

Developing the 'Understanding Library Impacts' protocol: a method for detecting and communicating  
academic library impact on student learning

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## Abstract

DEREK ALAN RODRIGUEZ: Developing the 'Understanding Library Impacts' protocol: a method for detecting and communicating academic library impact on student learning  
(Under the direction of Dr. Helen R. Tibbo)

The Understanding Library Impacts (ULI) protocol is a suite of instruments designed to demonstrate connections between undergraduate student use of the academic library and faculty-defined expectations for student learning. The ULI protocol features a Critical Incident Technique (CIT) survey for exploring student use of the library during 'high-impact' academic experiences such as capstone courses. A 'Learning Activities Crosswalk' links student use of the library to faculty-defined, discipline-specific and general education expectations for student learning. This methodological study was designed to evaluate the protocol with a population of undergraduate students enrolled in upper-level and capstone courses in the discipline of history at six colleges and universities.

The protocol focuses on students' use of traditional and electronic information resources, library services, and library facilities during learning activities associated with 'high-impact' experiences in the academic major. Learning activities are stages in 'high-impact' coursework during which students develop and demonstrate desired learning outcomes. The Learning Activities Crosswalk creates credible connections between information use behaviors during these learning activities and faculty-defined expectations for student learning.

A web-based survey using the Critical Incident Technique gathers quantitative and qualitative data about students' information uses when completing 'high-impact' coursework. Created and refined in two interview-based pilot studies, respondents identify the information resources, services, and facilities used when completing coursework and the learning activities each use supported. Partially-open questions identify the factors of library use that were helpful or problematic to students during their coursework. Open-ended questions gather qualitative data and user stories that reinforce other findings.

Undergraduates enrolled in history courses at the six study sites reported 127 critical incidents. Responses from the survey and results from the Learning Activities Crosswalk were entered into a database for analysis and presentation to study sites. Statistical and qualitative techniques were used to assess the validity and reliability of findings.

The study demonstrated a method for exploring library use as a component of student effort within the context of academic 'work tasks' and illustrated the power of the CIT for exploring library impact. The project also generated an extensible and scalable framework for detecting and communicating library contributions to student learning.

*To Rebecca and Carson*

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## **1. Introduction**

### **1.1 Research problem**

The United States' system of higher education has long been the envy of the world. Higher education institutions, including community colleges, four-year public institutions, private liberal arts colleges, and research universities, have the freedom to define unique missions and goals to support a range of educational experiences for students of varied backgrounds and interests and to meet a wide array of societal goals (Pascarella & Terenzini, 2005, p. 585). However, in recent years, concerns have been raised about access, affordability, and the quality of the outcomes of higher education (e.g. Kutner, et al. 2006; U.S. Department of Education, 2006a).

Higher education's many stakeholders, including federal and state government, business interests, public interest organizations, and the consumers of higher education, students and their parents, want evidence that colleges and universities are delivering anticipated outcomes. While retention and graduation rates are important measures, evidence of student learning in college is the gold-standard in higher education accountability. The U.S. Department of Education's Commission on the Future of Higher Education, otherwise known as the Spellings Commission, made forceful demands in its 2006 report, *A Test of Leadership* (U.S. Department of Education, 2006a). The commission called higher education institutions to measure and release "the results of student learning assessments, including value-added measurements that indicate how students' skills have improved over time" (p. 24). Higher education has responded with new mechanisms for reporting the costs and outcomes of college such as the Voluntary System of Accountability (VSA, 2011) and the University and College Accountability Network (U-CAN, 2011).

The absence of agreed-upon standards for describing expectations for student learning outcomes in higher education has been an obstacle to progress on meeting these demands.

Fortunately several organizations have devised ‘learning outcomes frameworks’ intended to support assessing and communicating student competencies within and across institutions. The Association of American Colleges and Universities, for instance, developed a set of Essential Learning Outcomes (AAC&U, 2007) expected of all undergraduate students. The AAC&U has also developed a set of meta-rubrics in the VALUE project (Valid Assessment of Learning in Undergraduate Education) to guide local assessment efforts of these outcomes (AAC&U, 2010). The Lumina Foundation has funded multiple ‘Tuning’ projects to define common expectations for student learning in specific disciplines such as history, chemistry, and education (e.g. Lumina, 2009; ICHE, 2009; TuningUSA, 2009; Brookins, 2012; Midwest Higher Education Commission, 2012). Tuning projects are led by faculty and are intended to create “a shared understanding among higher education’s stakeholders” (Lumina, 2009) of the competencies graduates should demonstrate at the conclusion of associate, bachelor’s, and master’s degrees. Another Lumina project resulted in the creation of the Degree Qualifications Profile, a framework for communicating expectations for student competencies in broad abilities and skills at the associate, bachelor’s, and master’s degree levels (Lumina, 2011a).

Today’s undergraduate student has numerous information sources to choose from in his or her quest to accomplish academic and life tasks. Library collections and services, assigned readings, and the open web, are all valid sources. Friends and family are within reach of a text or instant message, while faculty members are an email away. However, his or her college or university has invested in the campus library for the purpose of providing traditional (print) and electronic information resources, services, and facilities to support his or her information needs. The institution and its stakeholders expect a return on investment through evidence that student use of the library has contributed to the intended outcomes of college. The Library and Information Science (LIS) field lacks efficient tools for assessing and articulating library impact on student learning outcomes defined by faculty and valued by stakeholders (Poll and Payne,

2006; Oakleaf, 2010; Koltay & Li, 2010). This ‘academic library impact tools gap’ needs to be closed.

## **1.2 The ‘Understanding Library Impacts’ protocol**

### **1.2.1 A conceptual framework**

The Understanding Library Impacts (ULI) protocol is designed to fill the ‘academic library impact tools gap.’ A central challenge for assessment of any kind is selecting appropriate units of observation. The Understanding Library Impacts protocol focuses on the work tasks associated with ‘high-impact’ experiences within an undergraduate major. Students engaged in high-impact practices like writing-intensive coursework, capstone projects, and independent research projects work hard, interact with faculty and classmates in meaningful ways, and report higher learning gains than peers (Kuh, 2008). These are times when students are developing and demonstrating the competencies and abilities expected of college graduates, faculty expectations are at their highest, and student effort should be at its peak.

The decision to focus on work tasks associated with coursework in the academic major is derived from lessons from two research traditions: the literature of college impact and the literature of information needs, seeking, and use. The literature of college impact suggests that a portion of an undergraduate student’s learning gains can be attributed to levels of effort and engagement with best practices in education (Astin, 1991; Pascarella and Terenzini, 2005; Kuh, Pace, and Vesper 1997). Both the quantity and quality of a student’s effort influence learning gains. Students who work harder, in general, learn more (Pace, 1984). George Kuh defined student engagement as “the time and energy students devote to educationally sound activities inside and outside of the classroom” (2003, p. 25). Higher levels of engagement with institutional best practices in education have been shown to be related to higher learning gains in college (e.g. Carini, Kuh, and Klein, 2004) among certain populations. Several models suggest that personal factors such as nontraditional student status, residence, and full-time versus part-time enrollment

can influence levels of effort and engagement and integration with the academic and social life of the college (Weidman, 1989; Tinto, 1973). Furthermore, students' choice of academic major influences the type of academic work they complete, how they are taught, the behaviors for which they are rewarded, and ultimately what and how much they learn (e.g. Pascarella and Terenzini, 2005; Chatman, 2007). Academic library impact assessment tools must take into consideration methodological lessons from this literature. These points are elaborated on in sections 2.1, 2.2, and 3.1.

The literature of information needs, seeking, and use strongly suggests that an individual's decision to use or not use a given information resource, service, or facility is related to the context and purpose of use. Robert S. Taylor proposed the construct of the *Information Use Environment* (IUE) (1986, 1991) to describe the many influences on information use behaviors. The IUE encompassed sets of people, the setting in which they work, rules and resources which defined behaviors, and "assumptions made as to what constitutes a solution" (1991, p. 221). T.D. Wilson's person-in-context models of information use (1991, 1999) viewed information needs as secondary to physiological, affective, and cognitive needs. These needs and the information seeking behaviors taken to resolve them are influenced by the context of an individual's information need (school, work, etc.), intervening variables related to the individual, his or her role, or characteristics of sources, and issues related to risk and reward (Wilson, 1999, p. 257). Empirical work conducted by Paul Solomon (1997a, b, c) reinforces the importance of focusing information behavior research on work tasks instead of discrete information uses based on his finding that individuals in a work context do not think of their information behaviors as separate from their work tasks (1997b). Work by Katina Byström and Kalervo Jarvelin (Byström & Jarvelin, 1995; Byström, 2000), among others, suggests that the complexity of a task also drives information use decisions. Still others have found that potential reward or risk influence information seeking behaviors (e.g. Zach, 2005; Prabha et al., 2007). Models proposed by Constance Mellon (1986), Carol Kuhlthau (2004) and Brenda Dervin (1992) suggest personal



characteristics of anxiety and confidence can influence information seeking behaviors as well. This literature supports the creation of assessment tools which focus on work tasks carried out in the ‘real world’ instead of focusing on isolated information uses. The need to capture affective influences on information behaviors requires open-ended instruments which allow the voice of the user to emerge. I review this literature in section 2.5 and draw methodological conclusions in section 3.1.

The conceptual framework for the ULI protocol (Figure 1.1) is based on the assertion that undergraduate students make purposeful use of library and information resources, services, and facilities during high-impact academic activities such as upper-level and capstone courses within the academic major. During this coursework, students strive to achieve learning objectives defined and assessed by teaching faculty and valued by institutional and external stakeholders. Finally, library impact on student learning can be communicated through general education and discipline-specific ‘learning outcomes frameworks’ like the Tuning outcomes and the VALUE rubrics.

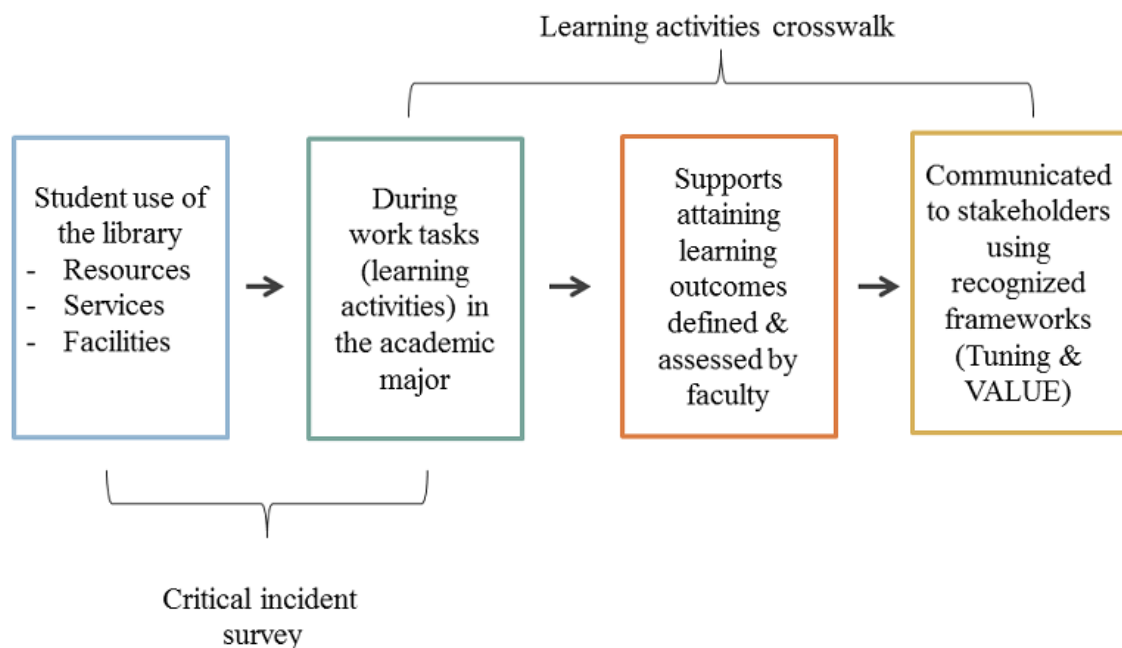


Figure 1.1 The Understanding Library Impacts Framework

### 1.2.2 Instruments

Two instruments support this framework: a learning activities crosswalk and a critical incident survey. Instrument design is guided by a definition of library impact provided by Caroline Wavell, Graeme Baxter, Ian Johnson, and Dorothy Williams:

“the overall effect of *outcomes* and *conditioning* factors resulting in a *change* in state, attitude or behaviour of an individual or group after engagement with the output and is expressed as ‘Did it make a difference?’” (2002, p. 7, emphasis in the original).

The library impact challenge, therefore, has two parts. First, assessment tools should generate credible connections between student use of the library’s resources, services, and facilities and institutional goals for undergraduate student outcomes. Second, assessment tools should identify the conditioning factors of library use which help or hinder student achievement. It is not enough to generate correlations between library use and student learning; Library managers must understand why students choose to use or choose not to use the library, how this use supports their academic performance, and where students have problems. Managers need answers to these ‘how’ and ‘why’ questions to support improvement processes and resource allocation. The ‘Learning Activities Crosswalk’ and the critical incident survey help address these challenges.

The ‘Learning Activities Crosswalk’ connects student use of the library to faculty-defined expectations for student learning within the academic major. The protocol as evaluated in this study also demonstrates connections between library use and frameworks for broad abilities expected of undergraduates as expressed in four VALUE rubrics (AAC&U, 2010) and discipline-specific learning outcomes for graduates in History as defined in ‘Tuning’ projects conducted in Utah (TuningUSA, 2009) and Indiana (ICHE, 2010). The design for the crosswalk is discussed in chapter 5.

The protocol uses the Critical Incident Technique (CIT) (Flanagan, 1954; Butterfield, et. al., 2005; Kain, 2004) in survey form to explore students’ use of the library during high-impact coursework. The CIT is a flexible research method which helps generate a general understanding of the factors that contribute to success or failure in a given activity. The method relies on self-

reported data as participants are asked to think back to a memorable time when they were engaged in the activity in question. Questions and probes identify factors which influenced task success or failure. Analysis of reports from multiple participants yields a general understanding of the factors which influence success and the obstacles which impede it. The CIT is discussed in detail in section 3.2 and the CIT instrument used in this study is reviewed in chapters 4 and 5 and reproduced in Appendix G.

### **1.3 Purpose and delimitations**

The purpose of this methodological study is to evaluate the ULI framework and the ULI instruments in the context of undergraduate education in the discipline of history. The instruments were designed to investigate library impact on student learning outcomes expectations associated with upper-level and capstone undergraduate coursework in history. The framework is intended to be transferable to other disciplines, but the instruments would need to be altered accordingly. For instance, the protocol could be used to assess library impact on student learning in the domain of psychology, but the instruments would need to be tuned to match the learning outcomes expectations appropriate to that discipline. Further, the instruments would need to be adjusted to account for the deliverables and learning activities associated with psychology coursework, as well as the types of information services used during those activities. The findings of the current study are compatible with several models of information seeking behavior and consistent with findings from other studies of undergraduate students' information use. Therefore, these findings may be transferable, but it is not my intent to suggest these findings are generalizable beyond the study population.

### **1.4 Design and research questions**

The study was conducted with a population of undergraduate students enrolled in upper-level and capstone history courses at six U.S. colleges and universities, hereafter referred to as study sites. Two sites participated in phase one of the study, conducted during the spring of

2011; and four study sites participated in phase 2 during the summer and fall of 2011. A 'Learning Activities Crosswalk' for the discipline of history was constructed in phase 1 and tested in phase 2. Undergraduate students from all six sites completed the ULI survey, providing 127 critical incidents for analysis. Results from studies conducted during spring 2011 and fall 2011 are reported in chapters 6 and 7. This study was preceded by two interview-based studies conducted in 2005 and 2006 (Rodriguez, 2006, 2007). Summaries from the interview-based studies can be found in chapter 4.

The ULI framework is based on the assertion that undergraduate students' information behaviors are influenced by the norms of the academic discipline associated with a student's choice of academic major. Therefore, assessing the impact of library and information use on undergraduate student learning must take into consideration the nature and complexity of work tasks associated with the discipline and the pedagogical emphases reinforced by teaching faculty. Yet these influences are also expected to be mediated by the availability of needed resources, students' awareness of those resources, student effort, and students' personal characteristics. The first three research questions are intended to test these assumptions and investigate the value of the protocol for understanding the information behaviors of undergraduates enrolled in upper-level and capstone courses in history. Findings are compared with results from other studies of undergraduates' information behaviors to assess theoretical agreement of the results and affirm the choice of the academic work task in the major as the unit of analysis. Questions four through eight were used to evaluate the instruments themselves and improve their value to libraries.

- Research question #1: What library resources, services, facilities, and equipment (hereafter types of library use) do students in this study use to complete their projects?
- Research question #2: Does the choice of library use type vary by academic product (e.g. research paper vs. senior thesis), by stage of the research process, by demographic categories, or by levels of academic effort?

- Research question #3: What aspects of library use are found to help or hinder student efforts to achieve learning objectives associated with their academic work?
- Research question #4: A premise of the ULI framework is that focusing on library use during high-impact coursework in the academic major will be an effective approach for demonstrating library impact on student learning. Does the ‘Learning Activities Crosswalk’ provide support for this assertion?
- Research question #5: Are the CIT survey content categories and item response categories representative of respondents’ experiences using library related resources, services, and facilities in the course of their academic work?
- Research question #6: Do open-ended questions in the CIT survey gather information about library impact that complement and augment data gathered in other parts of the instrument?
- Research question #7: Do students’ reports of their behaviors regarding academic challenge and effort expended in learning activities as measured using external scales of student effort correlate with responses in other parts of the survey? If not, can retaining these external scales in future projects be justified?
- Research question # 8: Do students recall incidents from one semester or one year ago as clearly as they recall recent incidents?

