the University of Washington's Information School. We seek to understand how college students find information and conduct research—their needs, strategies, and workarounds—for their course work and for addressing issues that arise in their everyday lives.²

We conduct our ongoing research against the backdrop of the digital age—a fast-paced, fragmented, and data-drenched time that is not always in sync with the pedagogical goals of colleges.

In this fall 2009 progress report, we present findings from our student survey, in which we systematically and formally investigate the underlying hows, whens, and whys of the college student's research process.

We administered an online survey in the spring of 2009 to 27,666 students enrolled at six community colleges and public and private colleges and universities across the U.S. Our findings are based on a collective sample of 2,318 responses.³

The purpose was to collect data about the key information needs of college students—how often their needs arise and which resources students are likely to consult when conducting research.

¹ The digital information forecast research is a worldwide growth projection for 2006-2011 from IDC in their White Paper, "As the Economy Contracts, the Digital Universe Expands," May 2009, accessed online August 7, 2009: <http://www.emc.com/collateral/demos/microsites/idc-digital-universe/iview.htm> In IDC's analysis, the drivers for increasing digital information are forecasted as mobility, interactivity, growing social networks, rapidly accelerating Net access in developing countries, real-time information from technologies such as surveillance cameras and RFID-equipped objects, user-created content, and new regulatory compliance demands.

² PIL is co-directed by Alison J. Head, Ph.D., Research Scientist in the iSchool and Michael B. Eisenberg, Ph.D., Dean Emeritus and Professor in the iSchool. The research for Year One (2008-2009) of Project Information Literacy (PIL) is sponsored by a generous gift from ProQuest to the University of Washington's Information School for the further study of information literacy. Communication about this progress report should be sent to Dr. Alison Head at ajhead1@u.washington.edu or Dr. Michael Eisenberg at mbe@u.washington.edu. Visit the [PIL project site](#) or for an overview of PIL's research findings, see "[Finding Context: What Today's College Students Say about Conducting Research in the Digital Age.](#)" (PIL Progress Report #1), Alison J. Head, Ph.D. and Michael B. Eisenberg, Ph.D., February 4, 2009.

³ We administered a 32-item online survey to sophomores, juniors, and seniors at Harvard University, Illinois State University, University of Washington, and with students, who had completed at least one semester, at three community colleges, including Chaffey Community College (CA), Shoreline Community College (WA), and Volunteer State Community College (TN) during April, May, and June 2009. On the average, the response rate from each school for the survey was 13%, although the overall response rate was slightly lower at 8%.

We were struck by what we found.

As a whole, our findings strongly suggest that many of today's college students dial down the aperture of all the different resources that are available to them in the digital age.

Whether they were conducting research for a college course or for personal reasons, nearly all of the students in our sample had developed an information-seeking strategy reliant on a small set of common information sources—close at hand, tried and true.

Moreover, students exhibited little inclination to vary the frequency or order of their use, regardless of their information goals and despite the plethora of other online and in-person information resources—including librarians—that were available to them.

Many students in our sample used a strategy for finding information and conducting research that leveraged scholarly sources and public Internet sites and favored brevity, consensus, and currency in the sources they sought.

Major findings from the survey are as follows:

1. Many students in the sample reported being curious, engaged, and motivated at the beginning of the course-related and everyday life research process. Respondents' need for big-picture context, or background about a topic, was the trigger for beginning course-related (65%) or everyday life research (63%).
2. Almost every student in the sample turned to course readings—not Google—first for course-related research assignments. Likewise, Google and Wikipedia were the go-to sites for everyday life research for nearly every respondent.
3. Librarians were tremendously underutilized by students. Eight out of 10 of the respondents reported rarely, if ever, turning to librarians for help with course-related research assignments.
4. Nine out of 10 students in the sample turned to libraries for certain online scholarly research databases (such as those provided by EBSCO, JSTOR, or ProQuest) for conducting course-related research, valuing the resources for credible content, in-depth information, and the ability to meet instructors' expectations.
5. Even though it was librarians who initially informed students about using online scholarly research databases during freshmen training sessions, students in follow-up interviews reported turning to instructors as valued research coaches, as they advanced through the higher levels of their education.
6. The reasons why students procrastinate are no longer driven by the same pre-Internet fears of failure and a lack of confidence that once were part of the college scene in the 1980s. Instead, we found that most of the digital natives in the sample (40%) tended to delay work on assignments as they juggled their needs to meet competing course demands from other classes.

Almost every student in our sample turned to course readings—not Google—first for course-related research assignments.

We fully acknowledge that while further research is required to confirm these findings in terms of generalizing to the full college student population, our analysis does show

consistent responses and fairly robust relationships among variables from a sample of students at six separate educational institutions in the U.S.⁴ Thus, our findings should not be viewed as comprehensive, but rather as another piece in our ongoing research.

In the following pages, we present detailed findings in four parts:

- Part One: An overview of findings how students conceptualize, operationalize, and prioritize their course-related and everyday life research tasks, based on student discussion groups (fall 2008).
- Part Two: An evaluation of our research typology, which describes four research contexts—big picture, language, situational, and information-gathering. Students attempt to satisfy these contexts as part of their course-related and everyday life research.
- Part Three: An analysis of how students use campus resources, including librarians, libraries resources, and instructors, during the course-related research process.
- Part Four: Concluding thoughts and recommendations for helping improve information literacy competencies among college students.

The Approach

Our ongoing study is grounded in information-seeking behavior research. This research investigates “what kinds of people seek what kinds of information through what channels.”⁵

Throughout, our goal has been to learn how college students conceptualize and operationalize course-related and everyday life research. We investigate these research processes through students’ accounts, reports, and experiences.

We define course-related research process in broad terms—from the moment students receive a research assignment in a humanities or social science course through collecting materials until the final writing of a mid-course paper (i.e., 5-8 pages).

By far, respondents had the most experience with conducting research for argument papers (67%). Respondents also conducted research for a fair number of interpretative reading assignments (i.e., “close readings”) of a passage or a text (53%), or for the analysis of a historical event (39%). Less frequently assigned were case study analyses—only a third of the sample (33%) had conducted research for a case study in the last year.

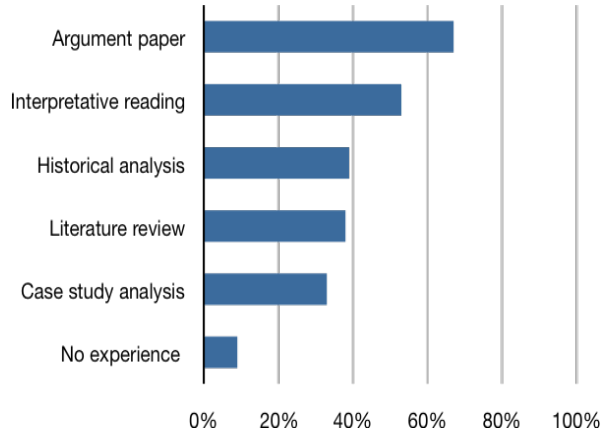
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⁴ The research for Year Two (2009-2010) of Project Information Literacy (PIL) will consist of a content analysis of instructors research assignment handouts/postings and a large-scale student survey, administered at 40+ community colleges and public and private colleges and universities in the U.S. Year Two research will be supported with contributing funds from the John D. and Catherine T. MacArthur Foundation to the University of Washington’s Information School for the further study of information literacy.

⁵ For a definition of information-seeking behavior research, we rely on the classic work, Edwin B. Parker’s and William J. Paisley’s *Patterns of Adult Information Seeking*, Stanford University Press, 1966, p. 9.

Figure 1 shows descriptive statistics for the course-related research paper assignments that the respondents to our survey were assigned in the previous academic year.

Figure 1: Course-Related Research Assignments



Type of course-related research papers written in the last year	Percent	Total (N)
Argument paper about an issue	67%	1518
Interpretative reading of a text with research from other sources	53%	1203
Historical analysis of an event	39%	878
Literature review	38%	863
Case study analysis	33%	748
No experience with writing course-related research papers here	9%	204

n = 2,266

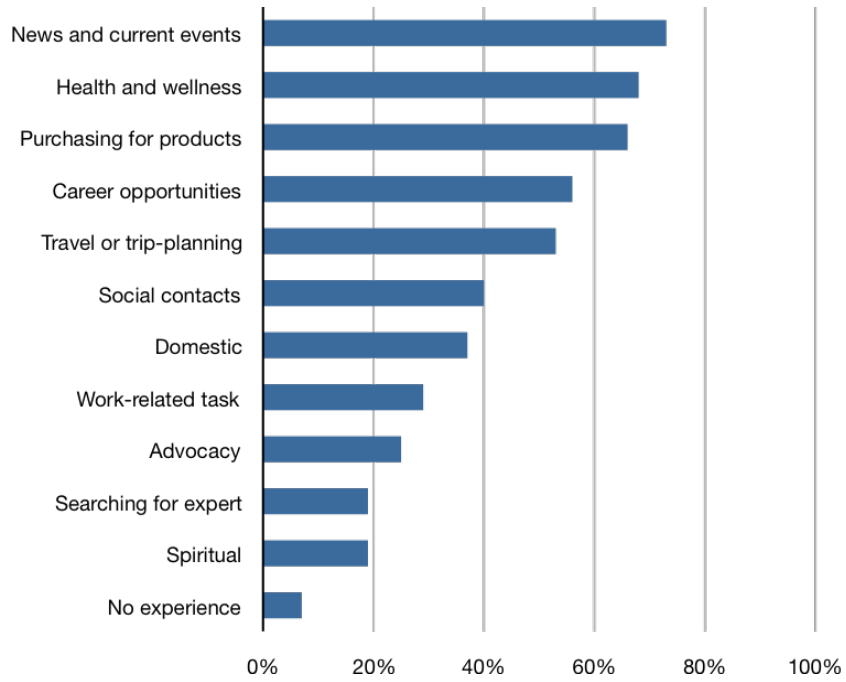
We also investigate what kinds of research these early adults conduct beyond their course-related research assignments.

We call it everyday life research. We define everyday life research as the ongoing information-seeking strategies for solving problems that may arise in daily life (e.g., health and wellness, finance and commerce, news, politics, travel, and/or policy).

According to the results in Figure 2, three-fourths of the respondents frequently looked for information about current events (73%). Other personal topics that were frequently researched were information about health and wellness (68%) and consumer-related topics (66%). The least researched topic was spiritual information (19%).

Figure 2 shows the everyday life research issues that respondents reported searching for in the six months preceding the survey.

Figure 2: Everyday Life Research About Personal Topics



Topics researched in the last six months for personal use in everyday life	Percent	Total (N)
News and current events	73%	1641
Health and wellness information for you or someone close to you	68%	1533
Purchasing information for a product or a service	66%	1475
Work or career information, e.g., salary ranges and job openings	56%	1255
Travel and trip-planning information	53%	1199
Social contacts, e.g., using social network sites to find others	40%	904
Domestic life, e.g., finding a place to live, checking out neighborhood	37%	829
Something related to what I am asked to do at my job	29%	645
Advocacy information related to political or social causes	25%	568
Searching for expert of some kind, e.g., medical doctor	19%	434
Spiritual information, e.g., finding our about different religious beliefs	19%	428
Have not conducted any everyday life research in last six months	7%	160

n = 2,248

Part One: Student Discussion Groups

In our fall 2008 discussion groups, students frequently referred to a need for “finding context,” in one form or another, when they discussed conducting research.

We soon discovered that finding context is key to understanding how students operationalize and prioritize their course-related and everyday life research activities.

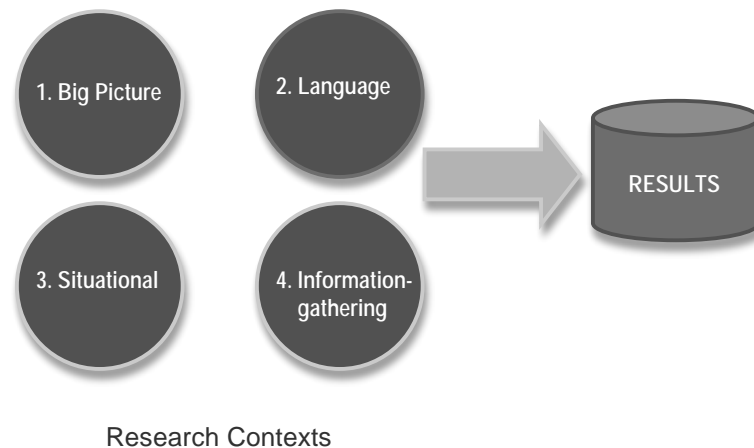
Finding context entails getting information for interpretation and definition of a topic, or an assignment. Students described finding context as laborious, often frustrating, yet essential to most of their research.

From these early findings, we developed a preliminary typology about the research contexts that students try to fulfill. The typology consists of four primary research contexts, which occur in varying degrees and at different times for both course-related and everyday life research.

Students described finding context as laborious, often frustrating, yet essential to most of their research.

Figure 3 presents a graphical representation of the research context needs that students have during the course-related and everyday life research.

Figure 3: A Typology of the Undergraduate Search for Context



We define the research contexts that students need to find as follows:

1. Big picture: Finding out background for defining and selecting a topic.
2. Language: Figuring out what words and terms associated with a topic may mean.
3. Situational: Gauging how far to go with research, based on surrounding circumstances.
4. Information-gathering: Finding, accessing, and securing relevant research resources.

During the sessions, students told us, for instance, they often needed to obtain “big picture,” or background context, for understanding a topic. Students also described needs for finding context about language, terms, and discourse of a topic area, and about the information setting they needed to find materials.

Finally, students needed to figure out how far they needed to go with their research. (e.g., receiving a good grade or consulting with a health professional about a medical issue).

The needs for each research context require varying degrees of effort and engagement.⁶ We found students' needs for different research contexts were more multi-faceted than one-dimensional. Figure 4 presents each context and its associated dimensions. As our research continues, we plan to modify these dimensions as needed.⁷

Figure 4: Associated Dimensions for Each Context

Research Context	Associated Dimensions
Big Picture	<ul style="list-style-type: none"> - Finding the summary of a topic - Finding the background of a topic
Language	<ul style="list-style-type: none"> - Finding the meaning of words or terms, related to a topic - Translating terms and words from one language to another language - Figuring out search terms for use in further research
Situational	<ul style="list-style-type: none"> - Figuring out how far to go with research activities, in light of meeting someone else's expectations (e.g., instructor or health professional) - Figuring out how much time to spend on a research - Figuring out how to get a "good grade" (i.e., for course-related research) - Finding sample papers from former students, provided by instructor (i.e., for course-related research) - Finding guidelines for paper submission (i.e., for course-related research)
Information-gathering	<ul style="list-style-type: none"> - Finding out what research has been published about a topic - Locating full-text versions of potential research sources

⁶ We recognize there are parts of our model that other researchers have addressed, too, but that other scholarly work has focused on different aspects of the overall student research process, including Carol Kuhlthau's emphasis on information seeking, *Seeking Meaning: A Process Approach to Library and Information Services*. Norwood, NJ: Ablex, 1993 and second edition, Libraries Unlimited, 2004, and Michael Eisenberg's and Bob Berkowitz's "[Big Six Model](#)" (1988) which includes the additional stages of use of information, synthesis and evaluation (of product and process).

⁷ In our ongoing work, we hope to examine what happens to students beyond information-seeking in other stages of the research process, especially during the synthesis or evaluation stages. So far, we have asked students about the entire research process—from getting to an assignment to conducting research to synthesizing findings, writing, and turning in a paper. Our respondents have focused more on the information-seeking part of the research equation, rather than on use or synthesis.

In the sessions, students also reported they used different resources and workarounds that sometimes helped (and sometimes did not) as they tried to find the contexts they needed.

For most students, it was during these research interactions—the use of certain information resources to find different research contexts—when difficulties, frustrations and challenges arose.

Respondents stated that many of these frustrations were the effects of information overload and the sense of being inundated by all the resources at their disposal. We also found that students were challenged by their inability to find the materials they desired and needed on a “just in time” basis, especially if they had procrastinated on course-related research assignments.

In general, students reported little information-seeking solace in the age of the Internet and digital information. Frustrations were exacerbated, not resolved by their lack of familiarity with a rapidly expanding and increasingly complex digital information landscape in which ascertaining the credibility of sources was particularly problematic.

Part Two: Evaluating the Context Typology

“ For a research paper, I would read as much as I could to get a general idea and background of the topic that I need to write about. Then, I get more specific and focus in on a trend I’m starting to find or the actual topic I’m supposed to do for the paper. Then, I’ll write a rough draft and try to list what the facts I want to include in the paper, and edit it after that.”

- Student in a follow-up interview

We administered a survey to collect data about the information needs and behaviors of respondents during course-related and everyday life research.⁸

The survey was also for evaluating the preliminary model of our research context typology. Last fall’s student discussion groups, which we held on seven U.S. campuses, informed the survey instrument.^{9,10}

Specifically, we investigate the usefulness of our typology in three areas:

1. The existence of each of the four research contexts—big picture, language,

⁸ For descriptive statistics about the survey sample, see the Appendix at the end of this report. The sample consisted of full-time students enrolled in two-year institutions (n=691) and four-year institutions (n=1,627) in the U.S.

⁹ We held 90-minute student discussion sessions with sophomores, juniors, and seniors at Harvard University, University of Illinois at Urbana-Champaign, Mills College, University of Washington, and with students who had completed at least one semester, at three community colleges including Diablo Valley College (CA), West Valley College (CA), and Shoreline Community College (WA), during October, November, and December 2008. We chose a sample of students who had some experience with conducting research in a college setting, as opposed to first-semester students who may have reported research strategies from high school.

situational, and information gathering, and, if each does exist, its frequency of occurrence in students' course-related and everyday life research activities.

2. The role, use, prioritization of individual information resources during the research process when certain contexts arise.
3. Motivating factors for using certain information resources, rather than using others.

Method

Our data analysis began with the creation of indices for each context (i.e., big picture, language, situational, and information-gathering).

We recoded and collapsed individual variables, which collected data about the each context's associated dimensions, into context indices. We have developed four indices for course-related research and four more for everyday life research.

Throughout the report we use *mode* as a measure for assessing survey results. Mode is the value indicating the most frequently occurring response from the sample for each research question asked.

Key Findings about the Typology

What do the results tell us about the existence and frequency of the different research needs that students have?

We summarize key findings, as follows:

1. All four of the contexts identified in the preliminary typology—big picture, language, information gathering, and situational—did, in fact, exist for respondents, whether they were conducting course-related or everyday life research. The need for finding all four contexts arises in the early stages of the research process, regardless of the type of research that students are conducting.
2. The need for big picture context—obtaining some background information on a topic—precedes any of the other contextual needs. Finding big picture context may indeed be part of what some students have called a “presearch stage.” Presearch is a time of thinking about and narrowing down a topic.¹¹ Most respondents expressed a need for big picture context “often” or “almost always,” while conducting course-related (65%) and everyday life research (63%). Most respondents—more than half—reported first needing big picture context, or a summary of a topic, at the start of their course-related (51%) or everyday life (64%) research.

Finding big picture context may indeed be part of what some students have called a “presearch stage.”

¹¹ In our fall sessions, students discussed going through a “presearch” stage during course-related research, which was a stage that involved thinking about a topic (even “stewing”), seeing what had been published about something, before moving on to what students called, their “more serious research.” A majority of students in our fall sessions used Wikipedia during the presearch stage.

3. For the most part, we found relatively little difference between how often most context needs arose for students. Most respondents stated they "sometimes" needed to find language context during the course-related (51%) and everyday life research process (40%). The same trend applied for situational context. Most respondents claimed that they "sometimes" needed situational contexts during the course-related (46%) and everyday life process (33%).
4. There were also not many differences between when context needs arose during different stages of the course-related or everyday life research process. Most respondents stated they first needed to find language context "near the beginning" of course-related (64%) and everyday life research processes (62%). The same trend applied for finding information-gathering context, with most respondents stating they needed to find what was published and where "near the beginning" of the course-related (52%) and everyday life (39%) process. The beginning of the research process is the practical time for these contexts to be satisfied, since most students are assessing a topic and whether there is enough published about it to continue.

Overall, the findings suggest that respondents were curious about and engaged in finding information, especially in the beginning. Big picture context was needed more frequently and sooner than other contexts, whether respondents were conducting course-related or everyday life research.

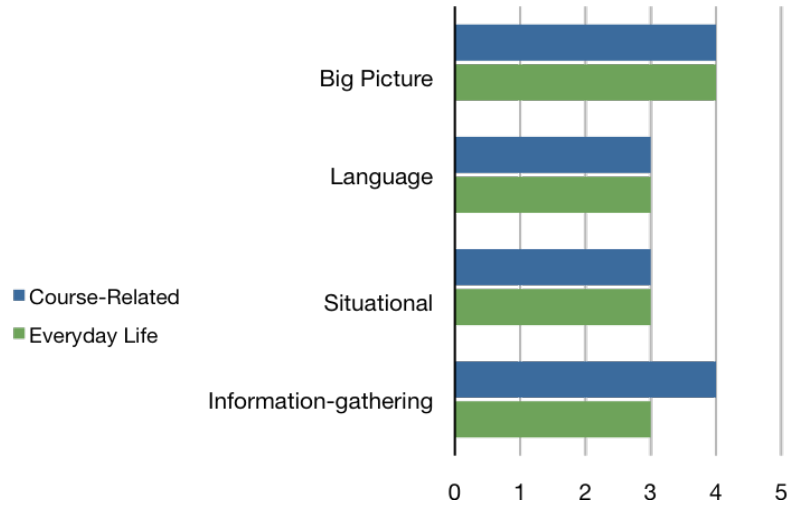
As an additional step in the analysis, we ran a cross tabulation comparing responses from two- and four-year institutions. From the results, none of the trends significantly varied by institution type: most respondents reported they needed contexts with the same amount of frequency (i.e., almost always to rarely), and at the same stage in the process (i.e., very beginning to end).

On the following pages, we present two charts to show the results of our typology evaluation about frequency of occurrence and stage of occurrence.

Figure 5 presents comparative data about the existence and frequency of research contexts for course-related research and everyday life research. While Figure 6 shows at which stage the need for a research context arises for course-related research and everyday life research.