### **1.5 Significance of the current study**

The *Understanding Library Impacts* protocol makes a unique contribution to librarianship at a time when the field needs methods for demonstrating its value. The protocol connects library use to student learning outcomes defined by teaching faculty and of interest to stakeholders in higher education. The protocol goes beyond use measures to demonstrate how library and information services helped (or hindered) student achievement. This evidence is intended to support internal improvement efforts or reallocation of resources. Qualitative data

gathered in ULI studies can inform other measures, reveal new themes, and elicit rich user stories of library impact to support library advocacy efforts. The use of externally valid scales of student effort and links to the VALUE rubrics and Tuning framework for student learning outcomes increase the credibility of ULI results in the wider higher education community. The ULI protocol features a flexible design that may be adaptable for use in multiple disciplines (e.g. social sciences, natural sciences, humanities) and in a variety of post-secondary settings.

The protocol contributes to the user-oriented information needs, seeking, and use (INSU) literature as well. The ULI protocol features an original design grounded in theories and methods from the literatures of college impact and INSU. The protocol uses the Critical Incident Technique (CIT) for exploring the value and impact of information services, adding to the strong and growing literature using this research method. The ULI contributes to the INSU literature through its use of both quantitative and qualitative methods and the use of multiple methods for testing the reliability and validity of study results. Finally, results from ULI projects will accumulate over time in the ULI database, creating a rich repository for studying the impact of library and information services.

## **2. Literature Review**

### **2.1 Evidence of student learning in college**

#### **2.1.1 Stakeholder demands for evidence of value for money**

The benefits of a college degree to individuals and to society have long gone unquestioned. In 1999, the average annual earnings of U.S. workers with an undergraduate college degree were projected to be 1.8 times the earnings of an individual with a high school education. Over their lifetimes college graduates were projected to earn \$2.1 million, compared with \$1.2 million for high school graduates (Day & Newburger, 2002). Numerous societal benefits are also attributed to college attendance including increased tendencies toward civic activities like voting and community service (Pascarella & Terenzini, 2005). Likewise, college graduates enjoy a better quality of life as measured by indicators such as longevity and health, dedication to child development activities, short and long-term financial investments, and proportion of income spent on enriching activities like reading and cultural affairs. Furthermore, college attendance has intergenerational benefits as the children of college graduates demonstrate higher gains themselves in high school and college in knowledge acquisition and academic performance than do children of non-college graduates. Children of college graduates are five times more likely to earn a bachelor's degree than first generation college students (Pascarella & Terenzini, 2005, p. 586-591).

Yet, as the second decade of the 21<sup>st</sup> century begins, three concerns have emerged among stakeholders in U.S. higher education: levels of participation in higher education, college affordability, and questions about the quality of a college degree. The U.S. currently ranks second among nations in the proportion of its population between the ages of 35-64 (39%) to

have completed at least an Associates' degrees. As of 2011, 41% of young adults (25-34) in the United States had completed at least an associate degree, but this is only good enough to place the U.S. twelfth among OECD nations (OECD, 2011). And the Lumina Foundation projects that the U.S. will face a shortage of 23 million college graduates in the year 2025 (Lumina, 2011b). The financial burden of attending college remains high as the costs of college continue to outpace median family income and standard cost of living indices. From 2000 to 2009, published tuition and fees at public 4-year colleges and universities increased at an annual average of 4.9% according to the College Board (College Board, 2009) outstripping 2.8% annual average increases in the Consumer Price Index over the same periods (U.S. Department of Labor, 2009).

The outcomes of higher education are increasingly called into question. Nationally only 59% of college students complete their 4 year degree within six years and there are significant discrepancies in completion rates between states and among minorities (Measuring Up, 2008 p. 7). There is also cause for concern regarding the competencies of college graduates. The National Assessment of Adult Literacy found forty three percent of the 19,000 adults surveyed performed at basic and below basic levels of prose literacy (Kutner, et al., 2006). Most troubling perhaps is that 45% of adults performing at these levels were college graduates. The National Survey of America's College Students (NSACS) assessed literacy levels of over 1,800 students nearing the completion of their 2 and 4 year degrees in 2003 (American Institutes for Research, 2006) and found on average 20% of these students scored in the basic or below basic levels of quantitative literacy and fewer than 50% were proficient in the document literacies (p.19).

Recent research using the Collegiate Learning Assessment raises new alarms about what students are learning in college. Using a broad sample of over 2,300 students at 24 institutions in a longitudinal design the study *Academically Adrift* used the Collegiate Learning Assessment to assess students' critical thinking, reasoning, and communication skills using a discipline-agnostic performance test. Approximately 45% of students showed no gains in performance over the first two years of college (Arum and Roksa, 2011). Employers are taking notice as well. In a 2006



Conference Board study, Jill Casner-Lotto and Mary Wright Brenner (2006) surveyed 423 management and human resources professionals in American corporations to study employer perceptions of workforce readiness. While perceptions of preparedness for 4-year graduates exceeded that of the other groups, 27.8% of respondents reported 4-year graduates were deficient in written communications and leadership skills (p. 41). In this context stakeholders and customers of higher education are demanding accountability from colleges and universities in the form of evidence of student learning.

### **2.1.2 Defining accountability**

Peter Ewell, Vice President at the National Center for Higher Education Management Systems (NCHEMS), defines *accountability in higher education* as

“[t]he constellation of mechanisms that colleges and universities employ to demonstrate to their external publics that they are responsible stewards of the resources invested in them, that they are soundly managed, and that they produce the kinds of results that they are expected to produce” (Ewell, 2005, p. 104).

Ewell’s definition implies that institutions will be well-run, will deliver expected results, and will exhibit transparency in communicating with their stakeholders regarding this performance. Kevin Carey (2007) states that it is not enough to gather information regarding institutional effectiveness but “real accountability systems push institutions to *act* on that information in a manner that is designed to change what they do in order to make them more successful than they would otherwise be” (p. 24). Carey’s definition implies that tools for accountability should communicate evidence students are learning in college and generate results which can be used to improve student performance.

In this section of the review, I assess the viability of two methods for demonstrating evidence of student learning in college: assessment gains in broad abilities and skills and surveys of student experience and assessment of student work. I close this section with a review of approaches for defining discipline-specific learning competencies and the potential of qualifications frameworks for communicating student competencies.

### **2.1.3 Assessing gains in broad abilities and skills**

Broad abilities are those skills and abilities that college graduates in all disciplines are expected to master. The Association of American Colleges and Universities (AAC&U) began work in 2005 on the program entitled Liberal Education and America's Promise (LEAP): Excellence for Everyone as a Nation Goes to College. Introduced in a report from the National Leadership Council (NLC) (AAC&U, 2007), the project's goals are to define essential learning outcomes needed by 21<sup>st</sup> century college graduates, create valid methods for measuring the degree to which students achieve those outcomes, and develop methods for communicating that achievement to stakeholders. The essential learning outcomes are liberal education outcomes that are applicable in all professions, transcend disciplines, and are essential for achievement in the workforce (Table 2.1). The authors note that employers do not want narrowly trained staff, but graduates "who are broadly prepared and who also possess the analytical and practical skills that are essential both for innovation and for organizational effectiveness (p. 16)." In the view of the NLC, these outcomes can only be achieved by focusing undergraduate learning on integrative learning that addresses the essential learning outcomes throughout the curriculum and in all disciplines.

The Spellings commission's report called for higher education to make available to the public "value-added measurements that indicate how students' skills have improved over time" in ways that enable "meaningful interstate comparison of student learning" (U.S. Department of Education, 2006a, p. 24). While many of the Spelling's report's recommendations have not come to fruition, the report has brought the issue of assessing and reporting student learning outcomes to the fore. Twenty-one states now have a state statute or policy on the assessment of higher education learning outcomes (Zis, Broeke, and Ewell, 2010, p. 11). While most of these states leave it to institutions to determine which assessments to use, several have begun to require nationally normed, standardized assessments.

Most early efforts at standardized assessment in U.S. higher education assessed students' mastery of declarative knowledge (Shavelson, 2007). The Graduate Record Exam General Aptitude Test launched by ETS in 1949 was the first instrument designed to assess students' verbal and reasoning skills (Shavelson, 2007). Richard Shavelson reports that ETS experimented in the 1960s and 1970s with constructed response methods to assess "communication skills, analytic thinking, synthesizing ability, and social/cultural awareness" (p. 10). For a time, the ACT's College Outcomes Measures Project (COMP) also experimented with open-ended assessments of performance such as real-world content and multiple choice, short answer, and essay questions to assess three process skills "communicating, solving problems, and clarifying values" (p. 11).

Table 1.1 Essential Learning Outcomes identified by the AAC&U LEAP Project

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Knowledge of Human Cultures and the Physical and Natural World
Acquired through study in the sciences and mathematics, social sciences, humanities, histories, languages, and the arts
Intellectual and Practical Skills, including
Inquiry and analysis
Critical and creative thinking
Written and oral communication
Quantitative literacy
Information literacy
Teamwork and problem solving
Personal and Social Responsibility, including
Civic knowledge and engagement—local and global
Intercultural knowledge and competence
Ethical reasoning and action
Foundations and skills for lifelong learning
Integrative and Applied Learning, including
Synthesis and advanced accomplishment across general and specialized studies

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Source: Adapted from American Association of Colleges and Universities, 2007.

### **2.1.3.1 The Voluntary System of Accountability**

The Voluntary System of Accountability (VSA) was developed by the National Association of State Universities and Land-Grant Colleges (NASULGC) and the American Association of State Colleges and Universities (NASULGC, 2010) specifically to meet demands for increased transparency and accountability in higher education. Participating VSA institutions

agree to use standard assessments and produce a publicly available College Portrait which provides data in three areas: 1) consumer information, 2) student perceptions of the college experience, and 3) student learning outcomes (NASULGC, 2010; Miller, 2008). Value-added models of assessing gain in cognitive abilities due to attending college are central to the VSA. Value-added models assert that students enter college with a varying degree of talents and abilities as evidenced by pre-college scores on standardized tests like the SAT and the ACT, differences that must be controlled when computing gains in learning. A common statistical method of controlling for these differences is regression of post-college test scores with pre-college test scores which “removes the relationship between pre-test and post-test from the post-test score” (Pike 2006a, p.5). The remaining variance is attributed to institutional effectiveness. Institutions using the VSA to report learning gains in this manner are expected to first predict expected scores on one of the three valid instruments based on students’ pre-college scores on the SAT or ACT. Actual scores on the chosen assessment can be compared with expected scores to compute gain *or loss* during college. Institutions are expected to report student learning outcome performance in one of five categories: *Well Above Expected*, *Above Expected*, *At Expected*, *Below Expected*, and *Well Below Expected* (National Association of State Universities and Land-Grant Colleges, 2010).

The Collegiate Learning Assessment (CLA), developed by the Council for Aid to Education differs significantly from the selected-response, multiple choice Collegiate Assessment of Academic Proficiency (CAAP) (ACT, 2010) and ETS Proficiency Profile exams (Council for Aid to Education, 2010; Klein, et al., 2005). The CLA is based on Richard Shavelson and Leta Huang’s Framework (2003) of Cognitive Outcomes which presents a hierarchy of cognitive outcomes ranging from domain knowledge, broad abilities, intelligence, and general ability and appropriate tools for assessing these outcomes. Shavelson and Huang assert that the acquisition of broad abilities, at least in college, is inextricably bound to the domain or subject matter context in which they are practiced. They continue,

“Only through extensive engagement, practice, and feedback within a particular subject area does learned knowledge become sufficiently decontextualized to enable it to transfer to the realm of enhanced reasoning, problem-solving, and decision-making skills exercised in broader or multiple domains.” (2003, p. 13).

As currently configured, the CLA features a set of performance tasks. Derived from real-world scenarios, performance tasks provide test-takers with a problem and a set of documents, some relevant to solving the problem and some not. Students use the documents to recommend a solution to the problem and write a memorandum explaining the solution (Shavelson, 2007, p. 31). The CLA is administered to a sample of students at the end of their freshman year and again at the end of their senior year. Shavelson argues that the CLA offers several advantages over other assessments. The CLA includes open-ended tasks based on real world problems to assess critical thinking, reasoning, and written communication skills expected of graduates in any academic major. Just as computer technology made large scale multiple-choice tests feasible through automated scoring in the 1940s, internet delivery and natural language processing software simplifies CLA administration and scoring. The use of sampling reduces the test burden on individual students, yet still allows comparing student results by institution and academic program. Scores can also be compared to other measures such as SAT or ACT scores to assess gain during college (Shavelson, 2007, p. 32).

Several researchers are critical of using standardized test results to compare institutional performance. Trudy Banta (2008) notes that scores on standardized tests like the CLA are highly correlated with pre-college test scores such as the SAT. This means that almost 80% of the variation in performance among institutions can be explained by entry level scores (Pike, 2006a). The remaining 20% of the variation is due to other factors including sampling and testing error, demographics, variation by college major, and changes due to normal maturation. Banta estimates that this means one to two percent of the variation can be explained by institutional impact (Banta, 2008, p.3). Gary Pike raises specific concerns about the use of residual scores as evidence of gain on the College Outcome Measures Program (COMP) Objective Test (1992).

Residual scores reflect the deviation of the actual scores from the scores predicted by the model. These scores represent the “portion of the post-test score that is not predicted by the model” (p. 79) – in other words, student gains beyond what was predicted by their freshman score. Pike reported that only 17% of the variance in the scores could be attributed to true differences between the groups (p.79).

The CLA uses cross-sectional sampling to recruit students to take the exam. Unlike a longitudinal design, different sets of students take the CLA freshman year and senior year. Victor Borden and John Young (2008) question the validity of drawing conclusions from cross-sectional samples considering the rates of attrition seen in U.S. institutions of higher education. Borden and Young suggest that students who persist through senior year will be more highly motivated and identify more with the institution than those who drop out. That is, the cohorts are no longer comparable raising doubts about conclusions that increases in scores can be attributed solely to “the impact of instruction” (Borden and Young, 28). Non-selective institutions will also be at a disadvantage. The student bodies at non-selective institutions present a wider range of preparedness and higher levels of attrition than found at selective institutions, resulting in greater heterogeneity between freshman and senior samples (Garcia, 2007) and making comparisons between institutions of these types meaningless.

#### **2.1.3.2 Authentic Assessment: The AAC&U VALUE Rubrics**

The AAC&U VALUE project (Valid Assessment of Learning in Undergraduate Education) is an AAC&U effort to create authentic methods of assessing student achievement of the LEAP Essential Learning Outcomes and consists of two parts: promotion of electronic portfolios (e-portfolios) of student work and rubrics that can support formative and summative assessment. E-portfolios are digital repositories for examples of a student’s academic work collected through his or her academic career. The e-portfolio can support ongoing individual assessment during college and follow a student from institution to institution. Samples of e-portfolios can be assessed to determine if groups of students are performing at expected levels.

The AAC&U devised the VALUE (Valid Assessment of Learning in Undergraduate Education) rubrics for assessing student e-portfolios or other academic work in each of the fifteen LEAP essential learning outcomes (Association of American Colleges and Universities, 2010). Faculty and curriculum specialists participated in workshops and other venues to create the fifteen rubrics (see Table 2.2) which identify abilities associated with each outcome and defines benchmark, milestone, and capstone performance expectations. For instance, the problem solving rubric defines six progressively complex tasks (defining the problem, identifying strategies, proposing solutions, evaluating potential solutions, implement solution, and evaluate outcome) and performance expectations from benchmark through capstone levels. The rubrics are intended to be localized for use at various campuses and by different disciplines for formative and summative purposes. Demonstrating accountability with the rubrics might be performed by first assessing a sample of student work and communicating performance as percentages. For instance, an institution could report that 90% of graduating seniors met capstone criteria in critical and creative thinking (Rhodes, 2008). While the funding for the VALUE project was depleted by 2010, the AAC&U continues to promote the essential learning outcomes and the VALUE rubrics in several of its projects. Ashley Finley (2012) reported early findings from reliability testing of the critical thinking VALUE rubric in February, 2012. Forty faculty members convened to assess student work using the rubric and their scores were compared. The multi-rater kappa statistic for ‘perfect’ agreement was .29 and kappa for approximate agreement was .52. Finley recognized further work was needed, but the AAC&U reported encouragement by these findings.

Table 2.2 AAC&U VALUE rubrics

Civic engagement	Inquiry and analysis	Problem Solving
Creative thinking	Integrative thinking	Quantitative literacy
Critical thinking	Intercultural knowledge	Reading
Ethical reasoning	Lifelong Learning	Teamwork
Information literacy	Oral Communication	Written communication

Adapted from Association of American Colleges and Universities, 2010.

### **2.1.4 Surveys of student experience**

Surveys of student experience have long been used to support studies of institutional effectiveness and to support planning. Surveys of the college experience have also been used as tools of accountability.

#### **2.1.4.1 College Student Experiences Questionnaire (CSEQ)**

C. Robert Pace developed the College Student Experiences Questionnaire (CSEQ) as a means of measuring the quantity and quality of effort that students expended in their college coursework (Pace, 1984a, 1984b; Trustees of the University of Indiana Bloomington, 2012a, 1998). Fourteen categories of items make up the CSEQ, covering student use of facilities such as the library, classroom, gymnasiums, student union, and labs as well as their participation in activities such as interacting with faculty, writing, and extracurricular activities. Students answer questions in each category, indicating how frequently they participate in each activity using a 4 point scale: never, occasionally, often, and very often. The effort required to complete activities increases with each question answered in each category. For instance, the first question in the Computer and Information Technology section of the survey asks how frequently the student ‘used a computer or word processor to prepare a paper reports or papers.’ The last question in this section ostensibly requires more effort: ‘developing a web page or presentation.’ The survey also includes questions regarding student perceptions of the degree to which the college environment emphasized student development in a variety of characteristics, perceptions of students’ relationships with peers, staff, and faculty at their institution, and demographic data. The survey closes with an estimate of gains on important cognitive, social, and personal measures during college (Pace, 1990, p. 9 – 19). Subject to extensive pretesting and validation, the CSEQ has been in continuous use since 1979.