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**Figure 5: How Frequently Are Contexts Needed?
(Graph of Modes)**

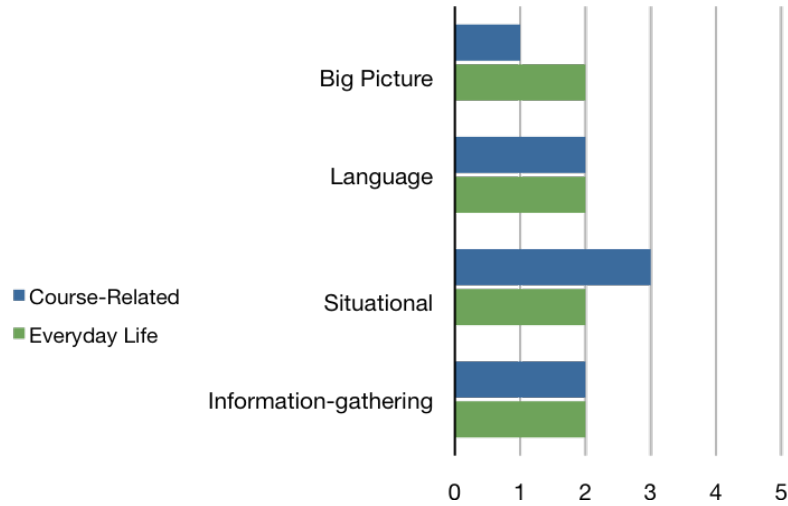


Everyday Life Research	Frequency (N)	Mode	Median	Modal Frequency
Big picture context	2094	4	4.0	Often
Language context	2045	3	3.0	Sometimes
Situational context	1874	3	3.0	Sometimes
Information-gathering context	2022	3	3.0	Sometimes

Course-Related Research	Frequency (N)	Mode	Median	Modal Frequency
Big picture context	2232	4	4.0	Often
Language context	2183	3	3.0	Sometimes
Situational context	2168	3	3.0	Sometimes
Information-gathering context	2230	4	4.0	Often

Scales are based on modes for each index and run from 1 (never) to 5 (almost always) for the context indices.

Figure 6: Stages in Research Process When Context Needs Occur (Graph of Modes)



Everyday Life Research	Frequency (N)	Mode	Median	Modal Frequency
Big picture context	1863	1	1.0	Very beginning
Language context	1483	2	2.0	Near beginning
Situational context	1233	2	2.0	Near beginning
Information-gathering	1374	2	2.0	Near beginning

Course-Related Research	Frequency (N)	Mode	Median	Modal Frequency
Big picture context	2116	1	1.0	Very beginning
Language context	889	2	2.0	Near beginning
Situational context	1254	3	3.0	Toward middle
Information-gathering context	2017	2	2.0	Near beginning

Scales are based on modes for each index and run from 1 (very beginning) to 5 (at the end).

Finding Context: Which Resources Are Used?

“ It’s mostly the same steps for me when conducting research. I think now, if you do it right, the Internet is good to give you any information you need that’s relevant to what you’re doing. It’s not like back in the day when your first step was going to the library, and going through books.”

- Student in a follow-up interview

So far, we have presented findings about how often and at what stage during the research process students have needs for different research contexts. In general, the respondents do experience needs for big picture, language, situational, and information-gathering context on a frequent basis and at the beginning of the course-related or everyday life research process.

Yet, there is another key piece to the typology puzzle: How often do students use individual information resources during times when they are also looking for information to satisfy certain research contexts?

Which information resources are most and least frequently used by respondents when research context needs arise? Do any patterns for information resource usage emerge?

To answer these questions, we conducted an analysis for course-related research and everyday life research. In the analysis, we created a new variable regarding the use of each individual information resource, which was dichotomous (used/not used). Next, we ran a cross tabulation by each research context for course-related and everyday life research.¹²

Key Findings: Resource Prioritization

What do the results indicate about the ways in which respondents prioritized their information usage when they were also experiencing different needs for context?

Almost all of the respondents relied on the same few information resources...

We summarize the key findings from this analysis, as follows:

1. Almost all of the respondents relied on the same few information resources—regardless of which research contexts they were trying to satisfy and regardless of whether they were conducting course-related or everyday life research.¹³

¹² Note there is a limitation to what cross tabulation analysis can tell—the data does not allow us to explicitly say students went to a given information resource for fulfilling a certain context, for instance. The strongest relationship that it is possible to report about the relationship between resource usage and context need is that respondents turned to a given information source at the same time they were searching for information to satisfy a certain context need.

¹³ To systematically evaluate agreement between the rankings, we calculated Kendall's W for the rankings of information resources used in everyday life research (Figure 7) and then for course-related research (Figure 8). We used Kendall's W, also known as the coefficient of concordance, to measure the agreement among individual rankings (i.e., information resource usage) across several data sets (big picture, language, situational, and information-seeking). Generally, Kendall's W ranges between 0 (no agreement) and 1 (100% agreement). In our results, the result for everyday life research was .993 and the result for course-related research was .994, indicating that the rankings across all four contexts, per type of research, were very high in agreement.

2. Google was the go-to resource for almost all of the students in the sample. Nearly all of the students in the sample reported always using Google, both for course-related research and everyday life research, and regardless of whether they were looking for the big picture, language, situational, or information-gathering context.
3. When it came to course-related research, however, almost all of the respondents turned to course readings first—more than Google, and more than any other resource. The findings suggest that students in our study turned to course readings because the resource was inextricably tied to the course and the assignment, were at hand, and were sanctioned by the instructor.
4. In addition to course readings, nearly all of the respondents used scholarly databases in their course-related research in order to satisfy all four of their context needs.
5. Almost all of the students in our sample consulted their instructors first when looking for research information from a person—before they consulted librarians, if they did, at all.
6. Few respondents made use of librarians—whether it was during course-related or everyday life research.
7. Overall, the findings suggest that respondents appear to be driven by familiarity and habit. The use of convenient and nearby information resources—no matter what contextual questions they were trying to answer and no matter whether it was for a course assignment or for their personal use.

Respondents appear to be driven by familiarity and habit.

Collectively, findings from this analysis lend some insight into how respondents prioritize their use of different resources. Also, the findings provide data about the usage of information resources during different contextual stages of the research process.

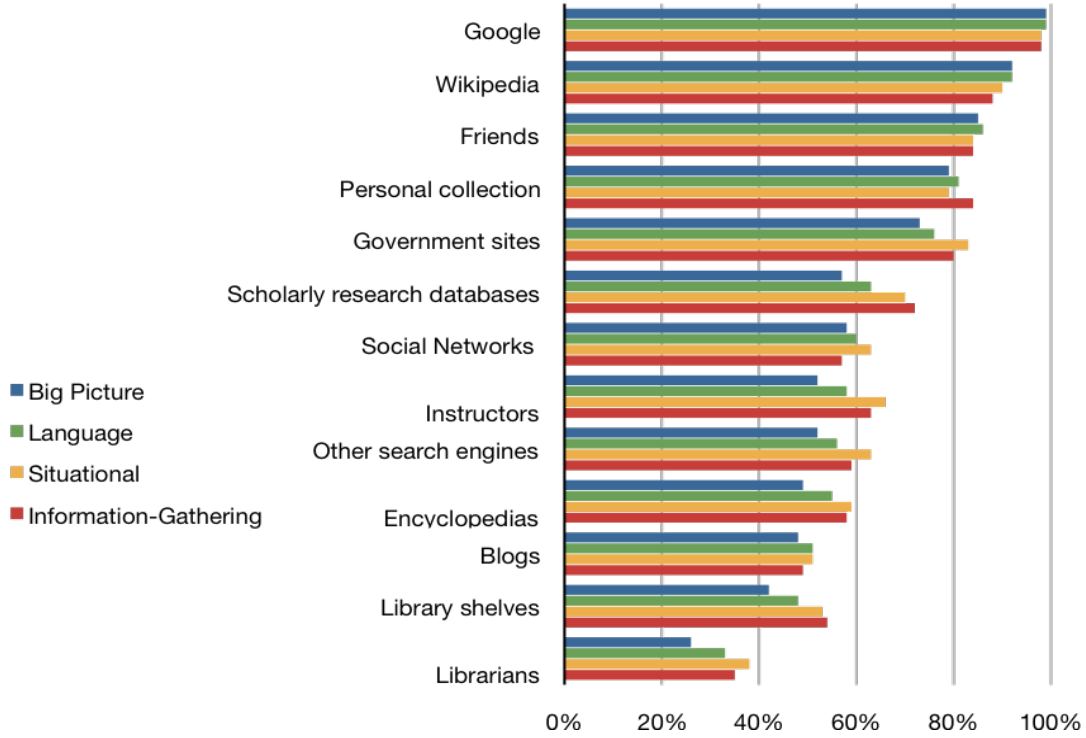
All in all, the findings indicate students in our sample applied a consistent and predictable information-seeking strategy. This strategy suggests a “less is more” approach to dealing with the proliferation of information resources available to students in the digital age.

Almost all respondents used a Google search, at some point, during their research process—but not always first or to the exclusion of using other sources (e.g., course readings, scholarly research databases, or Wikipedia).

In a further step in the analysis we found relatively few differences between resource use at two- and four-year institutions. Most notably, more respondents in four-year institutions than two-year institutions turned to Wikipedia for their course-related research and everyday life research, no matter which context they hoped to satisfy.

On the following pages, Figure 7 presents the findings for resources used in everyday life research and Figure 8 presents the findings for course-related research.

Figure 7: Resources Used When Everyday Life Research Contexts Arise



Everyday Life Research	Big Picture	Language	Situational	Information-Gathering
Google (i.e., for finding sites other than Wikipedia)	1745 99%	1137 99%	897 98%	1081 98%
Wikipedia	1600 92%	1043 92%	816 90%	952 88%
Friends	1480 85%	972 86%	746 84%	906 84%
Personal collection	1336 79%	894 81%	734 83%	892 84%
Government sites	1196 73%	827 76%	683 79%	832 80%
Scholarly research databases (e.g., EBSCO, JSTOR, ProQuest)	994 57%	709 63%	618 70%	772 72%
Social networks (e.g., Facebook)	986 58%	660 60%	560 63%	606 57%
Instructors	889 52%	639 58%	581 66%	672 63%
Other search engines (i.e., other than Google, e.g., Ask, Yahoo!)	903 52%	641 56%	575 63%	644 59%
Encyclopedias	834 49%	607 55%	517 59%	618 58%
Blogs	764 48%	530 51%	424 51%	481 49%
Library shelves	721 42%	534 48%	467 53%	573 54%
Librarians	454 26%	375 33%	346 39%	374 35%

Figure 8: Resources Used When Course-Related Research Contexts Arise

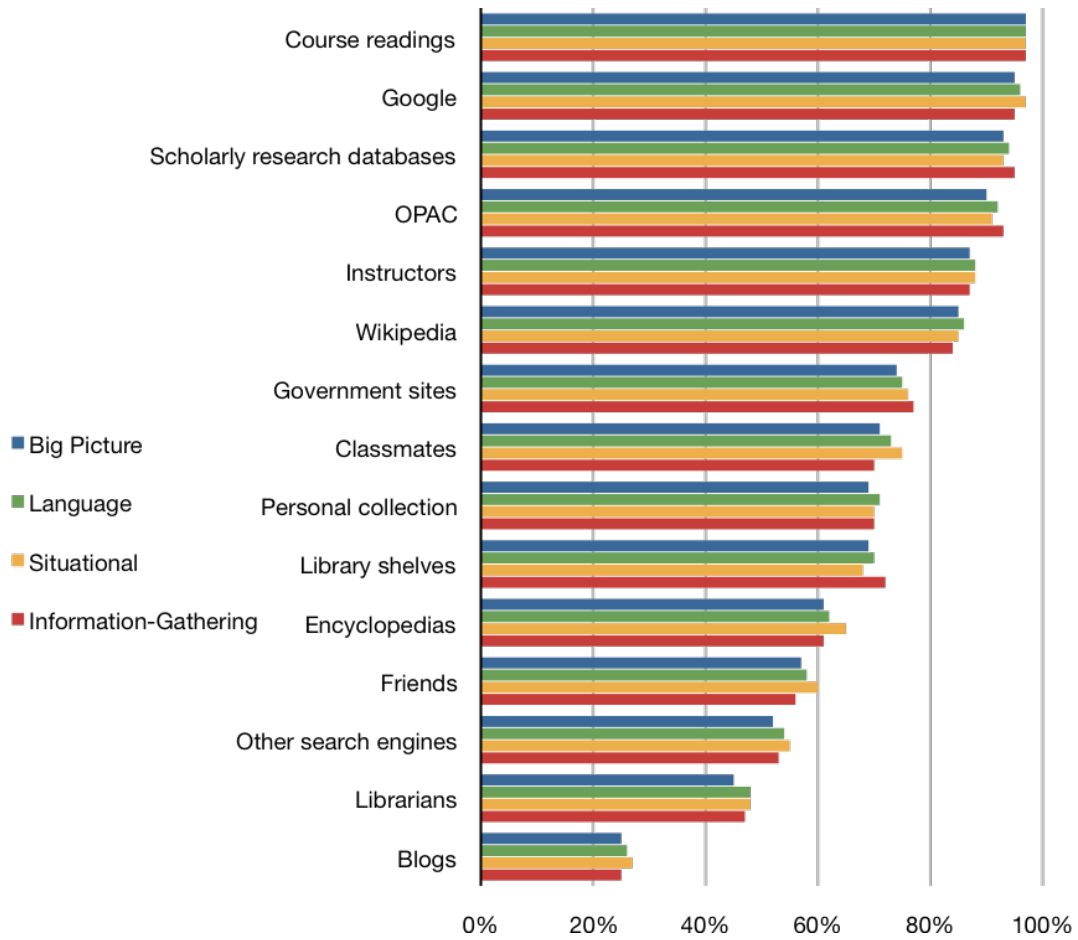


Figure 8 (cont'd.): Resources Used When Course-Related Research Contexts Arise

Course-Related Research	Big Picture	Language	Situational	Information-Gathering
Course readings	1903 97%	1624 97%	1434 97%	1787 97%
Google (i.e., for finding sites other than Wikipedia)	1891 95%	1622 96%	1444 97%	1769 95%
Scholarly research databases (e.g., EBSCO, JSTOR, ProQuest)	1823 93%	1562 94%	1375 93%	1758 95%
OPAC	1791 90%	1544 92%	1360 91%	1725 93%
Instructors	1662 87%	1433 88%	1272 88%	1548 87%
Wikipedia	1675 85%	1439 86%	1267 85%	1552 84%
Government Websites (i.e., .gov sites)	1381 74%	1186 75%	1055 76%	1333 77%
Classmates	1362 71%	1195 73%	1088 75%	1264 70%
Personal collection	1288 69%	1128 71%	982 70%	1218 70%
Library shelves	1312 69%	1148 70%	980 68%	1290 72%
Encyclopedias (print or online)	1188 61%	1030 62%	940 65%	1112 61%
Friends	1088 57%	952 58%	867 60%	1000 56%
Other search engines (i.e., other than Google, e.g., Ask, Yahoo!)	1022 52%	892 54%	814 55%	964 53%
Librarians	865 45%	784 48%	695 48%	848 47%
Blogs	474 25%	423 26%	385 27%	448 25%

Part Three: Use of Campus Resources

“ When I’m doing research, usually it’s the material that I have from the class, or the stuff I’m looking up from the library databases. But if I don’t understand something from those things like a word or a concept, then I’ll go a search engine, or if I just need quick facts or something like that, I’ll use a search engine to find them.”

- Student in a follow-up interview

Throughout our ongoing research, we have identified gaps between how students conceptualize research and the way in which others on campus conduct research (e.g., instructors and librarians).¹⁴

These gaps are especially useful in understanding how course-related research is conceptualized through the lens of the student experience, as well as how challenges may be addressed by faculty and librarians.

¹⁴ In our fall student discussion sessions we identified gaps between how faculty conducted research (usually primary research), especially at research institutions, and how students conducted research (usually secondary research) for course-related research. The gap in what research was and how it was conducted by each group, in this case, was the basis for frustrations with meeting instructors’ expectations for course-related research assignments.

Different Strategies: Students and Librarians

As a follow-up analysis in this round of research, we explored a possible gap between the librarians' and the students' strategy for conducting research. How do students prioritize their resource selection in contrast to the strategies that librarians recommend?

In Figure 9, as a basis of comparison, we provide an academic library guide, designed to assist students in conducting an effective course-related research strategy.¹⁵

Figure 9: A Library Guide for Conducting Course-Related Research

Library Approach to Research Process	Suggested Resources
1. Identify and develop your topic (including main concept and keywords for searching).	Library OPAC and periodical indices.
2. Find background information (so you understand the broader context of your research, including what is known).	Subject encyclopedias, bibliographies, dictionaries and course textbooks.
3. Use catalogs to find books and media.	Library OPAC and OCLC WorldCat.
4. Use indexes to find periodical articles.	Scholarly research databases.
5. Find Internet resources.	Search engines (e.g., Google, Yahoo! Search, and Ask), subject directories, and Invisible Web resources).
6. Evaluate what you find (includes narrowing or broadening your topic).	Use recommended sources (e.g., How to Critically Analyze Information Resources) and book reviews, among other things, to evaluate authority. Consult a librarian or instructor for narrowing or broadening a topic.
7. Cite what you find using a standard format (includes how to avoid plagiarism).	Suggestions include Modern Language Association (MLA) and American Psychological Association (APA) guides, Code of Academic Integrity, among other resources.

"The Seven Steps of the Research Process," Research & Learning Services, Cornell University Library

The library guide's research strategy recommends that students move from the general to the specific. The library approach satisfies many of the same research contexts that students in our sample reported needing at the beginning of their research processes.¹⁶

¹⁵ Figure 9 is derived from "The Seven Steps of the Research Process," developed and posted by Research & Learning Services, Cornell University Library, Ithaca, NY, USA. Permission for reuse in this report was granted on September 14, 2009 by Olin and Uris Library Director Kornelia Tancheva. Note these steps are openly provided as just one effective strategy and the authors advise, "depending on your topic and your familiarity with the library, you may need to rearrange or recycle these steps." Cornell's guide is regarded a "standard" in the field and the guide has been reposted on a number of other campus library sites as a methodology for how to conduct student research. The outline for the research process was accessed online on September 9, 2009 at: <http://www.library.cornell.edu/olinuris/ref/research/skill1.htm>

By comparison, though, there is a critical difference between the students' approach and the librarians' approach. The difference involves which information resources are used, and in which stage, each resource is used.

The library guide recommends beginning course-related research by using library resources to identify and narrow down a topic. These resources, the library catalog and periodical indices, are all vetted, credible, and authoritative. Only much later in the research process, and only after a topic has been safely nailed down (Step 7), does the guide recommend turning to Internet resources, such as Google, Yahoo! Search, or Ask.com.

The student approach is different. Nearly all of the students in our sample reported using course readings more than any other resources early on in their research process.

As one student explained his strategy in a follow-up interview:

"If you're going to understand the fundamental premises in most of my classes, you need to do the course readings. Professors have gotten pretty good about assigning interesting course readings, so from a personal improvement and entertainment perspective, many are useful. And then again, in research-oriented courses, the readings serve as an excellent starting point for where to look in terms of research data and argumentation."

- Student in a follow-up interview

Students also reported using public Internet sources (i.e., Google and Wikipedia) in their initial stages of their research for a variety of reasons, which included a belief that the Internet is an all-inclusive information resource.

Another student recalled in a follow-up interview:

"Because of my economic situation, money is always been tight, I've just come to the realization that all the information you need is mostly on the Internet—that includes text, the readings—you usually find stuff like that on the Internet. So, you can just get the whole bookstore."

- Student in a follow-up interview

All in all, the librarian approach is one based by thoroughness, while the student approach is based on efficiency. To that end, librarians suggest using scholarly resources, while many students in our study used a wide range of resources that deliver an abundance of results early on, whether they are scholarly, or not.

... the librarian approach is one based on thoroughness—while the student approach is based on efficiency.

¹⁶ In the library guide, the need for our typology's big picture context is satisfied in the guide's Step 2, language context in Steps 1 and 2, information-gathering context in the guide's Steps 3, 4, 5, and situational context in Steps 6 and 7—at the same stages in the research process as respondents reported.

As a whole, the findings suggest that students in our sample favored sources for their brevity, consensus, and currency over other qualities and less so, for their scholarly authority.

Key Findings: Student Research Strategies

What do these different approaches to resource usage suggest about the student research process?

Students in our sample employed a strategy driven by meeting their instructors' expectations (course readings) and, at the same time, obtaining as many results as possible early on (i.e., using a Google search). Whether the results are relevant or irrelevant is, of course, a different matter.

We also suspect that a strategy that returns an abundance of results early on may keep students from developing anything similar to what the seven-step library guide suggests. In our discussion groups, for instance, a very large majority of students only described following two and at most, three steps in their research process.

We summarize the key findings, as follows:

1. Library guides often recommend a strategy for scholarly information seeking, underscored by the use of credible, authoritative sources. These sources are more likely to bring success by resolving many of the credibility issues facing digital natives.
2. The student approach is based on efficiency and utility. The student strategy attempts to satisfy context needs (identifying and developing a topic) by using a combination of instructor-sanctioned sources (i.e., course readings) and with open-access, collaborative public Internet resources (i.e., Google and Wikipedia) that return a lot of results early on.

Library Usage: Resources vs. Services

"Generally, it is not necessary to talk to a librarian—if the library is well laid out, you can search for material online, once you find it, you can request that they put them on hold for you and then just go and collect them. Or, if you know the physical location, you can just go and collect it yourself. When those ways fail, I'll go bug a librarian. But otherwise, it just seems like there are resources to be used, rather than taking up someone's time."

- Student in a follow-up interview

So far, our research findings suggest that nearly all of the students in our study used a narrow range of library resources and services. Much of what was used by students was "cherry-picked" from the wide range of all library resources and services provided on most campuses.