In 1990, Pace published *The Undergraduates*, based on over 25,000 responses to the survey since its inception. Pace concluded in this study that except for the selective liberal arts colleges, there is very little variation in student experience by institutional type, but wide



diversity among institutions within each type. Further, the instrument revealed that students who exert more effort to produce high quality work and are more involved in the life of the university report higher gains than their peers (Pace, 1990, p.115 – 133). These findings have generated a deep interest in identifying effective practices of education that support student engagement. Since its creation, numerous studies have been conducted using CSEQ data on the topics of the college environment, the impact of student involvement on learning, impact of work and off-campus housing on levels of engagement and perceived gains, and on the experiences of certain classes of students such as first-generation students and athletes, and the experiences of students at specific types of institutions, such as liberal arts colleges (Trustees of the University of Indiana Bloomington, 2012a).

#### **2.1.4.2 National Survey of Student Engagement**

The National Survey of Student Engagement (NSSE) was the product of a Pew Charitable Trusts funded initiative to improve undergraduate education in the 1990s. The Trusts commissioned the National Center for Higher Education Management Systems (NCHMS) to design and validate the instrument. Launched in 2000, the NSSE is a survey instrument delivered to first and fourth-year students to explore student college experiences and perceptions. The instrument (National Survey of Student Engagement, 2012) underwent extensive testing with focus groups and cognitive interviews to refine the survey questions (Kuh, 2003; Ouimet et al., 2004) and several rounds of pilot tests at 72 institutions.

NCHMS drew upon the latest research in higher education quality and only included items on the survey if “there was a clear empirical case in the literature on college student learning and development that the factor represented could be associated with learning gains” and borrowed heavily from the CSEQ (Ewell, 2010, p. 87). Five Benchmarks of Effective (National Survey of Student Engagement, 2010a) form the basis of the survey. The first is the “level of academic challenge” as measured by time spent performing activities like reading and writing that are known to correlate with student learning. Students are asked to comment on their

experiences with “active and collaborative learning” activities such as group projects. Students also respond to questions about activities associated with “student-faculty” interaction including in-class and out-of-class contact with professors. Engagement in “enriching activities” including internships, community service, capstone and writing-intensive coursework, and study abroad is addressed in other questions. First-year students are asked whether they have done or plan to participate in these activities. Comments are elicited on how supportive the student found the campus environment including the perceived availability of academic support services and the degree to which the student took advantage of them. Finally, students are asked to estimate the degree to which their gains in knowledge, skills, and personal growth can be attributed to their college experience and to comment on their overall satisfaction with the institution. The conceptual grounding for the survey’s design is credited for lending the survey legitimacy in the higher education accountability community (Kuh, 2003).

The NSSE is administered on an annual basis. Over 600 institutions participated in 2010 and a cumulative 2.3 million student responses have been received since 2000. The results are reported nationally by Indiana University (e.g. National Survey of Student Engagement, 2010c). Individual institutions receive peer-comparison reports and a dataset of results for the institution for further analysis.

Table 2.3 Benchmarks of Effective Educational Practice

Level of Academic Challenge	Measures time spent in an average week on various activities such as writing papers, reading, and preparing for class and perceptions of the emphasis placed on higher order learning activities
Active and Collaborative Learning	Measures the degree to which students worked with other students, discussed topics in class or outside of class with students and faculty, and participated in community activities

Student-Faculty Interaction	Measures the degree to which students interact with faculty including discussion of grades or performance, discussing issues outside of class, participating in research projects with faculty, and discussing career plans with faculty
Supportive Campus Environment	Measures the degree to which the campus environment helps students cope with academic, personal, and social challenges and the quality of relationships with members of the campus community.
Enriching Educational Experiences	Measures the degree to which students participate in complementary activities outside the classroom that reinforce the curriculum including talking with students of different backgrounds and participation in supplementary activities such as community service, internships, study abroad, independent studies, and culminating senior experiences.

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Adapted from National Survey of Student Engagement, 2010a

#### **2.1.4.3 The Deep Learning Scale**

NSSE data have been used to identify high performing institutions for follow up study. A project called Documenting Effective Educational Practices (DEEP) involved a two-year study of twenty institutions with higher than expected graduation rates and higher than predicted results on the NSSE (Kuh, et al., 2005). The DEEP researchers sought to identify best practices at these outperforming institutions and to determine if those practices can be replicated at other institutions. Several factors stood out among the DEEP institutions including an institution-wide focus on improvement and student engagement, investing financial resources into efforts that are known to support student learning, and decision-making informed by data. Characteristics shared by these institutions included strong leadership balanced with a collaborative focus on student

learning and a philosophy of improvement and change that is embedded in the campus culture (Kuh, et al. 2005).

Thomas F. Nelson Laird, Rick Shoup, and George Kuh (2006) identified 12 questions from the College Report which make up the Deep Learning Scale (Appendix A). Deep learning behaviors are those in which students possess a “personal commitment to focus on the substance and meaning of material (p. 4)” as contrasted with surface learning in which the student’s goal is to get by with rote learning and memorization for the purposes of avoiding failure. Nelson Laird, Shoup, and Kuh (2006) ran exploratory and confirmatory factor analyses of responses to a battery of questions from the 2004 and 2005 NSSE survey regarding three deep learning behaviors: higher order learning, integrative learning, and reflective learning. Their factor analysis found 3 item groupings that explained 60% of the variance in the model. They also found a high level of correlation among the factors, suggesting a second order factor was in play. They termed this underlying factor the “Deep learning scale” (p. 13-14). These results were also found in a confirmatory study using results of the 2004 administration of NSSE. Another study conducted by the same team found that students who reported participating in deep learning approaches were more likely to report gains in college (Nelson Laird, et al. 2008).

Gary Pike (2006b) proposed the use of NSSE scalelets, or “clusters of highly related survey questions representing the experiences of a group of students” (p. 178). Using 50 questions, Pike defined 12 scalelets focusing on aspects of the college experience such as ‘course challenge,’ ‘writing,’ and ‘support for success’ and found each scalelet produced reliable generalizability coefficients with samples as small as 25 to 50 students. Pike suggests scalelets drawn from NSSE could be used to support disaggregated analysis at the program level for formative purposes (Pike, 2006b). The practical implication of the Deep Learning Scale and the scalelets project is that NSSE results seem to have facility for spotting high or low functioning programs within an institution to serve as exemplars or be singled out for remediation.

#### **2.1.4.4 NSSE as an instrument of accountability**

While the NSSE seems well-suited for supporting internal improvements within an institution, it has emerged as a tool for communicating accountability as well. This should not be a surprise since the project was launched in part as a response to the prevalence of reputation-based rankings publications such as those published by the U.S. News and World Report. NSSE results are also expressly prepared for release to the public since its inception through the annual report and by individual campuses and states. The explicit use of NSSE results as a tool of accountability is not without its controversy.

Concerns about the sensitivity of NSSE for detecting differences between institutions are among the most common criticisms. NSSE itself reports that comparing institutions based on levels of engagement is deceiving since in 2008 “for almost all of the benchmarks, less than 10% of the total variation in effective educational practices is attributable to institution” (National Survey of Student Engagement, 2008, p. 7) and that readers of the NSSE reports should look within institutions for variation by discipline, student characteristics, or enrollment type to support internal improvements (Kuh, 2007).

Other critics focus on the fact that gains estimates are self-reported, not measured objectively. Several reports suggest that the responses on the benchmark questions correlated with self-reported gains (e.g. Nelson Laird, et al. 2008), but connecting engagement results to objective measures of learning are a separate challenge indeed. As Ernest Pascarella, Tricia Seifert, and Charles Blaich (2009), point out, students are differentially “receptive to the effects of postsecondary education” (p. 8). Relying on self-reports about student gains in the absence of controls for pre-college measures for this predisposition challenges the internal validity of the instrument. Using data gathered during the Wabash National Study, 2006-2009 (Wabash National Study, 2009a, 2009b), Pascarella, Seifert, and Blaich investigated this issue in a longitudinal design with 3,801 students from 19 institutions during the 2006-2007 academic year (Pascarella, Seifert, and Blaich, 2009). In the fall of 2006, students completed a battery of

objective assessments to establish baseline measures of cognitive and personal development and completed a survey of demographic characteristics and precollege traits and experiences. In the spring of 2007, the same students completed the NSSE College Student Report and repeated the objective assessments. They found statistically significant, but modest evidence that the NSSE benchmarks and Deep Learning Scale were valid predictors of gains in “effective reasoning and problem solving, well-being, inclination to inquire and lifelong learning, intercultural effectiveness, leadership, moral character, and integration of learning” (p. 30-31). Specifically they found that student responses to questions regarding teaching quality and interactions with faculty, academic challenge, diversity experiences, and the Deep Learning Scale were valid but modest predictors of first year gains.

A study conducted at Georgia Tech University using NSSE results from 2005 (Gordon, J., Ludlum, J., Hoey, J.J., 2008) explored the convergent validity of the NSSE benchmark scales with less than impressive results. The authors define convergent validity as “the degree to which an instrument and the interpretations based on that data agree with other sources of information (p. 21).” None of the Benchmarks was able to explain more than 1% of the variance in freshman to sophomore year retention and contributions to GPA, job attainment, and plans for further education were minimal (p.26). Pike’s scalelets were also tested and found to be modestly better at predicting outcomes but explained less than 2% of GPA and .5% of the variance in retention (p. 31-32). Finally, they regressed each of the 41 NSSE items individually and found that only 15 were significant predictors of the outcomes of interest in the 2005 data. However, the models failed to predict outcomes when used with NSSE data gathered at Georgia Tech in 2003. Acknowledging that these results cannot be generalized beyond their campus, the authors suggest that because of the limited capability of the NSSE benchmarks to predict outcomes, they are not reliable indicators of institutional quality and should not be used for comparing institutions with one another (p. 38).

A study by Robert Carini, George Kuh, and Stephen Klein (2004) used critical thinking and performance tests developed by the RAND Corporation, GRE essay prompts, and college reported GPA measures, each standardized to an SAT-scale to assess the relationship between levels of engagement and student performance. They controlled for pre-college SAT scores, which explained between .48 and .55 of the variance in the RAND and GRE scores. Small but statistically significant impacts on RAND scores were observed between level of academic challenge, supportive campus environment, reading and writing, and institutional emphases on good educational practices (partial correlations from .09 to .11). Level of academic challenge and reading and writing were correlated with higher GRE scores (p. 11-12). They also found low-ability students with pre-college SAT scores below 1030 demonstrated higher gains attributable to levels of engagement than high-ability students (p.16). When comparing institutions, they found high-performing institutions were better able to convert engagement into improved performance. However levels of engagement only accounted for a small proportion of the overall gains.

#### **2.1.5 Discipline specific knowledge and abilities**

The undergraduate curriculum is largely structured around general education courses (GECs) and coursework toward the academic major. The general education curriculum is intended to support acquisition of broad abilities and skills. During coursework in the academic major students hone these skills through a specialized focus in terms of subject matter, methods, and types of academic work. Discipline-specific learning outcomes are of interest to employers seeking a skilled and informed workforce appropriate to their domain of business, to graduate schools seeking new students, and to individuals seeking a path toward a career or continued schooling. This section of the review uses the undergraduate history curriculum to introduce methods for defining and setting expectations for student learning in the disciplines.

### **2.1.5.1 About History**

The discipline of history is broadly defined as the study of the past (Gonzales & Wagenaar, 2005, p. 98) and is a popular major for undergraduates in Europe and the United States. As Michael J. Galgano writes, history entails the “systematic reconstruction of human actions and events, ordered chronologically or topically and firmly rooted in the evidence” (2007). The study of history is not about reporting the past as a series of events but involves examining and interpreting evidence to explain both how and why certain events transpired (Katz and Grossman, 2008).

Historians derive much of their evidence from primary sources and documents produced by actors in the historical events and time periods under study. Stanley Katz and James Grossman note that students are taught the methods of history so as to gain “the capacity to sift through masses of information and determine what matters, and a capacity for closely reading various texts” (Katz and Grossman, 2008 p. 2). In recent years, internet technologies and mass digitization has ‘democratized’ access to primary sources for historians and students alike (Galgano, 2007). Historians also use artifacts, oral histories, recordings, and images as sources of evidence.

According to Galgano, Katz, and Grossman, the typical undergraduate history curriculum begins with foundation courses in which students are instructed in the basic methods of the discipline including locating information in print and online resources, using standard reference collections, and gaining familiarity with the secondary literature. In research methods courses students build on this foundation to acquire competencies in analyzing and interpreting secondary and primary literature, using discipline appropriate citation formats, and framing historical questions based on evidence. The history major typically culminates in upper-level seminars and capstone courses in which students demonstrate the skills and abilities acquired during their undergraduate career. Katz and Grossman conducted a survey of history departments at U.S. universities and colleges and found 96% of the institutions in their sample required research



methods courses, upper level seminars, or theses (p. 27). While the history ‘research paper’ and an ‘oral report or defense’ remain staples of the history curriculum, students are also encouraged to present their findings using alternate means such as posters, exhibits, or multimedia presentations (Galgano, 2007).

#### **2.1.5.2 Qualifications frameworks and setting expectations for discipline-specific learning**

In 1999, education ministers from 29 European countries convened in Bologna, Italy to sign a declaration of commitment to align European higher education systems on several levels. The initial meeting identified several areas of action including the “creation of comparable degrees,” the creation of two cycles of higher education (undergraduate and graduate), creating a system of credits to manage credentials, encouraging educational mobility, and developing a common methodology of quality assurance (Gaston, 2010, p. 3). Cliff Adelman describes the Bologna Process as an ambitious reform of higher education in Europe intended to “define common reference points and operating procedures to create a European Higher Education Area” (Adelman, 2009, p. viii). The purpose of this initiative is to “bring down educational borders” to create a “‘zone of mutual trust’ that permits recognition of credentials across borders and significant international mobility for their students” (p. viii).

In 2003, European education ministers created three levels of ‘qualifications frameworks’ to govern European Higher Education. The ‘transnational’ Framework for Qualifications of the European Higher Education Area (QFEHEA) essentially defines expectations of student preparedness for a first cycle degree (bachelor’s degree), a second cycle degree (a master’s degree), and a doctoral degree. Cliff Adelman notes that at the QFEHEA level learning outcomes constructs are defined for each cycle in five areas. The performance expectations at each cycle are ‘ratcheted up’ in complexity.

Table 2.4 QFEHEA performance expectations at each degree cycle

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The reference points of “knowledge and understanding”; The contexts and modes of application of knowledge and understanding; Fluency in the use of increasingly complex data and information; Breadth and depth of topics communicated, along with range of audience for that communication; and Degree of autonomy gained for subsequent learning.
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Source: Adelman, 2009, p. 27.

National qualifications frameworks are intended to be local adaptations of the QFEHEA guidelines. National frameworks are in various stages of implementation and nations have taken a variety of approaches to implement them (Adelman, 2009, p. 26). The third level includes discipline-specific qualifications frameworks intended to “help the disciplines articulate outlines and benchmarks for subject specific knowledge and generic skills and competencies expected at the summative moment of each level of study” (p. 26). The qualifications frameworks, when complete, will support authentic credentialing throughout participating nations so that a first cycle degree from one country is ‘understandable’ in another. Individual students stand to benefit as public “posting of degree requirements in terms of content and performance thresholds phrased as learning outcomes” become a warranty of sorts for graduates (p. 47). Agreement on what students are expected to learn, supports an improved understanding of how the cycles are related to one another and for comparing institutions (p. 47).

### 2.1.5.3 Tuning the disciplines

Discipline-specific frameworks are created through faculty-led exercises called Tuning. Paul Gaston writes that the Tuning process is a means to “translate the expectations of the three-cycle program structure into disciplinary terms ... and secure agreement on those terms, discipline by discipline” (Gaston, 2010, p. 154). The Tuning Process is a consultative methodology in which faculty, graduates, and employers work together to identify common frameworks for the disciplines. The Tuning Process in Europe was completed for nine disciplines in 2005. Adelman notes that there are two levels of learning outcomes identified in a Tuning process: competences and ‘subject-dependent’ general learning outcomes. The four competences

are cognitive, methodological, technological, and linguistic and would be construed as broad abilities and assessed as general education outcomes in the U.S. The subject-dependent outcomes follow the performance expectations at the QFEHEA level, yet are written in the context of the discipline (Table 2.5). National and institutional autonomy are respected so the products of a Tuning process describe the learning outcomes expected of graduates but do not prescribe content or teaching methods.

Table 2.5 Subject-specific learning expectations for second cycle graduates

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Within a specialized field in the discipline, demonstrates knowledge of current and leading theories, interpretations, methods, and techniques;  
 Can follow critically and interpret the latest developments in theory and practice in the field;  
 Demonstrates competence in the techniques of independent research, and interprets research results at an advanced level;  
 Makes an original, though limited, contribution within the canons and appropriate to the practice of a discipline, e.g. thesis, project, performance, composition, exhibit, etc.; and evidences creativity within the various contexts of the discipline.

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Source: Adelman, 2009, p. 52.