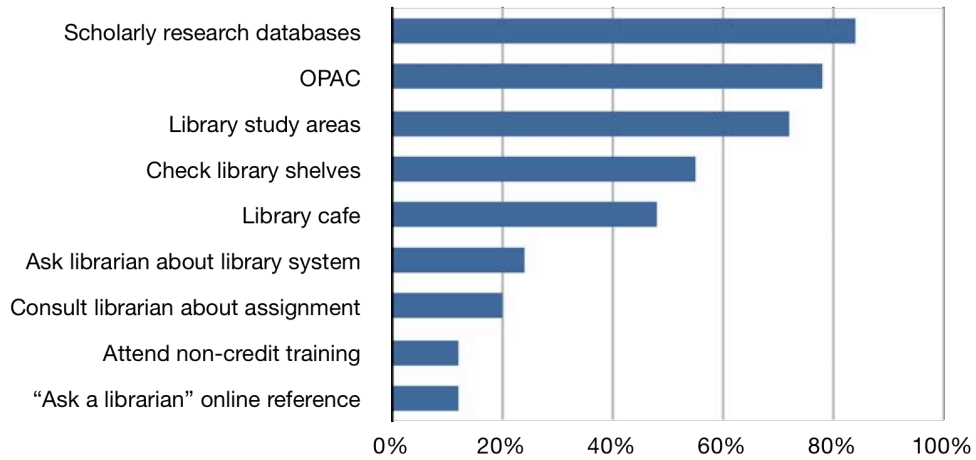
In this section, we examine in greater depth how the students use *all* that libraries offer, by asking how do college students use library resources and services in their course-related research and instructors, a situation that tests students' critical thinking and information-seeking skills?

In particular, we investigate three areas pertaining to college students, libraries, and the course-related research process: (1) students' use of library resources and services, (2) students' use of librarians, and (3) students' motivations for using scholarly research databases.

We begin by examining how students in our study used what their campus libraries offered. The results appear in Figure 10, ranked from most-to least-used resources and services in their course-related research.

Much of what was used by students was "cherry-picked" from the wide range of all library resources and services...

FIGURE 10: Usage of Libraries for Course-Related Research



	Usage of resource/service	Total (N)
Use scholarly research databases (e.g., EBSCO, JSTOR, ProQuest)	1866 84%	2216 100%
Use online public access catalog (OPAC)	1729 78%	2222 100%
Use of library study areas	1596 72%	2222 100%
Look on library shelves for materials	1197 55%	2193 100%
Use library café	1045 48%	2171 100%
Ask a librarian about workings of library system (e.g., location of materials on campus)	527 24%	2212 100%
Consult a librarian about a course-related research assignment	446 20%	2227 100%
Attend a non-credit library training session	274 12%	2193 100%
Use "Ask a Librarian" (chat, email, or IM) for reference	263 12%	2189 100%

Reported from most frequently to the least frequently used resource or service.

Key Findings: Library Use

How often do students use certain library resources and services in their course-related research?

The results in Figure 10 indicate that 8 in 10 respondents consulted libraries for online, scholarly research databases (e.g., EBSCO, JSTOR, and ProQuest). To a slightly lesser degree, respondents reported using the online public access catalog (OPAC) to find books and related library materials (78%), library study areas (72%), and the library shelves (55%) when conducting course-related research.

We summarize the key findings, as follows:

1. Most respondents used very few of the resources and services available to them. For instance, relatively few students in the survey used services that required contact with librarians. Only about 1 in 10 respondents ever used online reference (12%) or on-site, non-credit library training sessions (12%).
2. Few students in our sample consulted librarians about research assignments (e.g., developing a research strategy) (20%) or about the campus library system (24%) (e.g., finding out about available resources on campus). Eight in 10 respondents—80%—reported that they did not use librarians for help with a course-related research assignment.
3. Over three-fourths of the sample reported that they rarely, if ever, asked a librarian about the workings of the campus library system (76%). In a related question about respondents' perceived helpfulness of library services, less than a third of the respondents (31%) reported that consulting a librarian about an assignment proved helpful in their course-related research.

In a further analysis, we compared the differences between responses from the sample enrolled in two- and four-year institutions. We found that more respondents in four-year institutions (83%) reported they were less likely to use a librarian than respondents in community colleges (72%).

As a whole, the results suggest students do, in fact, *use libraries—but most of the respondents used library resources—not librarian-related services.*

Respondents had a strong preference for library resources—tangible research tools provided by the library—such as library databases and the OPAC, which allowed them to work independently, from any location, and at any hour of the day (or night).

As one student reported in a follow-up interview:

“The actual library itself? Do I use it? I physically don't go to the building anymore because it is all online. You can access the databases through, I guess some home network...hmmm...good question though.”

- Student in a follow-up interview

Eight in 10 respondents—80%—reported that they did not use librarians for help with a course-related research

However, when it came to human-mediated library services—such as those provided through contact with a librarian—most respondents did not make much use of them. It is important to note that whether a librarian-related service was computer- or human-mediated (e.g., face-to-face consulting), or not, had little bearing on whether students reported used the service.

Why Do Students Consult Librarians—When They Do?

“On occasion I use the library, but not as often as the online resources. Most importantly the library is good as a quiet work-oriented place, some place to physically conduct research, and on occasion, there will be some particular materials that they will have that aren’t available online, and in that case, libraries are essential.”

- Student in a follow-up interview

Throughout the data analysis, we have been struck by how few students in our study reported using librarians while working on a course-related research assignment.¹⁷

Our data show that only a small percent of the sample frequently use librarians. This leads us to believe there was a strong “student-librarian disconnect” occurring among students in our sample.

These results, of course, beg a related question: When students do consult librarians, what kinds of information or services are they seeking, based on the research contexts in our typology?

A logistic regression was performed to investigate the relationship of all four contexts with the likelihood that respondents would use different information resources in their course-related research.

The results of the logistic regression and an explanation appear on the follow page in Figure 11.

...there was a strong “student-librarian disconnect” occurring among students in our sample.

¹⁷ PIL’s survey results differ from what students told us about librarians in the discussion sessions last fall. Students in the discussion sessions told us they consulted librarians regularly, especially as “navigational coaches” for figuring out the complexities of their campus library system and for helping them find “good, citable stuff” and hard to find resources (i.e., statistics and government documents) during the research process. One explanation for the difference between results from the discussion groups vs. the survey may be who the sample was. The student discussion groups used a sample of humanities and social science majors; a group that uses the “library” as a “lab” for assignments. The survey, however, sampled students studying in all available disciplines, including the sciences, business administration, and at community colleges, occupational training programs.

**Figure 11: Logistic Regression
Predicting the Probability of Using a Librarian during Course-Related Research**

	<i>B</i>	S.E.	<i>p</i>	Odds Ratio	95% for C.I. Odds Ratio	
					Lower	Upper
Big Picture Context	-2.41	.102	.018	.79	.643	.959
Language Context	.469	.100	.000	1.60	1.315	1.943
Situational Context	.184	.095	.053	1.20	.997	1.450
Information-Gathering Context	.388	.132	.003	1.48	1.139	1.909

Variable(s) entered on step 1: bpcroften_index_di, lacr_index_ofTEN_di, sitcr_index_ofTEN_di, infocr_index_ofTEN_di.

The model contained four binary independent variables (i.e., big picture, language, situational, and information gathering contexts; 0-absent/1-present) and one dependent variable (i.e., use of a librarian on a course-related research assignment).¹⁸

The dependent variable (using a librarian) was significantly associated with all four independent variables (i.e., big picture, language, situational, and information-gathering). The full model containing all four predictors of context explained 29% of the variance.¹⁹

As shown in Figure 11, all four of the independent variables made a statistically significant (.05%) contribution to the model (i.e., need for big picture, language, situational, and information-gathering context).

However, the negative value for big picture context (the *B* column) indicates that a respondent who needs background information is *less* likely to consult a librarian.

In this logistic regression model, the strongest predictors of using a librarian came down to two needs for research contexts: a respondent with a language context need, recording at an odds ratio of 1.60, and a respondent having an information-gathering need, recording at an odds ratio of 1.48.

In other words, controlling for all factors in the model, this analysis indicates that respondents who needed to fill an information-gathering context need were just slightly less than 1.5 times more likely to consult librarians than respondents who did not have an information-gathering need, controlling for all factors in the model.

At the same time, respondents who needed to fill a language context need were more than 1.5 times more likely to consult librarians than were respondents who did not have a language need (controlling for all factors in the model).

¹⁸ In an early step in our statistical analysis we ran logistic regressions for each of the course-related research contexts (i.e., big picture, language, situational, and information-gathering) as predictors of using course readings, Google, library databases, instructors, Wikipedia, government sites, classmates, personal collections, library shelves, encyclopedias, friends, search engines, librarians, or blogs). The results were not statistically significant and therefore, are not reported.

¹⁹ The 29% is based on Nagelkerke R-squared value.

As one student in a follow-up interview explained:

“It’s kind of tough to answer why I use librarian, but is really more when I’m trying to think of the word to use, how to narrow my search, so it’s not such a huge list to choose stuff from. Say you are searching a certain kind of plant, or something, and you end up with a 100-plus things to look and they are not even necessarily what you need, so you want to know how to cancel those out and have a narrower search—librarians help you with that process of narrowing a search down.”

All in all, we conclude from this analysis that language needs are a key trigger for students’ use of librarians.

Students in our sample were much more likely to use a librarian when they needed help finding the meaning of a word or term related to a topic or figuring out what search terms to use. Also, respondents were more likely to turn to librarians for help with finding full text materials that were available from different sources.

Use of Online Scholarly Research Databases

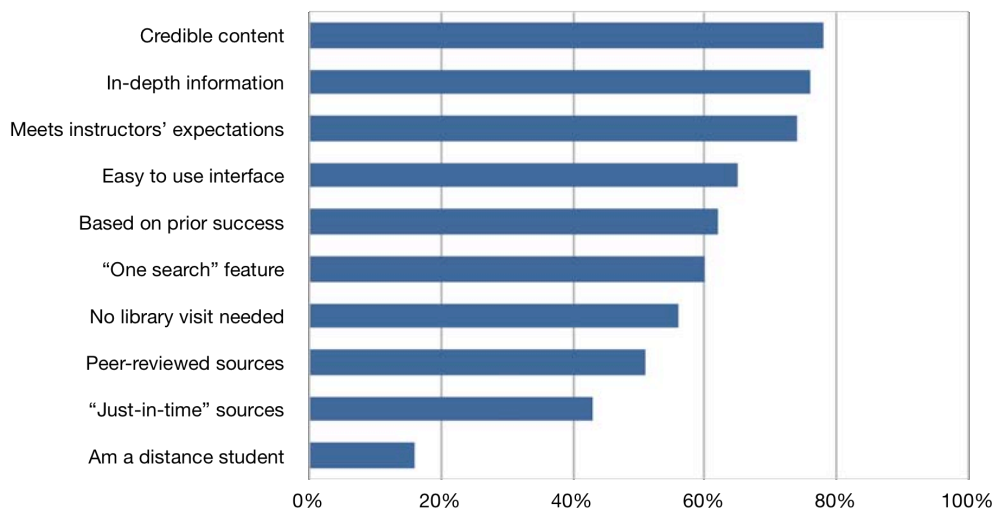
“During first year orientation and in a freshman writing class the message was explicit about using library databases. JSTOR is above all else where all the economics literature is stored, for instance, at least on our campus. There have been other databases I’ve used, too, mostly through classes or some assigned reading.”

- Student in a follow-up interview

At this point, we turn our attention to online scholarly research databases—a library resource that almost all students in our sample used at some point in their course-related research process.

Why is this so, according to the students in our sample? Why were respondents motivated to use scholarly research databases—more so, in fact, than any other resource or service provided to students by the campus library?

In Figure 13, we rank the most frequent to the least frequent reasons for using scholarly research databases.

Figure 13: Reasons Why Scholarly Research Databases Are Used

	Reason Used	Total (N)
1. Have more credible content than what might be found on the Internet	1735 78%	2220 100%
2. Have in-depth, detailed information	1676 76%	2218 100%
3. Have the kind of resources my instructors expect to see	1642 74%	2220 100%
4. Has an interface that makes it easy to find sources	1436 65%	2217 100%
5. Have allowed me to succeed in the past (e.g., get a "good grade")	1368 62%	2222 100%
6. Have a "one search" feature	1342 60%	2225 100%
7. Require no visit to library building, itself, to find resources	1235 56%	2222 100%
8. Have sources that are peer-reviewed	1124 51%	2218 100%
9. Allows me to quickly find articles "just in time"	941 43%	2218 100%

Reported from most frequent reason for using databases to the least frequently reason.

Key Findings: Use of Scholarly Resource Databases

Most of the students in our sample used library databases for three reasons: (1) quality of content; (2) ability to meet instructors' expectations for using "scholarly research resources;" and (3) perceived simplicity of search interfaces.²⁰

In a series of follow-up interviews with respondents we also found a number of students first became aware of scholarly research databases and how to use them through a librarian-led training or orientation, occurring their freshmen year.

²⁰ The survey also had a matrix question asking respondents under what circumstances they did not use scholarly research databases. The results were inconclusive, except for one response. Most students in the sample (37%) reported that they did not use a scholarly research database when they were looking for a summary about a topic.

We summarize the findings, as follows:

1. The perceived reliability of content found on scholarly research databases was the most significant driver for respondents' use. A majority of respondents (78%) used databases because they were a source of credible information—more so than what students might find elsewhere on the Internet. In addition, three-fourths of the sample (76%) used databases for the in-depth, detailed information, often found in journal articles, they could find with a keystroke.
2. The ability to meet instructors' expectations by using research databases was a trigger for students. Three out of five of the reasons respondents consulted databases were to meet instructors' expectations for research assignments (74%), to succeed on the assignment (62%) (i.e., get a good grade), and because of prior success that such use had brought them in the past (62%).
3. Interface matters, too. A majority of respondents also used databases because of their usable interfaces (65%) that made finding content "quick and easy." In particular, sites with a "one-search" search box were also a reason why a majority of respondents (60%) reported using databases.
4. The 24/7 online, last-minute availability of scholarly research databases was also a factor that determined use, though less so. Almost a half of the respondents (43%) reported using databases because it saved them a visit the library.
5. Follow up interviews lent insight into the importance of the librarians' role in the student research process. Librarians appear to play an important role in the beginning of a students' stay on campus, but, given our other findings, may lessen with each passing year some students are enrolled within an institution.

The ability to meet instructors' expectations by using research databases was a trigger for students.

As an additional step, we compared the reasons for database use given by students in two-year vs. four-year institutions. Institutional affiliation did not matter—respondents in four-year institutions and two-year institutions were relatively similar.

The only notable difference was that the credibility of database content was far more a factor of use for respondents in four-year institutions used databases (83%), rather than their counterparts in community colleges (68%).

Helpfulness of Instructors

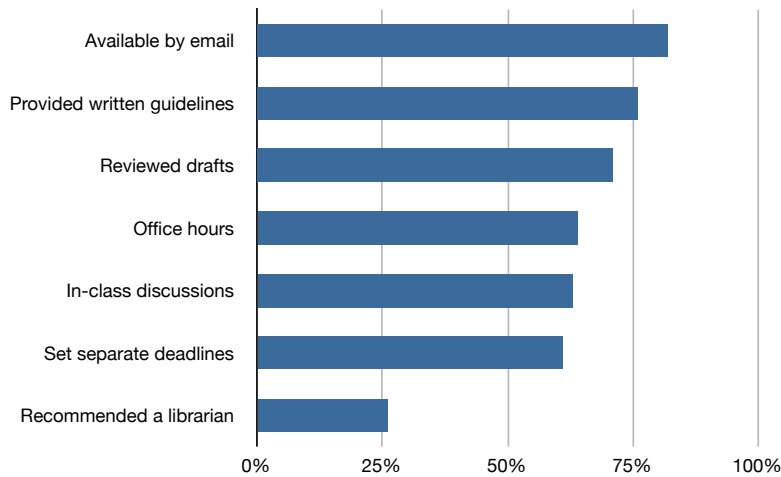
"I hear about conducting research in class. My professor kind of informs me, 'Okay, you got this kind of paper to do. You're going to need this kind of article, and a great database will help you find that. Just go to library—they have this PsychInfo database, which pulls on all these empirical studies that will be useful.' I haven't done too much exploring on my own on which are the best databases, which are the worst databases, and so on."

- Student in a follow-up interview

Finally, we examine how students make use of instructors for course-related research. Overall, we have found students in our sample may have used librarians less than most other library resources, but they definitely turned to instructors during course-related research for a number of different reasons.

Clearly, students used instructors since they were the ones graded the assignment, at hand. But, overall, how do instructors help with assignments, according to students? A ranking of how instructors help during the research process appears in Figure 12.

FIGURE 12: How Do Instructors Help Students with Course-Related Research?



	Reason Instructors Helped	Total (N)
1. Available via email for answering questions about a course-related research assignment.	1834 82%	2243 100%
2. Provided written guidelines with course-related research about what kinds of resources to use (and not to use).	1702 76%	2240 100%
3. Reviewed drafts of entire papers for a review, so revisions can be made before resubmitting.	1603 71%	2249 100%
4. Engaged in individual sessions about research process (e.g., office hours).	1439 64%	2245 100%
5. Held in-class discussions about research strategies to use on course-related research papers.	1412 63%	2241 100%
6. Set separate deadlines for different parts of the assignment (e.g., introduction, body due later on, etc.)	1359 61%	2248 100%
7. Recommended a librarian to work with on a course-related research assignment.	588 26%	2241 100%

Reported from most frequent way instructors help with course-related research to the least helpful way.

Key Findings: Use of Instructors

From these results, instructors played an important role of coaching respondents through the research process—from guiding students through the research process to writing papers.

We summarize key findings, as follows:

1. By far, respondents—8 in 10—put the greatest value on instructors' availability for answering the questions they submitted by email (82%).
2. Setting standards about which resources to use for assignments with written guidelines was also considered helpful by three fourths of the sample (76%).
3. Almost two-thirds of the sample (63%) found in-class discussions about how to conduct research useful, too.
4. The actual writing and editing of papers is another way that students see instructors helping them complete course-related research assignments. A majority of the respondents (71%) considered instructors' review of paper drafts helpful and slightly fewer respondents (61%) found separate deadlines for section by section of papers useful to them.

Taken as a whole, these results suggest that most respondents definitely included instructors in some role during their course-related research workflow. In particular, respondents turned to instructors for coaching throughout the entire research process from defining a topic to developing an information-seeking strategy to writing up their final papers.

We conducted a follow-up analysis and compared respondents from two-year vs. four-year colleges. In four-year institutions valued the helpfulness of office hours (68%) more than respondents in two-year institutions (56%).

Most respondents enrolled in community colleges (70%) found instructors' in class discussions about how to develop a research strategy more helpful than respondents in four-year institutions (60%). When an instructor recommended a librarian for additional help, respondents at two-year institutions (36%) considered the advice more helpful to them than respondents at four-year institutions (22%).

The results suggest that respondents in two-year institutions are more apt to consider their instructors as research coaches than those in four-year institutions. This makes intuitive sense: Instructors in four-year institutions tend to be more involved in primary research activities than in the secondary research they are asking their students to conduct.

... respondents in two-year institutions are more apt to consider their instructors as research coaches than those in four-year institutions.

A Question of Time

"This quarter I have to write a paper in one of my classes, but I can't seem to get started on it. Is that procrastination? I have my topic and I started finding research papers related to it, but I haven't been able to read them and get some focus on my topic. Lately, I've had to spend a lot of time at my job, so I just don't have a lot of time these days. In order for me to do a research paper, I need to have a big block of time to focus, and I haven't been able to get it. I'm starting to get stressed thinking about it."

- Student in a follow-up interview

Procrastination has always been woven into the fabric of the college experience.

In our study, only a few respondents reported starting to work on a course-related research assignment the day it was handed out by an instructor (16%). Most respondents (33%) began working on a 5-8-page research paper due in two weeks about a week before it was due. Still fewer respondents (18%) waited until a day or so before the deadline to start work on the assignment.

We were surprised to find, however, that students' reasons for delaying course-related research differed from the reasons that students had reported in prior research.²¹

We compared the results from a seminal study about student procrastination with those from our own survey responses to a similar question. The original study, designed to measure the frequency of cognitive and behavioral antecedents to college student procrastination, was conducted in 1984—well before the digital age was upon us.

The early results (1984) indicated that almost half of the sample (46%) were self-described procrastinators when it came to completing term papers that required outside research. Most respondents (50%) in this earlier study reported that the reason for procrastination was a fear of failure (need for perfection and/or lack of self confidence).

In our study, we found otherwise. The largest percentage of respondents (40%) in our study reported delaying work on assignments because of competing demands from other classes. A very low response—1% of our sample—reported that they procrastinated because they worried they might fail or that they procrastinated because they worried they could not meet their own expectations.

Collectively, these findings suggest that today's college students may be more confident when it comes to their course-related research competencies.

These findings also suggest that some students may have an "illusion of immediacy" since there are so many resources online, leading students to misjudge how much time is truly needed to complete a course-related research assignment. At the same time, though, students in our sample clearly felt pressed for time as they juggle multiple research assignments.

This finding suggest that students in our sample, given their needs to meet competing course demands, may feel they have less time for research, so therefore, they rely on predictable research strategies that had worked for them before.

... students in our sample clearly felt pressed for time as they juggle multiple research assignments.

Part Four: Conclusion

Results from our survey provide a snapshot of how a sample of college students—drawn from six institutions in the U.S.—conceptualized and conducted research. The findings provide deeper insights into how and why respondents prioritized and carried out their

²¹ See: L. J. Solomon and E. D. Rothblum, 1984, "Academic Procrastination: Frequency and Cognitive Behavioral Correlates," *Journal of Counseling Psychology*, 31, pgs. 503-509.

information-seeking tasks during course-related and everyday life research.

In particular, the research contexts that we identified in our preliminary typology—big picture, language, situational, and information-gathering—existed and occurred with frequency at some point, and in varying degrees, during the research process of the students we studied. Most respondents reported needing each one of the contexts on a frequent basis (i.e., almost always, often, or sometimes), whether they were conducting course-related research or everyday life research.