#### **2.1.5.4 Tuning for History**

The Bologna Tuning process for History completed in 2005, included consultations with graduates, employers, and academics (Tuning, 2004). Subject-specific learning outcomes are defined at the course level for non-majors and for graduates at the first and second cycles and fourteen competences were defined in three clusters. The competences for history (see Table 2.6) are expressed as abilities, capacities, or awareness, such as ‘ability to identify historical problems’ or ‘capacity to find new ways of using sources’ (p. 102).

Table 2.6 Learning outcome expectations for first-cycle graduates in History

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Possess general knowledge and orientation with respect to the methodologies, tools, and issues of all the broad chronological divisions in which history is normally divided, from ancient to recent times  
 Have specific knowledge of at least one of the above periods or of a diachronic theme  
 Be aware of how historical interests, categories, and problems change with time and how historiographical debate is linked to political and cultural concern of each epoch.  
 Have shown his/her ability to complete and present in oral and written form – according to the statute of the discipline – a medium length piece of research which demonstrates the ability to retrieve bibliographical information and primary sources and use them to address a historiographical problem.

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Source: Tuning, 2005, p. 102.

#### **2.1.5.5 Tuning USA**

In 2009, the Lumina Foundation funded three Tuning USA pilot projects in Utah, Indiana, and Minnesota (Lumina, 2009) to evaluate the process in the United States. These three states formed teams to conduct tuning projects in a variety of disciplines including chemistry, education, biology, graphic design, and history. Each project produced general educational outcomes and discipline-specific learning outcomes to be expected of holders of bachelor's degrees and master's degrees within each discipline. For instance, the Indiana team defined subject-specific outcomes which they labeled 'awareness' and defined broad competencies in four categories: thinking and analytical competencies, personal motivation and initiation competencies, communication competencies, and external awareness competencies. Each of these learning objectives is expressed as an action such as 'place new data and interpretations into context' and 'demonstrate acquired knowledge, understanding, and skills in an extended (final) research paper, including the critical use of primary sources' (Indiana Commission for Higher Education, 2010, p. 42-44; Wokeck, 2010). Competencies identified by the Indiana project are reproduced in Appendix B. The Utah State University History department used and applied the results from the Utah Tuning project to generate a rubric for evaluating capstone history coursework (Utah State University History Department, 2009). The faculty-driven process served as a catalyst for articulating evaluative standards within the department for all courses in the curriculum (McInerney, 2011).

#### **2.1.6 Summary**

Five years after the release of the Spellings report, institutions still struggle with finding the best tools for supporting internal improvement and demonstrating transparency and accountability to stakeholders. There is continued tension between the use of assessment for program improvement and for accountability. A National Institute for Learning Outcomes Assessment (NILOA) study (Kuh and Ikenberry, 2009) found a diversity of methods used for institution-level student assessment. Seventy-six percent of institutions use a nationally normed

survey (NSSE, CSEQ, etc.), 39% use standardized assessments of general knowledge and broad ability (CAAP, CLA, etc.), and only 8% used portfolios for that purpose (p. 10). However, over 80% of institutions surveyed reported the use of portfolios, traditional assessments, and rubrics for program level assessment and improvement. As noted previously, NSSE results hold great promise for investigating differences in student experience *within institutions* in support of program improvement, yet less than 10% of institutions reported using survey data for this purpose (p. 11). Kuh and Ikenberry also found that institutions are more likely to use assessment data for accreditation purposes – compliance – than for public reporting for accountability (p. 14).

The emergence of ‘learning outcomes frameworks’ in the U.S. signals the possibility of agreement on student learning expectations across disciplines and institutions. For instance, the AAC&U’s Essential Learning Outcomes and accompanying VALUE rubrics provide an assessment framework with potential to support both program and institution-level assessment for purposes of improvement and accountability (Association of American Colleges and Universities, 2010; Banta, et al. 2009). Qualifications frameworks such as ‘Tuning for the disciplines’ have similar potential. Success in this area could remove some of the mystery about “what students are learning in college” and restore confidence in institutions of higher learning. The lesson for academic libraries and other support agencies in higher education is that student learning outcomes remain of keen interest to stakeholders. Academic libraries and their leaders should be aware of the frameworks and methods emerging for communicating accountability for student learning and find ways to contribute to the conversation.

## **2.2 Lessons from literature of college impact**

The literature of college impact provides theories, models, and empirical data that can inform the design of instruments for exploring academic library impact.

### 2.2.1 Models and theories of college impact

Research of any kind begins with a conceptualization of the phenomena being explored and its antecedent causes. Theories and models provide frameworks which guide research design and the details of data collection and analysis. There is generally common agreement on what constitutes theory in social science as stated by Robert Sutton and Barry Staw:

“Theory is about the connections between phenomena, a story about why acts, events, structure, and thoughts occur. Theory emphasizes the nature of causal relationships, identifying what comes first as well as timing of such events” (Sutton and Staw, 1995, p. 378).

Models also define relationships between concepts in an attempt to explain phenomena. Some authors use the terms model and theory interchangeably (e.g. Jaccard and Jacoby, 2010), but most do not. Marcia Bates for instance suggests that a model “can be thought of as ‘prototheory’, a tentative set of relationships that can be tested for validity” useful during the “description and prediction stages of understanding a phenomena” and that “only when there is an explanation for phenomena can we say we have theory” (Bates, p. 3). Fred Kerlinger (1986) and Sutton and Staw (1995) both establish strict criteria for theories. Kerlinger asserts theories specify relationships between constructs which have been operationalized as variables. Sutton and Staw note theories identify the order in which constructs impact the phenomena in question and mediate the effects of other constructs. Once variables representing constructs have been defined and timing has been understood, the researcher can test the theory by attempting to predict phenomena. The aspect of “testability” by the theory’s creator and other researchers is seen as another important characteristic of good theory (Jaccard and Jacoby, 2010, p. 32). In the applied sciences, theories and models shape understanding of phenomena to support research that affirms, extends, or refutes their underlying assumptions, for the purpose of affecting policy or practice. Therefore the scope of a theory, viewed as the degree to which it explains phenomena in a variety of settings, is important to researchers and practitioners who wish to use research results for purposes of improving a process, a program, or outcome (Jaccard and Jacoby, 2010).

Ernest Pascarella and Patrick Terenzini identified two families of theories and models of college impact: developmental theories and college impact theories which take a sociological approach. According to Pascarella and Terenzini, “developmental theories seek to identify the dimensions and structure of growth in college student and explain the dynamics by which that growth occurs” (Pascarella and Terenzini, 1991) and focus on understanding change in the individual.

This review focuses on college impact theories that take a sociological approach. Models based on the sociological approach focus on “college environmental processes” and interpersonal relationships that influence change in the college student. These approaches are largely based on empirical evidence and their products have been used to guide policy and practice (pp. 45-52).

### 2.2.2 Astin’s Input-Environment-Output (I-E-O) model

Alexander W. Astin’s I-E-O model for studying college impact has three components: student inputs, the college environment, and student outputs. Student outputs are “those aspects of the student's development that the college either does influence or attempts to influence” (Astin, 1970, p. 224) and are operationalized as “measures of the student's achievements, knowledge, skills, values, attitudes, aspirations, interests, and daily activities (p. 224).” Inputs reflect the student’s pre-college attributes, skills, talents, and condition. The college environment includes facilities, programs, and practices that can influence student outputs.

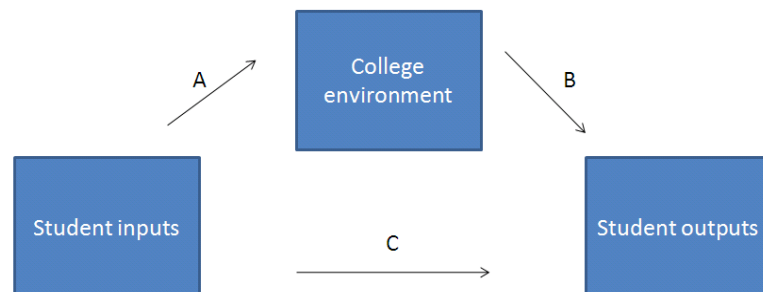


Figure 2.1 Astin's I-E-O model of college impact

The model depicted in Figure 2.1 allows for the direct effects of the college environment on student outputs (B) and for interaction effects between student inputs and the college environment with several research implications. Studies that fail to control for student input characteristics, may overestimate gains due to attending college. Studies that fail to control for aspects of the college environment will fail to detect real differences in the role student inputs contribute toward student outputs (Astin, 1970, 1973). Controlling for students' pre-college attributes and capabilities also supports longitudinal studies of college impact, which Astin argued were more persuasive than cross-sectional studies plagued by the real possibility that the nature of a study population had changed in meaningful ways between freshman and senior year (1970, p. 228). The practical implication, of course, is that an understanding of the effects of the college environment on student achievement can support changes in policy or practice (Terenzini and Reason, 2010).

Astin also developed a 2x2 Taxonomy which operationalizes student outcomes into outcome measures along three dimensions: type of outcome, type of data, and time span (Astin, 1973). Outcomes are divided into cognitive and affective categories. Cognitive measures emphasize acquisition of knowledge and abilities. Affective measures reflect changes in student values and attitudes. Type of data may be psychological or behavioral. Psychological data relate to "internal states" and are typically measured indirectly from "responses to a standard set of test questions" (p. 112). Behavioral or sociological measures involve directly observing an individual's interactions with the environment or with other individuals. Time span serves as a continuous variable allowing assessment of outcomes over time both during and after college. Using this taxonomy, student outcomes can be classified along these dimensions as illustrated in Table 2.7. The I-E-O model and the 2x2 taxonomy have provided significant guidance to researchers of college impact over the past 40 years (Pascarella & Terenzini, 1991, 2005).



Table 2.7 Astin's 2 x 2 Taxonomy of College Outcomes

Type of data	Type of Outcome	
	Cognitive	Affective
Psychological	Knowledge	Self-concept
	General Intelligence	Interests
	Critical thinking ability	Values
	Basic skills	Attitudes
	Special aptitudes	Beliefs
	Academic achievement	Drive for achievement
		Satisfaction with college
Behavioral	Level of educational attainment	Choice of a major or career
	Vocational achievements:	Avocations
	Level of responsibility, income, awards of special recognition	Mental health
		Citizenship
		Interpersonal relations

Adapted from Astin, 1973, p. 112.

### 2.2.3 Student-oriented research traditions: Effort, Involvement, and Engagement

#### 2.2.3.1 Quality of student effort

C. Robert Pace wrote in 1984: “Accountability for achievement and related student outcomes must consider both what the institution offers and what the students do with those offerings” (Pace, 1984, p. 4). Pace’s framework asserts that the degree to which a student exerts effort in his studies is proportional to the gains that he will obtain (1984). Pace thought that two dimensions, time and quality of effort, were relevant for understanding this process and eventually measuring it. For example, a student who works 8 hours on an essay will have expended more effort than if he worked on it for 2 hours. Likewise, the quality of effort can be expressed in a continuum. Checking references to see what other authors had to say about a topic can be considered a higher quality of effort than cutting and pasting text from web sites to provide supporting evidence. Pace noted that effort can be expended in several activities throughout the college experience in what he termed behavior settings. Behavior settings are those locations on a college campus such as classrooms, libraries, laboratories, and student unions within which certain types of learning activities occur. The quality of effort scales were operationalized through a series of questions measuring the amount and degree of effort expended

in those behavior settings during the college experience and make up the 14 scales in the College Student Experiences Questionnaire (Center for Postsecondary Research, 1998) related to desired behaviors. Subsequent analysis revealed that the scales were valid predictors of student self-reported gains in several outcomes of interest (Pace, 1984, 1990).

### **2.2.3.2 Astin's Theory of Involvement**

Astin defines student involvement as “the amount of physical and psychological energy that the student devotes to the academic experience” (Astin, 1999, p. 518). Involvement occurs in academic and social environments and occurs along a continuum; different students show different levels of involvement in certain activities at different times in their career. Student involvement can be measured quantitatively (time on task) and qualitatively (quality of effort). A student's return in terms of learning and personal development from a program is predicted to be proportional to her involvement in the program. Finally, the effectiveness of an educational program can be gauged by the degree to which it influences student involvement (p. 519). Astin defined two types of student involvement measures: (1) forms of involvement defined at the beginning of a student's experience such as residence, socioeconomic status, and probable major and (2) intermediate outcomes that transpire during the student's experience in college including academic involvement, student-faculty interaction, interactions with peers, involvement with work, and other types of involvement (p. 365).

There is ample evidence that the quality of student effort influences student learning based on self-reports gathered using the College Student Experiences Questionnaire (Pace 1984, 1990). In his 1984 study, Pace reported that responses to the questions regarding quality of effort in 14 dimensions of academic and social behaviors explained between 7% and 25% of variance in self-reported gains. In the 1990 study, student respondents were grouped by their breadth of effort, defined as the number of scales on which the student's responses were above average. Again students exhibiting low levels of effort reported lower gains than those exhibiting medium

and higher levels of effort (1990, 109-118). Pascarella and Terenzini (2005) report numerous studies that support these findings using self-reports and objective measures.

Using results from the surveys conducted by the Cooperative Institutional Research Program (2010a, 2010b), Astin (1993) reported that time spent studying and doing homework was positively correlated to all self-reported increases in cognitive and affective skills as well as objective gains on the National Teacher's Exam (NTE) (p. 375). Related to effort is a measure of the number of classes taken in a specific area (engineering, economics, etc.) and gains in related outcomes. Astin (1993) reports that the number of courses taken that emphasize writing skills is positively correlated with gains in writing skills, general knowledge, critical thinking, and public speaking skills (p. 377), the number of courses taken that emphasize scientific reasoning has a positive impact on GRE verbal scores, and self-reported scores in analytical and problem solving skill, and knowledge of a discipline (p. 378).

### **2.2.3.3 Engagement and high-impact experiences**

George Kuh defined student engagement as “the time and energy students devote to educationally sound activities inside and outside of the classroom” (2003, p. 25). While similar to the concepts of quality of student effort and student involvement, measures of engagement were derived from the “seven educational practices” (Table 2.8) known to result in positive student outcomes (Chickering & Gamson, 1987). Arthur Chickering and Zelda Gamson published these good practices as guidelines for faculty, administrators, and board members who have the responsibility to create environments that support student learning.

Table 2.8 Chickering and Gamson's Best practices in undergraduate education

Encourages contact between students and faculty
Develops reciprocity and cooperation among students
Encourages active learning
Gives prompt feedback
Emphasizes time on task
Communicates high expectations
Respects diverse talents and ways of learning

Adapted from Chickering and Gamson, 1987

Process indicators for engagement with these practices have been derived from scales used in the College Student Experiences Questionnaire (Center for Postsecondary Research, Indiana University, 1998; Kuh, Pace, Vesper, 1997). They were implemented in the National Survey of Student Engagement (Kuh, 2003) as the Benchmarks of Effective Practice (level of academic challenge, active and collaborative learning, student-faculty interaction, supportive campus environment, and enriching educational experiences) (National Survey of Student Engagement, 2010a). Thomas F. Nelson Laird, Rick Shoup, and George Kuh (2006) created the Deep Learning Scale using 12 questions from the NSSE College Report as indicators of three deep learning behaviors: academic challenge, integrative learning, and reflective learning (Appendix A). These measures have also been used to assess the degree to which institutions create environments that encourage levels of effort and involvement.

Numerous studies have examined student engagement with “best practices in education” through student self-reports. Seifert, et al. (2007) used longitudinal data from the National Survey of Student Learning (NSSL) to explore the effects of participating in an honor’s college on the degree to which students experience “good practices” of education (Chickering and Gamson, 1987) and objective measures of learning gains. Objective measures included CAAP exams in reading comprehension, critical thinking, and writing. The sum of these scores was used as a composite cognitive measure as well. Students in honors colleges reported significantly higher levels of exposure to 6 of the 20 “good practices” of education. After controlling for numerous pre-college traits and exposure to the “good practices” the authors found honors students outgained their peers in the composite cognitive measure, writing, and critical thinking. They also found that participation in an honors college may “accentuate the initial cognitive advantages” these students have over their peers (p. 68). Kuh (2008) reported findings related to engagement with high-impact practices such as first-year experiences, capstone courses, study abroad, and service learning. Students engaged in high-impact practices work hard, interact with faculty and classmates in meaningful ways, and report higher learning gains than peers.

The Benchmarks of Effective practice have been shown to predict positive outcomes with mixed results using national and single institution samples. Using longitudinal data and objective measures Carini, Kuh, and Klein (2004) found student engagement with effective practices and deep learning experiences to be statistically significant predictors of several outcomes, though levels of engagement only explained a small portion of the variation in gains. Again using a longitudinal design and objective measures, Pascarella, Seifert, and Blaich (2009) found the Deep Learning Scale to be related to gains in “effective reasoning and problem solving, well-being, inclination to inquire and lifelong learning, intercultural effectiveness, leadership, moral character, and integration of learning” (p. 30-31). However, in a single site study Gordon, Ludlum, & Hoey (2008) found that levels of engagement explained less than 1% of the variance in GPA and retention. Nelson Laird, et al. (2008) also found that engagement in Deep learning behaviors did not result in higher reported grades.

#### **2.2.4 The College Environment**

In section 2.2.3 I explored theories and models of college impact that emphasize the effort students must expend to succeed in college in a variety of ways. As seen in Astin’s model, however, the college environment plays a significant role in shaping student experiences.

According to Leonard Baird

“[t]he character of an environment reflects the nature of its members and that the dominant features of an environment reflect the typical characteristics of its members. If we know what kind of people make up a group, we can infer the climate that the group creates” (Baird, 2005, p. 512).

This section of the dissertation explores the role the academic major plays in shaping the college student experience and achievement of desired learning outcomes.

##### **2.2.4.1 Weidman’s conceptual framework of undergraduate socialization**

John Weidman approached the problem of college impact as a process of socialization. Brim (1966), cited by Weidman, defines socialization as “the process by which persons acquire the knowledge, skills, and dispositions that make them more or less effective members of their

society” (Brim, p. 3). Weidman (1989) constructed a conceptual framework for understanding undergraduate socialization which takes into consideration the “socializing impacts of (1) student background, (2) normative influences of the academic and social structure of the college, and (3) the mediating impacts of parental and non-college reference groups” (p. 298). Student background characteristics in the framework include socioeconomic status, aptitude, and occupational aspirations. It is during the college experience though, that students are influenced by academic and social pressures both formally and informally. Weidman identifies three processes for social norming: interpersonal interactions with faculty, staff, and peers, intrapersonal processes associated with student perceptions of the environment and judgments of “fit”, and social and academic integration. Formal academic pressures include institutional quality and orientation (a focus on the liberal arts versus engineering, for instance) and the structures and norms associated with the academic major. Informal academic expectations have to do with “unwritten rules” of student conduct and behavior. Formal social influences include institutional type and size, the student’s residence, and the groups with which he or she associates. Peer groups in social and academic contexts also influence the student. For instance, the degree to which a student’s peers are studious could affect the student’s expectations of himself and his academic effort. Further non-college reference groups and parents’ expectations, values, and attitudes influence students, mediating the cumulative influences of the college environment on socialization outcomes such as career choice, aspirations, and values (p. 299). While Weidman’s framework provides guidance for researchers in the selection of independent variables, it is left to the researcher to apply constructs and develop metrics.

#### **2.2.4.2 Holland’s “person-environment fit” theory**

The academic normative context in Weidman’s framework influences students through institutional emphases (e.g. liberal arts vs. vocational), the collective characteristics of peers (e.g. full-time vs. part-time students, student aspirations and values), and the academic department associated with the student’s chosen major. Patterns of peer and faculty influences on students

within the academic department have been explained using John Holland's "person-environment fit theory" (Holland, 1997; Smart, Feldman, and Ethington, 2000; Feldman, Smart, and Ethington, 2008). Holland's person-environment fit theory is based on the notion that there are six different personality types (Realistic, Investigative, Artistic, Social, Enterprising, and Conventional) and individuals of each type prefer certain types of activities, tend to acquire certain competencies, and vary in their self-perceptions in predictable ways. Investigative personalities for instance "tend to be critical, intellectual, and reserved, to possess strong mathematical and scientific competencies, and to value scholarly and scientific achievements" (Feldman, Smart, and Ethington, 2008, p. 330).

Two assumptions associated with Holland's theories have been used to explain college student development. The *congruence assumption* holds that the better the fit between a student's personality type and the academic environment or major that he or she chooses, the greater the likelihood of satisfaction and success in college. The *socialization assumption* suggests that students of all personality types are influenced by the norms and values reinforced by faculty in their chosen major. Further, the socialization assumption holds that student success should be judged "by the extent to which students grow in terms of the abilities and interests reinforced by their chosen academic environment ... rather than enhancing their initially prominent characteristics" (Feldman, Smart, and Ethington, 2008, p. 338). The mechanism for the socialization assumption is faculty-student interaction in the academic environment through activities associated with students' choice of undergraduate major. Faculty members in respective academic departments create a curriculum and associated activities and assessments that reinforce and reward undergraduates "for their acquisition of the attitudes, interests, and abilities of the analogous personality types who dominate them [the environments]" (Smart & Umbach, 2007).

Kenneth Feldman, John Smart, and Corinna Ethington (2008) reported on research supporting both assumptions. Using longitudinal data from the 1996 CIRP Freshman Survey

(Cooperative Institutional Research Program, 2010a) and the 2000 College Senior Survey (Cooperative Institutional Research Program, 2010b) they found that students whose personality types are congruent with their environments accentuated their pre-college characteristics, while other skills remained stable or declined resulting in a peaked profile of student capabilities. However, students of certain personality types who chose incongruent academic environments reported improved performance in the skills and abilities reinforced and rewarded in their chosen academic environment, while their initially prominent characteristics generally held steady or occasionally declined (Feldman, Smart, and Ethington, 2008, p. 359) resulting in graduates with strengths or abilities in multiple areas.

The socialization assumption of Holland's model has implications for the design of student learning outcomes assessments and their use for reporting program level and inter-institutional accountability (p. 365). Academic environments influence not just the knowledge and skills students acquire, but attitudes, values, and the modes for acquiring broad abilities associated with a liberal education. Therefore assessments should be designed "to assess student outcomes associated with the distinctive cognitive *and* affective outcomes that students' respective fields of study seek to reinforce and reward" (p. 365) and that "academic environments are an absolutely essential component in Holland's theory *and* in efforts to understand student success in postsecondary education" (p. 360).

#### **2.2.4.3 Supporting evidence: variations in student gains and learning by discipline**

Both Weidman and Holland's models suggest that academic discipline should have an impact on student learning. There is ample evidence to support this claim.

General Education Courses (GECs) are the parts of the curriculum that "are shared by all students" (Nelson Laird, Niskodé-Dossett, and Kuh, 2009), serve as introductions to a variety of topics ... and modes of inquiry" (p. 66) and "tend to involve the study of basic liberal arts and sciences in an integrative fashion" (Pascarella & Terenzini, 1991, p. 136). Prior reviews noted that students with exposure to general education curricula demonstrated higher gains in general



intellectual skills and abilities using the ACT COMP (Pascarella & Terenzini, 1991, p. 136-137) and GRE Analytical (Astin, 1993, p. 209) standardized tests. Thomas F. Nelson Laird, Amanda Suniti Niskodé-Dossett, and George Kuh (2009) explored the degree to which faculty members emphasize “essential learning outcomes” and Deep learning techniques in GECs. From the Faculty Survey of Student Engagement (FSSE) survey (Trustees of the University of Indiana, 2012b), the authors constructed three scales based on “liberal arts outcomes as identified by AAC&U (2007): intellectual skills, practical skills, and individual and social responsibility.” They found that faculty who taught GECs emphasized “intellectual skills with effect sizes of 0.21 SD,  $p < 0.001$  for lower division courses and 0.22 SD,  $p < 0.001$  for upper division courses, and individual social responsibility to a greater extent with effect sizes of 0.30,  $p < 0.001$  for lower-division courses and 0.32,  $p < 0.001$  for upper-division courses than their counterparts who were teaching non-GECs” (p. 74). Faculty who taught GECs also emphasized practical skills less often reporting effect sizes of  $-0.30$  SD and  $-0.12$  SD ( $p < .001$ ) for lower and upper division courses respectively. Nelson Laird and Amy Garver (2010) conducted a follow-up study that explored the degree to which faculty in various disciplines emphasize practices in the Deep Learning Scale in GECs and non-GECs. They found that faculty members who teach GECs were more likely to emphasize Deep learning practices in their courses, .17 SD,  $p < 0.001$  for the overall scale, .15 SD  $p < 0.001$  for the integrative learning scale, and .19 SD  $p < 0.001$  for the reflective learning scale. The effect was weaker for the higher order learning scale (.05 SD,  $p < 0.05$ ). They also found differences of emphasis within some disciplinary groups. For instance, faculty in the hard-applied-life fields who taught GECs were .07 SD below the grand mean, while their non-GEC peers were .49 SD below the grand mean. The authors note that “assessment and improvement efforts should account” for this variation (Nelson Laird & Garver, 2009).

John Smart and Paul Umbach (2007) used the socialization assumption of Holland’s theory to explore how faculty discipline influences the learning objectives promoted in undergraduate courses. Twelve items from the 2003 FSSE identifying a range of learning

objectives (acquiring a broad education, writing clearly and effectively, analyzing quantitative problems, etc.) were the dependent variables in the study. Four Holland environments (investigative, artistic, social, and enterprising) and five institutional types made up the independent variables in the study. The authors conducted 4 X 5 multivariate analysis of variance (MANOVA) and found that academic environment by institution was not statistically significant ( $F = 1.02, p < 0.05$ ), however the main institution effect ( $F = 1.81, p < 0.01$ ) and the main academic environment effect ( $F = 14.77, p < 0.001$ ) were statistically significant. Focusing on environmental effects, they conducted post hoc discriminant analysis and discovered three functions. The first function described the degree to which faculty emphasize “analyzing data” versus “understanding people” which differentiated faculty (.981) in the investigative disciplines from the other three types of disciplines. The second function described the degree to which faculty “emphasize understanding diversity issues” which separated the social (.391) and enterprising (.253) disciplines from artistic (-.606) and investigative (-.037) disciplines. The third function is bipolar and “reflects the extent to which faculty members structure their classes to emphasize “understanding people” versus student acquisition of “career and communications skills” (p. 189). On the positive side of the equation and separate from the other three disciplines were the enterprising faculty (.391) who emphasize “career and communication skills” (p. 189).

Steve Chatman (2007) used 58,000 responses to the 2006 University of California census survey of undergraduates (UCUES), to explore variation in student experience by academic major. Through principal components analysis, responses by discipline clustered in expected ways (social sciences, math and computer science, etc.) and analysis showed variation in students’ levels of engagement, satisfaction with their institution, and self-assessed gains by cluster (Chatman, 2007). In the NSSE 2010 report (National Survey of Student Engagement, 2010b), special attention was paid to variation in levels of engagement in the Benchmarks of Effective Practice and Deep learning practices within four academic majors: English, Biology, Business, and Psychology. For instance Psychology majors reported statistically significant

higher levels of higher order (.06 SD,  $p < 0.001$ ), integrative (.13 SD,  $p < 0.001$ ), and reflective (.20 SD,  $p < 0.001$ ) learning than all other students in the survey (p. 14). Senior English majors also reported participating in certain types of deep learning activities more often than all other students including “arguing a position using evidence and reasoning” (65% vs. 39%) and “analyzing or evaluating something you read, researched, or observed” (77% vs. 61%) (p. 13) and spent far less time memorizing facts than students in biology and psychology. Yet students in biology were more likely to conduct research with a faculty member or participate in an internship than students in other majors. A review of concurrently gathered FSSE results indicates that some of these differences can be explained by faculty practices in the classroom and emphases. For instance, English professors lectured 20% of the time, whereas Biology and Psychology professors lectured approximately 50% of the time. Seventy-five percent of Psychology and Biology faculty said it was important for students to do research with faculty, yet only one third of Business faculty agreed with this statement (p. 16).

Prior research indicates that students demonstrate higher levels of academic subject knowledge in subjects congruent with their major (Pascarella and Terenzini, 2005, p. 604). For instance pursuing a science or engineering major and the number of math and science courses taken are predictors of higher GRE Quantitative scores (Astin, 1993, p. 206). There is also evidence that student gains in some broad abilities varies by discipline. Self-reported growth in analytical and problem solving skills is positively correlated with majoring in science or engineering (Astin, 1993, p. 227). And majoring in a social science positively affects GRE Verbal scores (p. 218). Pascarella & Terenzini (2005) report evidence that “intellectual training in different fields of study leads to the development of different reasoning skills” (p. 175). They review a longitudinal study using objective measures conducted by Lehman and Nisbet (1990) that found students majoring in social science,  $t(22) = 3.96$ ,  $p < 0.001$ , and psychology,  $t(29) = 4.10$ ,  $p < 0.001$ , showed greater changes in statistical-methodological reasoning between first and fourth years in college than humanities and natural science majors. Whereas students majoring in

the humanities,  $t(38) = 3.41$ ,  $p < 0.003$ , and natural sciences,  $t(28) = 2.63$ ,  $p < 0.02$ , showed improvement in conditional reasoning skills during 3 years of college, but psychology and social science majors did not (Lehman and Nesbit, 1990, 956 – 957). Most studies reviewed by Pascarella & Terenzini found no statistically significant evidence of a differential impact on critical thinking skills by academic discipline (1991, pp. 65-66, 614; 2005, pp. 174-176). In the studies that did report statistically significant differences, it was difficult to separate the effects of the major with recruitment effects wherein some majors attract students with higher levels of critical thinking skills to begin with (p. 175).

### **2.2.5 Summary**

This section of the literature review provides several methodological lessons. In numerous models, *student effort* toward their academic work is the best predictor of learning outcomes achievement. While institutions may have limited influence over student effort, evidence suggests that levels of social and academic integration and the degree to which students engage in effective practices of higher education are related to the amount of effort students expend in college and how much they learn. There is evidence that levels of engagement with effective practices in higher education influence student learning gains. And exposure to high-impact practices, such as capstone courses, experiential learning, and study abroad provide students with powerful experiences where they integrate and apply what they've learned in college (Kuh, 2008). Current evidence also supports assertions that student academic experiences are likely to vary within institution more so than between institutions. Multiple models and empirical studies indicate a student's choice of academic major is a source of this variation. Students majoring in different disciplines are exposed to diverse academic norms including pedagogical methods and reward structures which influence behavior and learning gains. These findings suggest library impact studies should account for student effort and academic discipline.

## **2.3 Library vitality and invisibility**

The environment in which academic libraries operate has changed dramatically in the last two decades. Students enrolling in college in 2011 were born in the same year, 1993, as the World Wide Web. Now search engines, robust data networks (both wired and wireless), and the ubiquity of personal computers, tablet computers, and smart phones remove temporal and geographic barriers to information access. Students and faculty, accustomed to this environment, have high expectations for their information seeking experience, posing challenges to academic libraries. New methods of scholarly communication have also emerged to take advantage of these capabilities and meet the expectations of users. The scholarly journal literature has almost completely migrated to electronic formats and open access models have taken hold as viable alternatives to commercial publishing.

The challenges and priorities of the academic library of 2010 are much different from the library of 1990. Libraries are shifting resources and staff toward the acquisition of digital resources while continuing to serve the traditional roles of print repository and as a place for study and reflection. Likewise, there is evidence that student, faculty, and administrator perceptions of the library are changing. No longer can the library's centrality to the academic mission go unquestioned. Like other campus units, the library is expected to communicate its contributions to the teaching and learning mission of its parent institution.

### **2.3.1 The hybrid library: the case of the scholarly journal**

The transition to hybrid libraries is perhaps most evident in the allocation of budgets in research libraries. For instance, expenditures on electronic resources in research libraries who are members of the Association of Research Libraries (ARL) ballooned from 3.6% to 25.02% of materials budgets from 1993 to 2003 (ARL, 2004; Kyrillidou, 2002) and to 47% of materials budgets in 2007-2008 (ARL, 2008b). Scholarly journals were the first genre to successfully make the transition from print to digital distribution and today, electronic journals (e-journals),

consume a plurality of the typical academic library materials budget. In 2007-2008, ARL libraries spent over \$556 million on electronic journal subscriptions (ARL, 2008b).

The Open Access (OA) movement also began in the 1990s. Open Access literature is by definition freely available over the internet to readers without delay and without charge. Peter Suber defines two types of Open Access: *gratis OA* “which is free of charge but not free of copyright or licensing restrictions” and *libre OA*, which is free of charge and free of copyright or licensing restrictions (Suber, 2010). The purpose of the OA movement is to remove price barriers and permission barriers to sharing scholarly literature, while protecting the rights of authors and copyright holders (Case, 2002). Open Access literature is distributed via Open Access journals and Open Access archives or repositories and is positioned to compete with journals distributed by publishers. Open Access publishers fund their operations by charging authors or their host institutions to publish their work, which is the reverse of the traditional model in which authors submit articles to journals and institutions license access to the literature via their libraries. The growth of open access publishing can be tracked at the Directory of Open Access Journals which links to over 800,000 articles in over 7,700 open access journal titles as of May 2012 (Directory of Open Access Journals, 2012). And the proportion of the scholarly literature that is now Open Access continues to grow (Björk et al., 2010). The conversion to digital formats for publishing licensed and open access scholarly articles is now almost complete. As of 2008, the Association of Learned and Professional Society Publishers estimated 96.1% of STM journals were published online and 86.5% of humanities and social sciences journals were published online (Cox & Cox, 2008).

The adoption of e-journals by users accelerated in the 2000s (Tenopir & King, 2002) and libraries have made the transition in their acquisitions patterns to meet users’ needs and to decrease costs and storage space by cancelling print subscriptions (e.g. Montgomery & King, 2002a; 2002b). The impact of the transition can also be seen in readers’ habits. Carol Tenopir and Don King (2007) report that personal subscriptions to scholarly journals among faculty has

declined from an average of 5 subscriptions in 1977 ( $n=2350$ ) to just under 3 in 2005 ( $n=1674$ ). However, the average annual number of articles read per faculty member increased from 150 in 1977 to 271 in 2005 (p. 201). In 2005, over 50% of articles read by faculty in this study were provided by their academic library, up from 20% in 1977 (p. 205), suggesting this change in reading habits can in part be attributed to faculty members taking advantage of the convenience of e-journals licensed by academic libraries. Raw use figures continue to climb. A JISC study of e-journal use found that the number of article downloads doubled between the academic years 2003-2004 and 2006-2007 at 67 United Kingdom universities (Research Information Network, 2009a, p. 15). And Charles Martell (2008) reported electronic resource usage by Harvard University Library patrons grew 420% from 2001 to 2006.

### **2.3.2 Undergraduate resource preferences in the internet age**

The nation's undergraduate students are more diverse than ever. Millennials, those students born after 1977, have grown up in an age of ubiquitous computing. Millennials have been portrayed as exhibiting learning styles far different from their parents. Preferring to work collaboratively and freely multi-tasking, they are quick to adopt new technologies, expect customization and 24x7 access, and are comfortable with Internet sources as valid sources of information (Howe and Strauss, 2000; Oblinger, 2003; Lippincott, 2005). While we typically think of college students as being between 19 and 22 years old, enrolled in college full-time, and living on campus, current demographic trends indicate otherwise. In the 1999-2000 academic year, fully 73% of undergraduate students exhibited one or more traits of the nontraditional student such as matriculating well after graduating from high school, attending college part-time, supporting dependents, or holding full-time jobs (United States Department of Education, 2002). While Millennials may prefer electronic resources to traditional materials, today's nontraditional students who balance family, work, and school are perhaps more dependent upon ubiquitous access to electronic information resources to complete their academic work.