Strategies of Consistency and Predictability

From our research, a picture emerges about students' research processes. Findings suggest conducting research can be a layered, and potentially complex multi-faceted information-seeking process for many—not all—students.

Students' research processes may have a strong underlying similarity and this holds across the different types of institutions in our sample—from community colleges to research universities.

Most respondents, whether enrolled in a two- or four-year institution, almost always turned to a small set of information resources, no matter which research context they were trying to satisfy.

Students in our sample were curious about and engaged in the beginning stages of their research process.

When it came to everyday life research, nearly all of the respondents used Google, Wikipedia, and friends for finding context. Almost all of the students used course readings, library resources, and public Internet sites such as Google and Wikipedia, when conducting course-related research—no matter where they were enrolled, no matter what resources they had at their disposal.

The relatively consistent pattern of information usage suggests that most students in our study favored a risk-averse and predictable information-seeking strategy. The student approach appears to be learned by rote and reliant on using a small set of resources nearly each and every time.

At the same time, the student approach may sometimes backfire. Using public sites on the Internet, such as Google search, early on, may be one reason why students reportedly find research frustrating in the digital age.

We have found students' frustrations and challenges involve narrowing down topics, finding relevant resources, sorting through too many results from online searches, and evaluating the credibility of what students choose to use. Still, almost all students used public Internet sites early on, despite their known limitations.

It seems that that a very large number of students operationalize research tasks independently of librarians—but not independently of library resources (scholarly research databases) and/or of their instructors.

A significant majority of students in our sample—8 in 10—did not consult librarians for course-related research assignments. Instead, instructors played an important role in coaching students through the research process—from figuring out a research strategy to finding acceptable resources to writing up their findings.

...conducting research can be a layered, and potentially complex multi-faceted information-seeking process for many—not all—students.

What Makes Today's Students Different?

So, after a year of collecting data about how college students conduct research, how do we conclude? What thoughts do we carry forward in our research?

In the end, findings from our first year of research suggest students conceptualize the information-seeking part of research as a practice learned by rote. A strategy such as this one does little to leverage the resources, services, and training most college campuses make widely available to students in the digital age.

When we have presented our findings, we are often asked what makes today's digital age student different than those who have come before them?

Today's students are not naïve about sources, systems, and services.

When it comes to finding information and conducting research, today's students clearly favor brevity, consensus, and currency in the information sources they seek. This may have been the criterion for some students 20 years ago, too.

What has changed is that today's students have defined their preferences for information sources in a world where credibility, veracity, and intellectual authority are less of a given—or even an expectation from students—with each passing day.

All in all, we are reminded of a comment from one student in our fall discussion groups last fall about using books from the campus library: "Books, do I use them? Not really, they are antiquated interfaces. You have to look in an index, way in the back, and it's not even hypertext linked."

Today's students are not lazy or unthinking. This student, representing many, looks at information sources, systems, and services as to how well they meet his or her needs in terms of content, accessibility, and usefulness.

This is our ultimate conclusion: Today's students are not naïve about sources, systems, and services. They have developed sophisticated information problem-solving strategies that help them to meet their school and everyday needs, as they arise.

Recommendations

We are certain this report may raise as many questions as it does provide answers. What's an educator to do? How shall librarians respond and take action? How should we change how we transfer information literacy and critical thinking competencies, if at all?

As researchers, we offer four recommendations in this final section. In a large part, the recommendations are derived from the gaps we have identified as occurring between students, faculty, and librarians and based on the limited sample we studied.

While our findings may not be generalizable to the college students everywhere, we do see these gaps as opportunities for improvement, in some cases, depending on a campus setting.

Our hope is that our recommendations will resonate, on some level, with faculty, administrators, and librarians, who are in the front lines and out in the field each and

every day in some of the most challenging times any of us have ever seen.²²

1. We see a perfect storm brewing on some campuses: (1) many students have imperatives to graduate in four years or less, because of the weak economy, rising tuition costs, and pressure from the institution and family; (2) many students take a brimming course load each term, which may require more work than they are capable of completing; (3) many students develop a work style that tries to get as much done in as little time as possible and work expands to fill the time allotted; and (4) many students' information-seeking competencies end up being highly contextual, a set of predictable skills developed for passing courses, not for lifelong literacy and professional goals beyond college.

As a result, we see the very important pedagogical goals of deep learning and critical thinking are at risk of being greatly impeded within the academy. We suggest that administrators and faculty should systematically examine student workloads across classes on their campuses, in light of an institution's educational goals. We recommend that an analysis of gaps between desired results and existing conditions and their consequences be undertaken and examined more closely on campuses, as needed.

...the very important pedagogical goals of "deep learning" and "critical thinking" are at risk of being greatly impeded within the academy.

2. We see a trend that concerns us: Students in our study developed information strategy that was learned by rote, applied with dogged consistency, and resulted in respectable grades.²³ Many students' research methods appear to be far from experimental, new, developmental, or innovative. Course-related research assignments should not indirectly encourage students to half-heartedly engage in a narrow exploration of the digital landscape (e.g., assignments that state requirements such as, "must use five sources cited in your paper").

Administrators, faculty, and librarians should examine whether research-based assignments result in opening students' minds to expand their information-gathering competencies. Instead, we recommend that students be given course-related research assignments that encourage the collection, analysis, and synthesis of multiple viewpoints from a variety of sources, so the transfer of information literacy and critical thinking competencies may be more actively called up, practiced, and learned by students.

3. We have come to believe that many students see instructors—not librarians—as coaches on how to conduct research. This situation seems to occur whether the faculty may qualify as expert researchers in the area of student research methods, or not. Librarians and faculty should see the librarian-student disconnect as a timely opportunity, especially when it comes to transferring information competencies to students.

We recommend librarians take an active role and initiate the dialogue with faculty to close a divide that may be growing between them and faculty and between them and

²² While we draw some conclusions and make policy recommendations in this section, we also recognize that the limitations of our findings in terms of generalizability to a larger population or to any and all other campuses. Further, we recognize that some of our recommendations may already be undertaken in some venues, or may not apply.

²³ On the average, most students in our sample had a mean GPA of 3.4, or a B+ average.

students—each campus is likely to be different. There are, of course, many ways to initiate this conversation that some libraries may already have in use, such as librarian-faculty roundtables, faculty visits, faculty liaison programs, and customized pathfinders to curriculum, to name but a few. And there is always room for creating new ways to facilitate conversation between faculty and librarians, too. No matter what the means of communication may be, however, librarians need to actively identify opportunities for training faculty as conduits for reaching students with sound and current information-seeking strategies, as it applies to their organizational settings.

4. Our work leads us to draw an important distinction between *library services* and *library resources*. We suspect a lot of students have a very narrow view of all that libraries offer, one which does not begin to include the wealth of library services that libraries, do in fact, provide. In our study, students were frequent users of library resources, especially OPACs and scholarly research databases. At the same time, though, students in our study turned, more often, to instructors, rather than librarians, for guidance with course-related research. For the most part, in our study, librarians were left out of the student research workflow, despite librarians' vast training and expertise in finding information.

Librarians should systematically (not just anecdotally) examine the services they provide to students. This may require looking at things through a new lens, if need be. Questions should be addressed about *how and why services and resources are used*—not only *how often* (e.g., circulation or reference desk statistics). Librarians may want to initiate their analysis by asking what percentage of their campus are using the library, for what particular resources or services, and why or why not? At the same time, we recommend librarians seriously question whether they are developing a set of "niche services," which only reach a small percentage of students.

Next Steps

This analysis of our student survey concludes work in the Phase I: Pilot Study of Project Information Literacy. In the coming academic year (2009-2010), we have already begun to take our research in a new direction, that includes:

1. Carrying out a content analysis of instructors' course-related research assignments, based on a sample of 150-200 handouts (online and offline) from 25-30 U.S. colleges and universities. The purpose is to study what types of guidance and support instructors provide to students (in written guidelines) as part of the course-related research process.
2. Conducting a large-scale online survey of full-time students at 30-40 community colleges, public colleges and universities, and private colleges and universities in the U.S. (n=5,000). The survey will collect data in a new area for PIL, which examines in more depth how students resolve credibility issues and synthesize and formalize their research in the later paper-writing stages of course-related research. We will also investigate the ways that students use instructors in course-related research and friends in everyday life research, both through online and offline communication channels.

Appendix A: Research Methods and Sampling

The Project Information Literacy Team administered a student survey to 27,666 students on six campuses in the U.S. between April and May 2009.

The 32-item survey was administered online, using the University of Washington's WebQ software and a secure file server on campus, set up for collecting survey research data. The collective sample, after data cleaning, was 2,318 responses. On the average, the response rate from each school in this phase of the study was 13%, although the overall response rate was slightly lower at 8%.

We pre-tested wording and functionality of the survey was pilot-tested with five students at the University of Washington in March. Minor revisions were made for clarity of the email invitation and in overall functionality of the instrument. A revised survey was pilot-tested with 20 students enrolled at Harvard in early April. At each campus, we conducted a "dry run" with a campus official to ensure that the survey was not blocked by a firewall or sent to a spam filter before we launched the sample.

We sampled students studying in all disciplinary areas (e.g., humanities, social sciences, sciences, engineering, business, and occupational training) at community colleges and public and colleges or universities. Our sample was segmented by sophomores, juniors, or seniors at four-year institutions and by students who had taken 12 units, or more, at the community college at which they were enrolled.

Research Liaisons

In order to facilitate data collection activities on each campus, we enlisted a research liaison, who was employed at the campus where the survey was administered.

Liaisons were instrumental in helping PIL obtain a digital Excel file of all students on their campus who were eligible to take the survey and in obtaining approval from Human Subjects Officers (e.g., VP of Academic Affairs at community colleges) on their campuses. Liaisons' job titles ranged from library deans and directors, to instructional researchers, and reference librarians.

Our sampling criteria for selected institutions were based on choosing campuses from our volunteer sample that were geographically diverse and represented what our data reflected as coming from both ends of the information literacy scale (i.e., a short questionnaire was administered to each liaison, asking him or her to rank the information literacy competency rate of the student population at their institution).

A figure on the next page shows baseline information about each institution where survey data was collected. Three of the institutions in our spring survey (Harvard, University of Washington, and Shoreline Community College) had also participated in our fall student discussion groups.

Appendix Figure 1: Institutions in the Spring Survey Sample

Institution and Undergraduate Enrollment	Research Liaison	Dates Survey Administered	Follow-up Reminders Sent to Non-respondents	Sample Size and Response Rate ²⁴	Survey Population Size of FTEs ²⁵
Four-Year Institutions					
Harvard University 7,715	Susan Gilroy, Head of Reference, Lamont Library	April 14, 2009 – May 5, 2009	#1: April 21, 2009 and #2: April 27, 2009	n = 352 7.4%	4,769
Illinois State University 17,949	Dane Ward, Associate Dean of Public Services, Milner Library	April 15, 2009 – May 6, 2009	#1: April 21, 2009 and #2: April 27, 2009	n = 163 3.3%	5,000 ²⁶
University of Washington 28,843	Betsy Wilson, Dean of University Libraries	May 8, 2009 – May 29, 2009	#1: May 15, 2009 and #2: May 22, 2009	n = 1,174 14.7%	8,000 ²⁷
Two-Year Institutions					
Chaffey College 14,840	Marie Boyd, Student Learning Objectives Chair and Librarian	April 20, 2009 – May 11, 2009	#1: April 27, 2009, and #2: May 4, 2009	n = 267 4%	6,195
Shoreline Community College 9,898	Tom Moran, Acting Library Director and Claire Murata, Information Literacy Librarian	May 13, 2009 – May 26, 2009	#1: May 13, 2009 and #2: May 9, 2009	n = 307 10.2%	3,004
Volunteer State Community College 7,241	Louise Kelly, Director of Library Services and Jane McGuire, VP, Instl. Effectiveness	April 20, 2009 – May 11, 2009	#1: April 27, 2009 and #2: May 4, 2009	n = 268 38%	698

²⁴ This sample reflects the net sample size per-institution before a final round of data cleaning and elimination of survey-takers, who dropped after the first page of the questionnaire and were eliminated in our study analysis. The sample size for the study findings, after data cleaning, was 2,318 respondents.

²⁵ The PIL survey sample consisted of sophomores, juniors, and seniors (i.e., no freshmen, who were new to conducting research on campus) at four-year institutions and students who had taken more than 12 units at community colleges where they were enrolled. Emails for voluntary participation were sent to students who made their institutional emails publicly available through the Office of the Registrar.

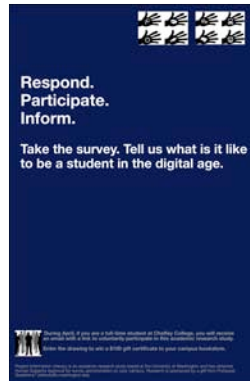
²⁶ ISU's undergraduate enrollment, without freshmen, is 14,555 students. A random sample, per the Registrar's request, was used to deploy the survey to ISU students. At Harvard, campuses, the PIL survey was administered to the entire population that met our eligibility requirements (i.e., no freshmen).

²⁷ UW's undergraduate enrollment, without freshmen, is 19,430 students. A random sample of 8,000, per the Registrar's request, was used to deploy the survey to UW students.

The PIL team worked closely with the research liaisons to publicize the survey on campuses.

We used several methods to spread this awareness: (1) putting up PIL posters announcing the survey around campus (see poster in Figure 2 below); (2) posting a brief reminder about the survey on the campus news page; (3) posting a brief reminder on Blackboard or other online course management systems; and (4) having faculty remind students to take the survey.

Appendix Figure 3: Promotional Poster for Survey



Description of the Student Sample

More females (65%) than males (35%) took the survey. (However, we did not intentionally try to balance our sample for gender.) The mean GPA for the total student sample across all six schools was 3.4, or B+.²⁸

Students studying in arts and humanities, social sciences, and the science comprised nearly half (42%) of the community college sample and about three-fourths of the four-year college sample (74%).

All of the students in the sample from community college had taken 12 or more units. In the sample from four-year institutions, the largest category of students was sophomores (43%), though juniors (25%) and seniors (24%) also made up the sample.²⁹

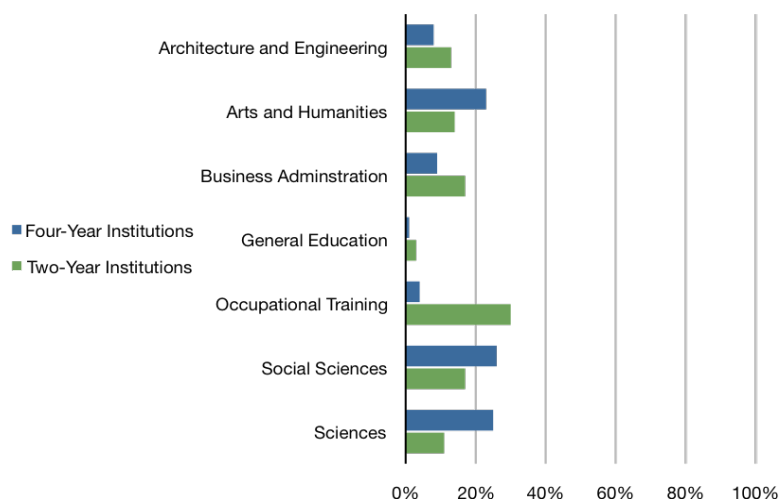
A number of students had declared "other" majors (n=255); many were attending community colleges and taking courses in occupational training (e.g., dental hygiene, paralegal studies, radiology technician) and were recoded as such.

Figure 3 shows a breakdown of major areas of study for the collective sample by four- and two-year institution.

²⁸ For purposes of our analysis, we employ University of Washington's scale for translating GPA to letter grades, courtesy of the Office of the Registrar, http://www.washington.edu/students/gencaf/front/Grading_Sys.html, accessed online on August 10, 2009.

²⁹ The remaining 8% were freshmen and were excluded from the analysis.

Appendix, Figure 3: Major Areas of Study for the Sample



Incentives for Students' Time

In exchange for their time, survey respondents were invited to enter a PIL drawing for a \$100 gift certificate to their campus bookstore. Three \$100 gift certificates were awarded on each campus to respondents who entered the survey. If respondents did not fill out the survey, itself, but did enter the contest, they were still eligible to win. Names of winners were randomly selected from each school's sample the day after the survey ended.

Overall, the sample was limited in the number, nature, and range of participants. Where it was possible, we made a concerted effort not to recruit a sample through library connections in order to avoid bias in the answers we received.

In communication with students, we described the study as "a national research study about being a student in the digital age," not as a study about how students conduct research, use library resources, and other sources. Admittedly, though, we acknowledge that self-report is always unavoidable with surveys, such as the one used in our research design.

Human Subjects Review and Confidentiality

The Human Subjects Division at University of Washington (UW) approved our research protocol on March 26, 2009. UW is affiliated with PIL as the sponsoring institution for Project Information Literacy.

UW's Human Subjects' reviewers certified PIL's survey project as "exempt," due to the no-risk nature of the research the methodologies used to collect data and guarantee confidentiality. As a matter of course, the proposal was submitted and approved at each of the six institutions where data was collected from students.

All measures were used to protect any identifiable data (e.g., each participant has been assigned an identification code; all responses and code keys were stored separately in locked files or on secured computers). No participants or individual institutions will be identified in any reports of the research.

Further, survey contest winners were contacted by cell phone; no additional contact information about the respondents was collected (name, street address, or email from the survey) to preserve their anonymity.

Survey Design

The purpose of conducting the student survey was to collect quantitative data about early adults' research processes, the needs they have in course-related and everyday life research, and which resources they turn to for fulfilling them.

Our goal is to have practical and applicable findings, which will allow faculty and academic librarians to understand the student research process, especially what students experience when conducting research.

Ideally, there will be direct value to numerous constituents in academic settings, including professors, librarians, and administrators, who may also be trying to impart information literacy skills, standards, and competencies to a growing population of students, who are heavily influenced by the convenience of a Google search and the ubiquity of the Web. We hope that the findings will have great value as they are applied in conjunction with other data in the core curriculum discussions among library staff, administrators, and faculty.

At the same time, we make no claims that data and subsequent findings from our student survey are generalizable to larger populations, or beyond the sample in our study.

The survey's purpose for PIL is as an integral part of collecting data to begin answering PIL's overarching research question: In the digital age, how do early adults conceptualize and operationalize course-related research and research for solving information problems related to their daily lives?

The trajectory of our research study seeks to answer the following research questions:

1. How do early adults define and conceptualize the process of research (i.e., both course-related and "everyday" research)?
 - a. What does the activity of research mean to early adults (in their own words and from their own experiences)?
 - b. What barriers and obstacles keep early adults from taking the first steps in both the course-related and everyday research?
2. What steps do early adults take to locate, evaluate, select, and use resources required for course-related and everyday research?
 - a. What processes do early adults employ and what "workarounds" have they developed for evaluating and selecting resources?
 - b. How do early adults engage in collaborative information problem solving about conducting course-related and everyday research?

- c. How do early adults use peer-to-peer "socially constructed" digital resources (e.g., Wikipedia, course wikis, and/or blogs) when conducting course-related and everyday research?
- d. How do early adults determine if peer-to-peer resources are credible and reliable sources of information for course-related research assignments and/or for everyday research, if at all?
- e. How do early adults' strategies for conducting course-related research vary from the search for information about everyday problems?
- f. How do early adults' strategies systematically vary within the population of institutional settings (i.e., community colleges vs. state colleges and universities vs. private colleges and universities)?

Ultimately, findings from PIL will have considerable impact on the understanding of information literacy in five major areas:

1. How information literacy education and coaching are provided to early adults by professors and librarians for conducting course-related and everyday research.
2. How a college curriculum that requires course-related research and everyday research is developed and communicated to early adults.
3. How the design of online resources used by campus libraries and produced by database vendors, enhance or detract from early adults' research experiences.
4. How (and to what extent) different types of institutions impact the information-seeking strategies of their early adults.
5. How to improve the understanding of the problem-solving potential of current U.S. college students who are an important subset of the "adult" cohort, given their unprecedented enrollment, their professional destinies, and their likelihood to have "grown up digitally."

Follow-Up Interviews

Many of the results from our analyses, provided some answers about the "hows and whens" of the research process, but, at the same time, also raised new questions once the data was analyzed. As a method for addressing some of these questions, we conducted follow-up interviews with a students in our sample, who had volunteered there time (n=18).

The sample was segmented along four lines: (1) by community college vs. four year institution respondents, (2) high vs. low GPA respondents, (4) science vs. arts majors, and (5) frequent vs. infrequent librarian usage respondents.

Each interview was conducted by telephone and lasted for 20 - 30 minutes. A script with eight open-ended questions was employed and the same interviewer was used

throughout for consistency.³⁰ The questions were as follows:

Q1. Tell me a little about how you do research for a course-related research paper you get assigned in one of your humanities or social science courses. What's your process? That is, what steps do you take and what sources do you consult, as you go through your research process?

Q2. Do you tend to follow the same steps, the same process most of the time? Do use the same resources from assignment to assignment, or do the things you consult and the steps you take vary? If so, how do they vary? Why? If not, why don't they vary?

Q3. Why do you use course readings, for what purpose? In courses that have assigned or optional readings, do you use these readings for research assignments such as papers? If you do use course readings, at what point during your research process do you do so?

Q4. Do you ever turn to a person for help when you are conducting course-related research? If so, who? How are you hoping this person will help you? Do they end up helping?

Q5. Do you use research or article databases in your research? By that I mean, the kinds that are available through the library Web Site? How did you first find about that these databases were available?

Q6. Thinking about your college or university library, do you use the library for course-related work? If so, how? If not, why not? What would you say that college libraries, overall, are good for when you are conducting research for a course assignment?

Q7. Do you ever use librarians during your research process? Why/why not? What would you say that the college librarians are good for when you are conducting research for a course assignment?

Q8. Do you use Web sites or search engines when you are working on research for courses, or for your own personal use? Which ones do you use? At what point do you turn to these sites? How do they help you the most with your research? Do you use different search engines or websites for course-related work vs. personal use?

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³⁰ John Marino, a doctoral student in the University of Washington's Information School and a member of the PIL Research Team, conducted the telephone interviews during October and November 2009.