Undergraduate students' preference for easy to use general web search engines when initiating research for school assignments has been documented by several studies (OCLC, 2002; Jones, 2002; and OCLC, 2006a). Jillian Griffiths and Peter Brophy (2005) report similar preferences among students in the United Kingdom concluding that student familiarity with search engines has come to influence their expectations of other information retrieval systems. However, students do use the library web site, library-provided resources, and course-related materials to complete their academic assignments. OCLC (2002) found that 70% of students use the library web-site to find information for assignments. These students typically learned about the library's web site through teaching faculty (49%) or through classes about using the library (34%). OCLC (2006a) found 56% of students visit library web site monthly, 42% use online databases monthly, and 49% report using electronic journals from the library. In a single site study, Bridges (2008) found 83% of students in her sample used the library web site remotely with 46% of students reporting use at least monthly.

Allison Head and Michael Eisenberg (2009, 2010) using multiple research methods and large sample sizes, created a four-part typology for use in exploring ways in which students find context for beginning and completing an academic project. The four contexts are big picture (finding the background of a topic), language (understanding terms used in discussions of the topic, identifying search terms), situational (understanding expectations and thresholds for the project, referring to prior examples of similar projects), and information gathering (finding out what research has been completed on the topic, finding relevant sources). The researchers found students tended to use the same resources in all contexts. The top four resources used were course readings (~97% of students), search engines (92-96% of students), scholarly research databases (88 – 94% of students), and instructors (83 – 88% of students) (Head & Eisenberg, 2010, p. 7).

A closer examination of undergraduate student preferences for internet search engines and library-acquired electronic resources reveal that students value different aspects of these



resources and perhaps use them for different tasks. The OCLC Perceptions study (2006a) found that search engines were rated higher than library resources by students in 5 areas: *reliability*, *cost-effectiveness*, *ease of use*, *convenience*, and *speed*. However, 76% of students in the survey rated libraries higher than search engines for being *trustworthy/credible sources of information* and *accurate*. Wong et al. (2009) explored these preferences by classifying information resources as internal or external. *Internal* resources are developed or acquired by the students' or researchers' institution such as the library catalog or licensed databases, e-journals, or e-books. *External* resources are those electronic resources "outside of the library's provision" such as Google, Google Scholar, and Wikipedia (p. 32). The authors conclude that:

"The main driving force for the choice of resources used was the prior knowledge and a positive experience with a resource and a perception of trust and belief that external resources provided by Google and Google Scholar are reliable and relevant, and always return a list of results. The most common reason for using 'internal' resources was the quality and credibility of material and broad subject coverage" (Wong et al., 2009, p. 79).

However, students' trust in specific information resources is also influenced by their instructor's definitions of quality. Stuart Hampton-Reeves, Claire Mashiter, Jonathan Westaway, Peter Lumsden, Helen Day, Helen Hewertson and Anna Hart found in their study of student use of research content in the UK (2009) that instructors generally define what sources are acceptable and provide examples in class. Therefore students know they will be marked down for improper sources and stick to recommended resources (p. 40), results also reported by Urquhart & Rowley (2007b, p. 1192). Carol Tenopir (2003) and OCLC (2002) similarly report that on their own, students will choose easy to use internet search engines to conduct research unless their professors require the use of specific sources. Other studies support these findings. Urquhart & Rowley report that exposure to information literacy training provided jointly by library and academic staff increased e-journal awareness and use among students between 1999 and 2004 ( $\chi^2 = 13.5$ ,  $df = 1$ ,  $N = 789$ ,  $p < 0.01$ ) (2007b, p.1193). For two years running, Project Information Literacy (Head and Eisenberg, 2009, 2010) found that 96 – 97% of students participating in their studies reported using course assigned readings in their research projects and over 80% referred

to their instructors for sources of research resources (2010, p. 7). However, Wong, et al., (2009) found in their study that more expert users tended to rely to a greater degree on 'internal' resources, suggesting a correlation between experience as a researcher and the use of internal resources (p. 33).

The requirements posed by the academic task at hand may also drive the selection of information sources. Chandra Prabha, Lynn Silipigni Connaway, Lawrence Olszewski, and Lillie R. Jenkins (Prabha, et al., 2007) explored the criteria students and faculty use to decide when they have found enough information to meet their need and can stop a search. The authors found that undergraduates apply quantitative and qualitative criteria when making a decision to stop a search. The quantitative criteria are mostly tied to the demands associated with the particular assignment, such as identifying the minimum required number of citations, writing the minimum number of pages acceptable for a paper, and the time available. Qualitative criteria included assessments of information accuracy, finding similar information repeated in multiple sources, and deciding that sufficient information was gathered (p. 81). Students in this study were more likely to apply quantitative criteria associated with the requirements of the assignment instead of opting for a more “thorough” search. Students also reported that the effort expended was proportional to the reward (grade) associated with the paper or project. This behavior called “satisficing” is defined as “comparing the benefits of obtaining ‘more information’ against the additional cost and effort of continuing to search” (Prabha, et al. 2007; Shmid, 2004; Simon, 1973). Further, the study reported as do other studies (e.g. OCLC, 2006a, Head & Eisenberg, 2009) that students start research with the internet because of its convenience and speed. For this reason, Prabha and her co-authors conclude that library search experiences should emulate internet search engines in their simplicity and collocation of all types of information (p. 86).

Students may also use different sets of resources for different types of academic tasks. Urquhart & Rowley (2007b, p. 1192) report that discipline was a factor in determining the use of electronic journals ( $\chi^2 = 77.8$ ,  $df = 4$ ,  $N = 1484$ ,  $p < 0.01$ ) where students in clinical disciplines

were more likely to use e-journals than students in other disciplines. It is unclear however, if the study controlled for the availability of e-journals classified for each discipline. In a single-site study, Anna Van Scoyoc and C. Cason (2006) surveyed 884 visitors to an ‘information commons’ placed not in a library, but in an academic support building at the University of Georgia. The ‘information commons’ boasted 500 public computers with convenient links to library-subscribed resources on the computers’ ‘desktops’ and a staffed reference desk nearby. In spite of these encouragements to use library resources, students surveyed in this study used search engines (75.7%) and course websites like Blackboard (71.6%) more often than library resources like library databases or the library catalog (44.4%). The researchers found no variation by class year. Interestingly, these use patterns did not hold in the traditional libraries on campus where use of electronic library materials far exceeded use in the information commons. The authors suggest that the academic research task may be a factor in this discrepancy. That is, students in the ‘information commons’ may be completing course work of a different nature than students who use the traditional libraries on campus.

Ease of use and immediacy of information access also explain student preference for internet search engines. OCLC (2002) reports students named difficulty searching and navigating the library website a barrier to use. William Wong et al. (2009) report that “poor usability and complexity [of online catalogs and publisher provided e-resource platforms] have raised the threshold of entry” and students go to friendlier applications to “find their bearing after becoming lost in a vendor database platform.” Student participants in a study of e-books usage reported a preference for printed books due to numerous usability problems with e-book platforms including visual clutter, the necessity of using both multiple navigation methods (paging and scrolling), and incompatibility with screen readers (JISC & UNL, 2009, p. 21). Karen Calhoun (2009) reported in a study entitled *Online catalogs: what users and librarians want* found that users valued evaluative metadata in systems that allowed them to make relevance judgments about items without having to go to the stacks. Above all, problems with access and availability such as

broken links to the full-text of an article (Wong, et al. 2009), lack of access to back-files (Hampton-Reeves et al., 2009), and embargoes (Wong et al., 2009) continue to be troublesome to library users. Calhoun (2009) also found that users value links to electronic resources and information about requesting or retrieving physical items and that the “delivery experience is as important, if not more important than the discovery experience” (p. 11).

“Discovery happens elsewhere.” Increasingly students can have both the convenience of internet search engines and the quality of peer-reviewed, library licensed resources through the integration of Google Scholar with their library’s link resolver. The JISC E-journals study conducted over 4 months in 2007 found that one third of the users of ScienceDirect e-journals and one-half of users of Oxford e-journals used search engines such as Google or Pubmed rather than publisher-provided search and discovery platforms to access licensed e-journals (Research Information Network, 2009a, 2009b). Wong et al. (2009) reported students begin their search at Google Book Search to identify titles of interest and then going to the library to check out wanted books.

### **2.3.3 Trends in the use of print and electronic books**

While undergraduate students express a preference for electronic resources, undergraduates continue to be heavy users of traditional print materials. Eighty-nine percent of students surveyed for the DLF-CLIR study (George and Marcum, 2003) reported use of books and print journals from the library. Ninety-three per cent of students surveyed for the 2002 OCLC study reported using books from the library for academic coursework (2002). The OCLC Perceptions study (2006) found 39% of students used print books from the library at least monthly. While the proportion of undergraduate students who use traditional library resources remains strong, there has been a significant decline in the circulation of print materials in U.S. academic libraries. The NCES Academic Libraries Surveys for 2004 and 2006 show a 7% decline (155.1 million to 144.1 million) in circulation transactions over two years (United States Department of Education, 2006b, 2008b). And there has been an overall decline of 14% in

circulation in academic libraries between 1996 and 2004 (Martell, 2008) and (Department of Education, 2006b, 2008b). Martell notes that ARL libraries reported a 15% decline in circulation between 1995 and 2006 in spite of a 31% increase in number of volumes held by ARL libraries, a 22% increase in the number of FTE students enrolled, and an 11% increase in the number of FTE faculty. Using these figures, Martell noted that median circulations per FTE student declined from 32 to 21 at ARL libraries between 1995 and 2006 (Martell, 2008, p. 403).

The growing proportion of collection budgets dedicated to electronic books in academic libraries may be one explanation for declining print circulation. E-book sales in the US have increased precipitously over the last decade as publication and web-based reading platforms have evolved and readers take interest. Bowker Annual reports that annual e-book publication figures have increased from 7,337 titles in 2002 to 113,200 titles in 2008, an increase of 1,774% (Bowker, 2009, p. 514). And adoption among academic library patrons has picked up in the last five years. A study of e-textbook use conducted in the United Kingdom found that 64% of students in had used an e-textbook for academic purposes and over 50% used e-textbooks acquired by their university library (JISC & UCL, 2009).

However, several studies report that e-book reading sessions are relatively short (JISC & UCL, 2009; Penrose, 2006). Peter Hernon, et al. (2007) found undergraduate students did not read e-books in their entirety online, but browsed the table of contents to download and read chapters. Students in this study generally limited their online reading to 1 – 2 chapters but found online readers confusing and difficult to use. One student in the JISC study said, “I think we came to a reasonable consensus that people tend to use e-books for finding specific pieces of information instead of extensive reading” (JISC, 2009, p. 17). Wendy Sherburne (2009) surveyed 1547 faculty and students at the University of Illinois and found users of e-books complained of difficulties reading from the screen, navigation, and digital rights management points echoed by Jan Noyes and Kate Garland who conducted two studies of student’s attitudes toward books and computers and their preferences for each medium for learning (2005, 2006).

The e-book studies just reviewed suggest that students enjoy the convenience of online access to web-based e-books, but are hampered by usability problems and prefer print to web-based e-books for intensive reading.

#### **2.3.4 Use of in-person services**

##### **2.3.4.1 Reference**

Inevitably, college students need help deciding on the best information resource for a given academic project, learning how to use that resource, and oftentimes, help in navigating the library itself. Reference services in academic libraries are positioned to support these needs through face-to-face, telephone, and virtual communications. However, reference transactions in academic libraries have been dropping in the last decade. Again, drawing from the NCES Academic Libraries Survey the average number of reference transactions at all U.S. academic libraries during a typical week during the fall semester dropped 21% between 2004 and 2006. The drop was almost exclusively seen in institutions in the Carnegie classifications Doctoral/Research institutions (-36.4%) and Master's I and II (-29%) (United States Department of Education, 2008b). Statistics from the Association of Research Libraries (ARL) back up these findings. ARL Libraries reported a 3.8% annual decline in reference activity from 1991 to 2006. The decline for research libraries steepened from 1996 to 2006 as the annual drop reached 5.6% for an overall reduction in reference traffic of 56% (Association of Research Libraries, 2008, p. 10). Leo Clougherty, John Forys, Toby Lyles, Dorothy Persson, Christine Walters, and Carlette Washington-Hoagland (1998) found that 70% of students used reference services at some time during their academic careers at the University of Iowa. In 2006, less than a decade later, OCLC found that 42% of students sought help using electronic resources and only 33% of students visited the library to get help with research at least monthly (OCLC, 2006a). Alison Head & Michael Eisenberg reported only 11% of students in their study reported asking librarians for help evaluating information sources for academic projects (2010, p. 16). Several studies report that

students increasingly rely on instructors or ask their friends or family members for help with research before contacting a librarian for assistance (Wong, 2009; Foster and Gibbons, 2007, Head & Eisenberg, 2009, 2010).

As libraries have put their materials online, so have the reference librarians gone online. Rare is the academic library that does not offer email or chat reference service. However, even though students will use these mechanisms to communicate with one another and with their professors, they seem less interested in using electronic mechanisms to communicate with librarians. OCLC (2006a) found that of the students who did seek help with using electronic resources, 76% of those students approached a librarian for help yet only 2% used an online reference tool. Six out of ten students preferred face-to-face interactions (OCLC, 2002). Other studies indicate similar preferences and levels of adoption during the period of 2000 to 2005 (Cummings, Cummings, and Frederickson, 2007; Horowitz, Flanagan, and Helman, 2005; Radford & Kern, 2006). Head & Eisenberg found that 11% of students on six campuses ( $n = 2,183$ ) reported using chat or email-based ask a librarian services (2009, p. 23). However, some single institution studies show increased awareness and use of virtual reference services among undergraduate students (e.g. Jakubs, 2008).

#### **2.3.4.2 Library instruction and Information literacy**

Library Instruction, until recently called ‘bibliographic instruction,’ has been offered by academic libraries to undergraduate students for many years. The purpose of library instruction is to prepare students to use resources relevant to their course or academic project, to encourage awareness of resources and services, and to teach skills associated with identifying and evaluating information. Instruction librarians typically work with teaching faculty to use one class session in the semester as the *library instruction* session. A one-hour session is standard where lecture can be mixed with discussion and hands-on work where students can use computers or print materials to apply their learning. Other models include librarian-led “for credit” courses and online tutorials (Rausch & Popp, 1997).

The reach of library instruction can be measured indirectly through measures of “presentations to groups” gathered by the NCES Academic Library Survey. In 1994, 3,094 institutions responded to the survey reporting that group presentations reached 6,081,000 individuals accounting for .6 interactions per FTE student (U.S. Department of Education, 1994, p. 10). In 2006, with 3,182 institutions reporting, presentations to groups reached 8.3 million participants accounting for .46 interactions per FTE and in 2008, with 3,080 institutions reporting, 8.97 million patrons participated in almost 500,000 sessions (U.S. Department of Education, 2006, p. 6; 2008a, 2010). ARL libraries reported an 84% increase in the number of students participating in group programming and a 64% increase in group presentations between 1991 and 2006 (Association of Research Libraries, 2008a, p. 11).

### 2.3.5 Who is going to the library?

As libraries increasingly collect and license online electronic resources and students’ preferences for electronic resources are satisfied, it stands to reason that visits to the library would decline. However, gate count statistics reported in the Academic Library Survey (U.S. Department of Education, 2006b, 2008b, 2010a; Phan et al., 2011) indicates stable or growing patterns of building use.

Table 2.9 Gate counts in a typical week at U.S. academic libraries 2004 - 2010

Year	Gate count statistics	Number of libraries reporting
2004	19,368,745	3,653
2006	18,765,712	3,617
2008	20,274,423	3,827
2010	22,077,092	3,689

Sources: U.S. Department of Education, 2006b, 2008b, 2010a; Phan et al., 2011) Table 3, Gate count, reference transactions per typical week in academic libraries, and total information service to groups, by control, level, size, and Carnegie classification of institution.

While the overall number of visits to the academic library remains strong in the age of the Internet, patterns of visiting behavior among undergraduates have shifted. Qun Jiao and Anthony Onwuegbuzie (1997) surveyed students at two universities to generate a demographic profile of who uses the library, finding that approximately 80% of undergraduates visited the campus



library once per week. OCLC (2006a) reports that 14% of students visited an academic library daily, 34% visited the library on a weekly basis, and that 42% visit the library at least monthly. Laurie Bridges, studying the library use patterns of 948 undergraduates found that 96% visited the library at some point in their career, with 71% visiting the library at least once per month and that academic year was not a significant predictor of library visitation (Bridges, 2008).

Students report a variety of reasons for visiting the library. Jiao and Onwugbuzie (1997) found that library resource use such as obtaining books (74%), using online databases (53.2%), and reading books on reserve (38%) accounted for most visits to the library. Studying for a test (67%), reading a textbook (50%), or studying for a class project (49%) were also significant reasons for visits. Using data from a decade later, OCLC (2006a) found a shift in students' priorities from using library resources to the use of library space and facilities during library visits. Forty-eight percent of college students reported visiting the library to do homework or to study, 44% visited a library to use online databases, and 39% reported visiting a library at least monthly to borrow materials. Susan Gardner and Susanna Eng (2005) report that of the undergraduates who used the library at the University of Southern California, 80% visited the library to study alone, 61% did so to use a computer to complete class work, 55% visited the library to study with a group, while 36% visited to borrow a book and 12% sought research assistance. Head & Eisenberg (2009) found 72% of students on six college campuses reported using the library as a place to study.

Jiao and Onwugbuzie (1997) found variation in the reasons why students used the library by gender, how far away the student lived from campus, preference for working alone, and first language. Females were more likely to visit the library to borrow materials and males were more likely to visit the library to study or socialize. Students who prefer to study in groups were more likely to visit the library to study than students who prefer to study alone. Students who lived farther from campus were more likely to use the library to borrow books or get a journal article and use online databases than those who live closer to campus. Non-native English speakers

were more likely to study in the library and obtain a book or article than native English speakers. Students with lower library-anxiety scale scores were also more likely to use the library. Scott Gonyea and George Kuh (2003) included a wide range of institution types in their study and found that students attending liberal arts colleges are more likely to use the library than their peers at research universities. The authors suggest that this may be a function of size since liberal arts college campuses are generally smaller and residential so students can more easily visit the library than their university bound peers; a conclusion that runs counter to findings by Jiao and Onwuegbuzie whose study was conducted at mid-sized universities.

Library buildings have also been reconfigured to meet new pedagogical emphases in the undergraduate curriculum and the preferences of today's students. Robert Barr and John Tagg (1995) asserted that a paradigm shift was underway in higher education. In the old 'Instruction Paradigm,' a college's purpose is to teach or provide instruction. In the 'Learning Paradigm' the college's purpose is to produce learning. They continued noting that colleges can only meet public demands for accountability by adopting practices and creating environments that encourage learning and then devising ways to assess and communicate those outcomes to stakeholders. Scott Bennett, writing in 2005, suggests that academic libraries must align their missions, their service models, and their facilities with this paradigm: "[a]cademic librarians need to make a paradigm shift from a service to a learning culture" (Bennett, 2005, p. 11). To achieve this shift, Bennett argues that library spaces need to support both sustained study and research as well as social interactions among students to encourage time on task and active learning. Libraries also need to support students who seek solitude or group study and meet their information technology needs for data manipulation, document creation, or presentation production (Bennett, 2005). Bennett also studied the motivations behind academic library renovation projects initiated in the previous decade. He found that the 'changing character of student study space' was a significant motivator in 45% of the projects, second only to the need to accommodate collection growth – 57% – (Bennett, 2003, p. 7).

Over the last fifteen years academic libraries have aggressively reconfigured public service spaces to combine reference, media, and computing service points in coordination with the redesign of learning spaces in the form of ‘Information Commons.’ Donald Beagle conceptualized the information commons as a physical space in a library as well as an organizational structure. The information commons, according to Beagle, integrates the traditional roles of reference, media assistance, and the new roles of technology assistance and production into a single service presence. Instead of forcing a patron to choose a service desk, a single service point is staffed by team members who triage a patron’s needs and ensure students get the help they need from the appropriate team member (Beagle, 1999). Laura MacWhinnie provides a straightforward definition: “the IC is a central location within a library where access to technology and reference service is combined” in which students can initiate a research project, have access to productivity software to manipulate data or write papers, all the while having access to reference and technology staff assistance (MacWhinnie, 2003). Writing in 2006, Joan Lippincott characterized the information commons as sporting pervasive information technology and group learning spaces coupled with access to user support for a variety of research and technology needs (Lippincott, 2006). MacWhinnie cited 19 recently completed ‘Information Commons’ projects in 2003 and reviewed their capabilities, service models, and funding models. As of February 2012, the ‘Information Commons’ blog listed 215 U.S. and Canadian academic libraries boasting a space labeled an ‘information commons’ or a ‘learning commons’ (Information Commons, 2012). Harold Shill and Shawn Tonner (2003) conducted a review of academic library building projects completed between 1995 and 2002 and reported on general project characteristics including technology, user space, collection provisions, interior features, non-library facilities, and facility quality. Shill and Tonner found that these projects increased the number of group study rooms, the number of computer workstations available to students, and the number of seats for studying. They also reported an increase in the presence of ‘nontraditional’

space uses in these buildings including teaching space, conference rooms, computer labs, and educational technology support facilities (Shill and Tonner, 2003).

Aspects and features of library buildings have been shown to be predictors of use as measured by gate count. Shill and Tonner (2004) explored post-occupancy library use related to 171 library building projects, additions, or renovations completed between 1995 and 2002. They found that 80% of responding libraries measured increases in use and 20% saw decreases in use. The median change in use for the ‘increasers’ was 37%. Factors that correlated with increased use are noted in Table 2.10. Notably the presence of general purpose computer labs, wireless access, number of workstations, the presence of cafes or snack bars, and the presence of non-library units in the facility were not significant contributors to post-occupancy use. Other single-site studies report similar findings (Jakubs, 2008).

Table 2.10 Factors correlated with increased library use following renovation projects

Factor	Correlation (Pearson’s r)	Level of significance (p =)
Quality of overall facility ambience	0.244	0.020
Quality of library instruction lab	0.399	0.000
Quality of layout	0.341	0.001
Number of data ports	0.293	0.005
Number and quality of public access computers	0.292	0.006
Quality of natural lighting	0.282	0.007
Quality of user work spaces	0.280	0.008
Quality of telecommunication infrastructure	0.259	0.014
Quality of collection storage space	0.236	0.026
Quality of HVAC system	0.236	0.026
Percentage of seats with wired network access	0.223	0.034

Source: Adapted from Shill and Tonner, 2003, p. 146

Studies of student perceptions reinforce these findings. Nancy Foster and Susan Gibbons (2007) reported in a single-site study that students desired library spaces that provided flexibility to meet multiple needs (group study, individual study, social, media viewing), comfort (furniture, lighting, and ‘food-friendly’), and technology and tools (wi-fi, computers for checking email and writing papers, electricity for charging laptops, hole punch, etc.). They also expressed interest in

having access to librarians and IT support staff as well as information resources in these spaces (books, magazines, DVDs, etc.) (2007, p. 24-25, Ch. 4).

Lynn Sutton, Rosann Bazirjian, and Stephen Zerwas (2009) replicated the OCLC Perceptions study (Sutton, Bazirjian, and Zerwas, 2009) at two universities and found that issues with facilities/building/environment received the highest number of responses to all five questions including the main purpose of the library, the first thing a respondent thought of when they thought about the library, positive associations with the library, negative associations with the library, and suggestions for the library (p. 482-484).

Student self-reports of academic challenge and levels of effort have been positively correlated to library use. Scott Gonyea and George Kuh (2003) in a study using 380,000 CSEQ survey responses over 18 years found that five of eleven academic challenge indicators were found to be positively correlated to library use. These indicators had effect sizes greater than .08, which for the researchers indicated practical significance. Three of these indicators were related to course learning experiences: “put together different facts and ideas, worked on projects integrating ideas from various sources, and applied class material to other areas in life.” The other two items were related to student-faculty interactions: “worked harder than you thought you could to meet faculty expectations and worked harder due to instructor feedback.” Ethelene Whitmire (2001) used data from the National Study of Student Learning (NSSL) to conduct a longitudinal study of undergraduate students’ experiences. The NSSL collected background and experiences data from students over three years using the College Student Experiences Scale and the College Assessment of Academic Proficiency (CAAP) was used to measure critical thinking skills. Early in the college career, background characteristics such as gender, race, high school library use, and pre-college critical thinking scores were predictors of library use. Ultimately, Whitmire’s model found that active learning activities, writing-intensive curricula, student-faculty interaction, and high school library use were significant predictors of library use (p. 539).

Unsurprisingly, students majoring in different disciplines use the library at varying rates. Bridges (2008) found that College of Agriculture and Engineering majors were less likely to use the library than students enrolled in the Arts and Sciences though she found no difference in library visits by class standing.

Ethelene Whitmire (2002a) used the Biglan model of disciplinary differences to investigate the information seeking behaviors of 5,175 undergraduate students. The Biglan model classifies disciplines as Soft or Hard based on the degree to which the discipline agrees on the discipline's important research questions, the focus of research questions (Applied versus Pure), and the degree to which the discipline deals in issues related to living beings (Life versus Non-life) (Biglan, 1973a,b). Whitmire used the students' responses to the Library Experiences Scale questions on the 1996 CSEQ as an indicator of information seeking behavior (refer to Appendix C for the 1998 version of these questions). The Library Experiences questions investigate the frequency with which students perform a variety of library and research related behaviors on a Likert scale from never to very often. Differences in mean scores for the responses were tested for statistical significance between the following pairs of groups: Hard versus Soft, Pure versus Applied, and Life versus non-Life. Students in the Soft disciplines were more likely to engage in 7 of 10 information seeking behaviors including searching the online catalog, asking librarians for help, creating bibliographies, checking citation, and checking out books. Students in the Pure disciplines were more likely to engage in all but one of the information seeking behaviors in the Library Experiences Scale than those majoring in the Applied disciplines. Students majoring in the Life disciplines were more like to engage in 6 of 10 information seeking behaviors than student majoring in non-Life disciplines.

### **2.3.6 Faculty perspectives of the library**

A series of studies conducted by Ithaka S+R (Shonfeld & Housewright, 2006; Housewright & Schonfeld, 2010) found that in the first decade of the 21<sup>st</sup> century, faculty members at U.S. universities, like their students, now prefer network-level information search and

delivery systems. In surveys conducted in 2000, 2003, 2006, and 2009, Ithaka S+R asked teaching faculty where they started their search: in the library, from the library catalog, in an internet search engine, and in specialized electronic databases. The percentage of faculty visiting the library steadily decreased from 2003 to 2009 when less than 10% of faculty visited the library to initiate a search. Use of the library catalog also declined with less than 20% of faculty reporting its use as a starting point in 2009; while use of general purpose search engines increased to a little over 30% in 2009. The most popular starting points were “specific electronic research resources” which were used by almost 50% of respondents in 2009 (p. 5). A further probe found that most faculty preferred discipline-specific electronic resources, to multi-disciplinary resources. An Ithaka study conducted on behalf of the Association of Research Libraries in 2008, found that faculty use a wide range of sources including e-journals, pre-print and working paper services, data-centric e-resources, interactive web sites such as forums and blogs, and professional and scholarly hubs (Maron & Smith, 2008 p. 17).

However, faculty members choose traditional ‘discipline-approved’ methods of scholarly communication when it comes to disseminating their own research findings. Diane Harley, Sophia Acord, Sarah Earl-Novell, Shannon Lawrence, and C. Judson King (2010) explored faculty values, needs, and attitudes toward various vehicles for scholarly communication through 160 interviews with faculty at U.S. from 2007-2009. They found strong preferences for traditional modes of publication, even though there are many viable nontraditional modes of scholarly communication available to faculty. Again, there are differences by discipline driven largely by reward structures and discipline-specific traditions for disseminating research results. Humanities scholars still prefer the monograph, edited volume, and scholarly article for dissemination, while quantitative social scientists and scientists privilege the scholarly peer-reviewed article (Harley et al, 2010). Harley et al. also report “no evidence” that younger faculty members are more likely to use nontraditional modes of dissemination. On the contrary, they are more likely to hew to traditional modes while under consideration for tenure. Established faculty

members, on the other hand, may have more freedom to ‘venture out’ into forms of nontraditional publication (2010). Recent surveys of faculty also reveal little interest in ‘Open Access’ publishing for its own sake. A JSTOR study on scholarly communication in biological sciences found perceptions that open access is seen as “less scholarly” and scholars seek to publish in journals with high impact factors (Quinn & Kim, 2007) finding corroborated by Harley et al. (2010). JSTOR studies on perspectives of History scholars and Economics scholars found similar disinterest in Open Access journals (Griffiths, Dawson, & Rascoff, 2006; Dawson & Rascoff, 2006). Scholars in astrophysics (Harley et. al., 2010) and economics (Harley et. al., 2010; Dawson & Rascoff, 2006) report heavy use of open access pre-print servers used to share drafts of articles and working papers, most of which are eventually published in peer-reviewed journals.

Faculty members remain relatively uninterested in e-books (Housewright & Schonfeld, 2006; Schonfeld & Housewright, 2009; Ebrary, 2007) for their scholarship and research. In a survey of teaching faculty conducted by ebrary in 2006, 36% of faculty did not integrate e-books into their courses because of a lack of awareness of e-books, an inability to find them, perceptions that they were difficult to use, and available e-books were not relevant to the courses they taught (Ebrary, 2007, p. 15). A JSTOR study of perspectives on scholarly communication in the discipline of history found, unsurprisingly, that the scholarly monograph remains a critical vehicle for scholarly communication. However, participants were not aware of many e-books in their field and did not “assign e-books the same scholarly status as print books” (Griffiths, Dawson, & Rascoff, 2006, p. 12). The dearth of e-books in the discipline of history is possibly explained by the fact that most history monographs are published by university presses, entities which have not yet entered the e-book market with some exceptions such as Oxford University Press.

As noted earlier, faculty are just as enthusiastic about using electronic journals as their students (Tenopir and King, 2007; King, 2003; and Smith, 2003), but they have been slower to embrace the complete conversion of the periodical literature to e-formats. Predictably, there is



variation among disciplines. In 2006, Ithaka found over 60% of Humanities scholars, slightly less than 50% of Social Sciences faculty, and 40% of faculty in the Sciences said they would prefer to read a journal article in its “original printed format” (Schonfeld & Housewright, 2006, p. 60). However, faculty in 2006 were accepting of the inevitable move to e-formats for current issues of periodicals where 60% of faculty strongly agreed with the statement that “If my library cancelled the current issues of a print version of a journal but continued to make them available electronically, that would be fine with me.” This figure exceeded 70% in 2009 (Housewright & Schonfeld, 2010, Figure 12, p. 15). Signs suggest that faculty members are reluctant to part with back-files of print journals even if e-journal collections “are proven to work well and are readily accessible” but opinions are changing quickly. In 2003 and 2006, 20% of faculty respondents strongly agreed with a policy of discarding print back-files. In 2009, almost 40% of reporting faculty strongly supported doing so (Housewright & Schonfeld, 2010, p. 18).

Since its 2003 survey, Ithaka has asked faculty members about their perceptions of three roles for the academic library: purchaser, preserver, and gateway. From 2003 to 2009, the proportion of respondents who stated that the gateway role “is important” has declined in all disciplines correlating with the increased reliability and maturity of network level discovery tools (Housewright & Schonfeld, 2010, p. 10). In 2003, 80% of Humanities respondents stated the gateway role was important, a figure that declined to 65% in 2009. The decline among Social Sciences faculty was from 70% to a little less than 60% and the decline among Sciences faculty was from 65% to 45%. While perceptions of the gateway role have declined, perceptions of the importance of the library’s archival role have been stable. Since 2003, around 70% of faculty stated that the archival role was important. This is consistent with findings that show faculty are comfortable with e-formats for scholarly resources, only if appropriate preservation mechanisms are put into effect (Schonfeld & Housewright, 2010). Over the same period, faculty appreciation of the library’s role as a purchaser of information resources has increased, with 90% of faculty agreeing that this role was important in 2009 (p. 9). In 2009, Ithaka asked faculty members about

the importance of library support for teaching and research. Almost sixty percent of faculty agreed that these roles were important in 2009. There was variation by perceived role as well. Faculty members who see themselves as teachers as opposed to researchers rated libraries' teaching roles (67% vs. 45%) and researching roles (62% vs. 51%) as important. The study's authors note that "these patterns suggest that the relationships built through engaging faculty in supporting their own teaching activities ... may be an especially beneficial way to build relationships with faculty members more broadly" (p. 10). The Ithaka surveys also asked faculty to report on their dependence on the library. The proportion of faculty who say they are very dependent on the library declined from 2000 to 2006, and then increased to a little over 40% of respondents in 2009. The study's authors conclude that faculty may be more aware of the library's 'purchaser' role due to the dearth of other sources during the recent economic downturn or because of improved library advocacy efforts.

In summary, trends suggest that faculty in all disciplines are increasingly using network-level discovery tools and discipline-specific information hubs for their work. While libraries are acquiring materials needed to support faculty teaching and research efforts, the *visibility* of these efforts to faculty is on the decline. The typical configuration and use of Google Scholar (2012) illustrates this dilemma. Libraries can share their electronic holdings with Google to support 'appropriate copy' linking from within Google Scholar results. Users may therefore use Google Scholar to discover and ultimately access a library-licensed resource, but the user may never know that the library was responsible for its purchase. As academic libraries shift resources away from print and toward electronic formats and resource use is increasingly dis-intermediated, libraries will continue to see a decline in visibility among faculty. As library visibility decreases, faculty perceptions of the library's value to the enterprise will decline. Faculty members' current preference for 'discipline-specific' traditional modes for publishing their own research, driven largely by reward structures, may provide a temporary reprieve as faculty will remain reliant on academic libraries as purchasing agents for scholarly materials for the foreseeable future.

According to David Lewis (2007) such a reprieve may provide time to allow academic libraries to redefine their relationships with teaching and research faculty and communicate the library “value proposition”.

### **2.3.7 Academic leaders’ perceptions of the library**

In 1968, Robert Munn used the metaphor “Bottomless Pit” to describe expenditures in the academic library saying “only the librarian is unable to place any limits on his needs” (Munn, 1989). Munn wrote during a time of retrenchment in higher education and modern management techniques were being introduced into universities. In this environment, Munn saw the library unable to communicate its value or quality in ways that justified costs. These sentiments were echoed by Wesley Posvar, Chancellor of the University of Pittsburgh, who noted increasing public demands for measurements of performance in higher education would soon bring increased scrutiny on the academic library (Posvar, et al. 1977).

Larry Hardesty conducted interviews with thirty-six chief academic officers (CAOs) in 1991 and found that indeed many administrators remained frustrated with the increasing costs of library materials and services, but were also enthusiastic in their support for the library and its role. While several CAOs supported the library financially for symbolic reasons, the practical nature of the library’s contributions to undergraduate outcomes was of more importance. Finally Hardesty sensed the CAOs were frustrated with the demands for evidence of student learning from accreditation agencies and externally initiated assessment initiatives and the CAOs’ inability to apply those metrics when judging the library’s needs (Hardesty, 1991). Hardesty agreed with Munn however, when asserting that library directors needed to be better advocates for their libraries and build better relationships with administrators.

Deborah Grimes (1998) approached the question of CAO attitudes through examining the construct of organizational centrality, a concept which merits introduction. Given a scarcity of resources in the modern university, organizational units compete for resources or to avoid elimination. A unit’s ability to compete is proportional to its perceived centrality. Grimes cites

two definitions of centrality. The first is based largely on the concept of “workflow pervasiveness” and “immediacy.” Pervasiveness is the degree to which a unit interacts and is interconnected with other units through its workflow. Grimes cites Hickson, Hinings, Pennings, and Schneck’s definition of immediacy as “the speed and severity with which the workflows of a subunit affect the final outputs of the organization” (Grimes, 1998, p. 40), that is how quickly will the organization notice that work stops or slows in the unit. A unit’s centrality and power is therefore directly proportional to its pervasiveness and immediacy. The second definition of centrality is the degree to which a unit’s purpose is connected with the larger organization’s mission. Core units could negotiate for resources on their own terms since their purpose was tightly aligned with the mission of the university. Peripheral units were strongest in negotiations when seeking resources in support of the larger organization or when they were able to acquire resources from outside the organization (Grimes, p. 42). Grimes evaluated the concept of centrality of the academic library in seven interviews with CAOs or Deans at Universities in 1992. She found that the CAOs did not agree with the assertion that the library played a symbolic role as the heart of the university. Instead they saw the library’s practical roles providing access to resources and study space measured through use as more important. The CAOs also thought both definitions of centrality as applied to the library, interconnectedness and contributions to the mission, to be equally important.

Beverly R Lynch, Catherine Murray-Rust, Susan E. Parker, Deborah Turner, Diane Parr Walker, Frances C. Wilkinson, and Julia Zimmerman (2007) repeated Grimes’s study and found that the meaning of the academic library to campus constituencies was changing. The CEOs and CAOs in this study were mixed on the degree to which the library remained the heart of the campus. Some participants said that libraries remain symbolically at the heart of the campus due to their location, their role as a gathering point for students, and as the main repository for printed materials representing the institution’s commitment to scholarship and support for faculty research. However, the participants thought that practical contributions to student and faculty

productivity with the library itself were far more important than symbolic roles. Decision drivers for CEOs and CAOs included library-use statistics, innovative services, quality of staff and collections, satisfaction of students and faculty, acquisition of outside funding, and contributions to visibility of the institution. Interestingly, the last two emphases were not found in Grimes' 1992 study. While the physical role of the library for storing print resources remained important, CEOs and CAOs noted the shift to virtual access to information posed challenges to libraries and that "the centrality of libraries has been diminished because of technology" (p. 219). The participants were concerned that faculty and students were unaware that the library acquired and maintained access to these resources on their behalf and libraries should correct this misperception (p. 219).

Leigh Estabrook (2007) interviewed twenty-four CAOs at two and four year institutions to understand "what they wanted from their libraries" and their library directors. These participants measured library quality by their contributions to student and faculty success and satisfaction. They also wanted the library to be "central" to the purpose of the university, highly prizing libraries that included instructional space, faculty offices, and IT facilities. These leaders wanted their library directors to have a service orientation and to collaborate effectively with faculty, students, and IT. These participants also expressed interest in statistics on use, measures of value vs. the cost of library investments, and strong advocacy for the interests of the library. Barbara Fister (2010) surveyed 130 academic leaders and found many of the same trends. CAOs in this study noted trends in technology and access have changed user expectations and libraries need to be entrepreneurial, creative, and attentive in these times. The CAOs were aware of relatively new roles for librarians including user-centered outreach and information literacy efforts and were interested in librarians being more involved in support for student learning. These leaders also wanted their library directors to use evidence and data in their advocacy efforts.

Several trends can be noted from this review of CAO perceptions of libraries. CAOs observe that dramatic shifts in information technology within libraries and competition from external information providers are changing users' perceptions of the academic library. CAOs expect libraries to answer this challenge by creating new roles and opportunities, while making measurable contributions to student learning and faculty research outcomes. Finally, CAOs want library directors to be better advocates for their organization's missions using evidence of the libraries contributions to the institution's mission to communicate the needs of the library.

### **2.3.8 Summary**

This section of the literature review identified some of the trends in the use of academic libraries and stakeholder perceptions of the academic library in light of these trends. Truly, today's academic library differs greatly from the library of twenty years ago. The conversion of current periodical literature to electronic formats is almost complete; and as the scholarly monograph makes the transition from print to electronic format, the process of disintermediation will almost be complete. Both the students and faculty of today enjoy the convenience of electronic resources, yet they are growing increasingly intolerant of difficult to use applications, unreliable delivery systems, and inexplicable barriers to access. While library discovery tools and publisher platforms are still used, there is growing evidence that discovery begins with internet search engines or Google Scholar which connects the user to licensed resources via a library-licensed and maintained link resolver. Users do not have to enter the library and they need not talk to a librarian. In this scenario, the institution's investment to acquire access to these resources and the technical infrastructure and staff commitment to enable delivery are largely invisible to the end-user be they undergraduate, graduate student, or faculty member. In addition to internet search engines, the open web and numerous open access repositories compete with the academic library for the time and attention of scholars, professors, and students. And soon the proportion of the average academic library materials budget devoted to electronic resources will pass the 50 percent mark forcing academic administrators and library directors to question the

long term commitment of precious campus space to aging print resources. Justified by the shift in expenditures from print to e-resources, students are less likely to visit the library to use information resources, but may increasingly ‘only’ use library space for studying, using productivity software, and collaborating with their peers. And faculty members rarely if ever visit the library. These trends pose challenges for the academic library and the academic library director.

As academic libraries proceed to tackle these and other challenges, evidence suggests they must abide by three rules: Library priorities and initiatives must be aligned with the teaching and research missions of their institution. Libraries must incorporate findings from local user studies and industry-wide environmental scans into their planning initiatives. Finally, academic libraries must communicate their contributions using terms and measurements that are meaningful to stakeholders in higher education. Failure to do so will jeopardize the utility of library services and collections to students and faculty, further decreasing library visibility. The opportunity to act is now, as David Lewis says,

“Books and libraries are revered in academic culture, and librarians in general are well thought of by faculty and even administrators. We have a reasonable measure of good will that we can spend down. If we do this wisely, we can successfully manage the transition we now face. However, this window will not stay open forever, so we cannot afford to wait too long” (p. 420).

## **2.4 Toward an operational definition of library impact**

“Few libraries exist in a vacuum, accountable only to themselves. There is thus always a larger context for assessing library quality, that is, what and how well does the library contribute to achieving the overall goals of the parent constituencies.” Sarah Pritchard, 1996, p. 752.

“We need to understand that the success of the academic library is best measured not by the frequency and ease of library use but by the learning that results from that use.” Scott Bennett, 2005, p. 11.

“[T]he primary purpose of measuring the value of a library must be to see if the library is doing well, not to judge whether it is doing better or worse than other libraries” Jennifer Cram, 1999, p. 2.

The academic library, as a subunit in the university, must align its activities and assessment regime with the mission, purpose, and results of its parent institution and develop its own ‘constellation of mechanisms’ to communicate the ways in which it contributes to results of interest to their stakeholders. This portion of the literature review defines key terms and examines the library performance measurement literature for solutions to this challenge.

#### **2.4.1 Definitions**

The terms assessment and evaluation are often used interchangeably in the library literature. Helpfully, Dugan, Hernon, and Nitecki (2009) provide definitions for these terms noting that assessment is “a process-oriented, cyclical activity involving the collection of information and appraisal data to measure or otherwise gauge progress toward a goal or benchmark.” Evaluation is the process of “interpreting data that was collected in assessment practices” for the purpose of “making judgments about the value of a policy, project, program, or service and determining if the benchmarks are being met” and making “decisions about ways to correct, improve, or terminate a program” (p. 48). In short, assessment is concerned with measurement, evaluation is concerned with “comparing ‘what is’ with ‘what ought to be’” (Van House, Weil, McClure, 1990, p. 3).

Robert S. Taylor, writing in 1973, suggested three purposes for conducting library evaluation: (1) short term decision making, (2) long-term planning for purposes of predicting future demands for library services, and (3) to support the study of information use processes to create models, “simulation programs”, and better tools for library managers (p. 33). As early as the 1970s, Ernest DeProspero, Ellen Altman, and Kenneth Beasley (1973) noted the importance of demonstrating library effectiveness to stakeholders as evidence that public expenditures in libraries were well spent; a purpose expressed by others (e.g. Van House, Weil, & McClure, 1990; Baker and Lancaster, 1991). Writing in 2009 in regard to academic libraries, Dugan, Hernon, and Nitecki (2009) note that assessment and evaluation methods should be designed to detect how well the library is contributing to its parent institution’s mission to “determine their



internal status,” to aid in communicating this fact to stakeholders, to support resource allocation, and to support corrective action that will improve the library’s performance. Peter Brophy (2006) states that performance measurement often pertains to one of the three Es: *Economy* or “is the service being offered as cheaply as possible?”; *Efficiency*, which focuses on ratios of output per unit cost, and questions of *Effectiveness* that ask if the “right product is being delivered” to meet expectations and are “often linked to questions of value and impact” (p. 7). While issues of efficiency may be touched on briefly, this review emphasizes the communication of accountability through evidence of library effectiveness.

Joseph McDonald and Lynda Micikas (1994) note that library effectiveness can be generally defined as “accomplishing tasks in ways that promote the general well-being of an organization, its members, and its constituencies” (p. 1), yet they acknowledge such an imprecise definition is of limited use to researchers or practitioners. Sharon Baker and F.W. Lancaster (1991) offer that “library effectiveness can be measured as how well a library service satisfies the demands placed on it by its users” (p. 7), such as measures of success in answering reference questions or the degree to which materials are available when a user needs them. Richard Orr defines effectiveness of a service as its “capability for meeting the user needs it is intended to serve” and differentiates between the effectiveness of a service with the benefits accrued by users when he wrote in 1973 that “the value of a service must ultimately be judged in terms of the beneficial effects accruing from its use as viewed by those who sustain the costs” (Orr, 1973, p. 318).

#### **2.4.2 Types of measures and the linear model of library impact**

Dugan, Hernon, and Nitecki (2009) identify five types of metrics that are relevant to library performance evaluation. *Input* metrics are the “resources provided to the library” including staff, materials, equipment, and space and represent the “cost of operating the library as well as the mix of resources used to provide the library’s services.” *Process* metrics “portray how efficiently resources are transformed into potential capabilities or to deliver services” and

focus on “how something gets done” in terms of time, money, or both. *Output* metrics suggest “the degree to which a library and its services are used.” Historically, output measures have been seen as indirect measures of value (Orr, 1973). *Outcome* metrics on the other hand “indicate the effects of library services on an individual and ultimately on the library’s community,” including changes in “attitude, skills, knowledge, behavior, status, or condition.” *Performance* metrics, however, measure “progress toward predetermined goals” and may communicate efficiency, quality in terms of user satisfaction and success in meeting customer expectations, or “qualitative results of a service” in terms of the degree to which user interactions with the service enabled the intended outcomes” (Dugan, Hernon, and Nitecki, 2009, p. 56-57).

The terms outcomes and impact are often used interchangeably in the literature, when their meaning is really quite different and so they bear definition. The Association of College and Research Libraries standard for Outcomes Assessment provides a broad definition of library focused outcomes: “the ways in which library users are changed as a result of their contact with the library’s resources and programs” (American Library Association, 1990). Peter Rossi, Mark Lipsey, and Howard Freeman (2004) make the connection between program objectives and outcomes explicit when they assert “an outcome is the state of the target population or social condition the program is expected to have changed” (Rossi, et al. 2004, p. 204). Caroline Wavell, Graeme Baxter, Ian Johnson, and Dorothy Williams (2002) provide a similar, yet vague, link when they state that “[o]utcomes are the positive or negative *engagement* with planned outputs by an intended or unintended user” (2002, p. 7). John Bertot and Charles McClure suggest outcomes can be anticipated, emergent, or unanticipated. Anticipated outcomes are those changes in users that library services are intended to effect and are included in implementation and assessment plans. Practitioners become aware of emergent outcomes during the planning or implementation of the service and ultimately include them in assessment plans. Unanticipated outcomes arise after a service becomes operational and may be positive or negative (Bertot & McClure, 2003). Outcomes may be short term or long term (Poll, 2007, p. 32; Brophy, 2006, p. 56).

Impact however, involves verifying an outcome was achieved and confirming the outcome was an effect of the user's interaction with a library service, program, or interaction.

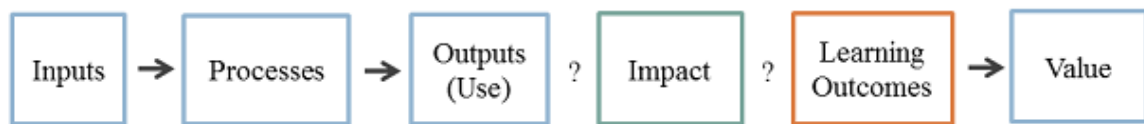
Caroline Wavell, Graeme Baxter, Ian Johnson, and Dorothy Williams define library impact as

“the overall effect of *outcomes* and *conditioning* factors resulting in a *change* in state, attitude or behaviour of an individual or group after engagement with the output and is expressed as ‘Did it make a difference?’”

Jenny Cram (1999) states that “[t]he impact of an event or activity is the effect it has on other activities, or on the providers, recipients or beneficiaries of those activities. Outcomes, on the other hand, are the realised benefits or detriments that flow from those impacts.” Rossi, Lipsey, and Freeman (2004) again provide clarity in their definition of impact as “that portion of an outcome change that can be attributed uniquely to a program, with the influence of other sources controlled or removed” (Rossi, et al. 2004).

The relationships among inputs, outputs, processes, and outcomes have practical implications for the design of effective performance assessment tools. John Bertot and Charles McClure (2003) propose an inclusive framework linking each type of metric asserting that “inputs are the resources that libraries invest ... in order to produce outputs .... [Q]uality assessment involves determining the degree to which users find the library services/resources (outputs) to be satisfactory (p. 599).” Outcomes assessment is used to “to determine the impact of those outputs” on users and “without outputs there are no outcomes.” Therefore “libraries need to know what investments (inputs) produce what services (outputs), in order to determine the perceived quality (quality assessment) and impacts (outcomes) of those services/resources” (Bertot & McClure, 2003). While Bertot and McClure do not distinguish between impacts and outcomes, Roswitha Poll and Phillip Payne (2006) assert impact as the “effect or influence” of a user's interaction with a library output that contributes to the attainment of outcomes (p.549). Poll and Payne suggest that the general linear model for connecting library inputs to outcomes should be modified so as to acknowledge this distinction. Their model has been adjusted for the

academic context in as shown in Figure 2.2.



Source: Adapted from Poll & Payne, 2006

Figure 2.2 General linear model of academic library impact

Wavell, Baxter, Johnson and Williams (2002) extend our definition, asserting that understanding impact involves making the connection between the service interaction (output) and the outcome *and* exposing the conditioning factors underlying the effect. These conditioning factors may be described as independent variables contributing to or inhibiting the effect of the user's interaction(s) with library outputs. Conditioning factors then can describe attributes of the service, aspects of the interaction, or conditions of the user which mediate the effect (e.g. Cram, 1999).

#### 2.4.2.1 An operational definition of library impact on student learning

Using these definitions we can say that “demonstrating academic library impact involves connecting student use of the library with institutional expectations for undergraduate student learning while isolating and articulating the conditioning factors of library use that influence student achievement.” To meet these standards, library impact assessment tools must link library use to appropriate student learning outcomes, generate credible evidence that libraries contribute to those outcomes, and identify factors of library use that influence student achievement.

#### 2.4.3 Toward user-oriented assessment in academic libraries

Richard Orr recognized in 1973 that the value of a library service or resource is ultimately defined by the objectives and criteria of the larger organization which the library serves and ultimately, measures that focus on benefits to the user will be of the highest use to evaluators (Orr, 1973, p. 328). A significant early effort to assess library performance with regard to impact on the user was the work done by Ernest De Prosopo, Ellen Altman, and Kenneth

Beasley authorized by the United States Office of Education in 1971 (De Prospro, Altman, & Beasley, 1973). In this project they identified public library measures that contributed to user success, created a simple-to-use instrument, and field-tested the instrument. The resulting scorecard presented statistics that could tell a manager at a glance how well their library scored relative to other libraries of similar size. Dimensions measured included materials availability and use, building use, reference service activity, user satisfaction with their visit, and staffing measures (De Prospro et al., 1973, p. 47). In 1990, on behalf of the ACRL Ad Hoc Committee on Performance Measures, Nancy Van House, Beth Weil, and Charles McClure presented a practical approach for measuring academic library performance that used surveys of materials availability, general satisfaction, reference satisfaction, and satisfaction with online search experiences ultimately providing fifteen measures (see Table 2.11). Their approach also makes a special emphasis on measuring user satisfaction with the library on a specific visit using averaged scores from Likert-style satisfaction questions. They recommend easy-to-gather measures in the form of ratios, such as circulation per volume added, for demonstrating library performance (Van House, Weil, & McClure, 1990, p. 128).

Table 2.11 Use oriented measures of academic library measures

General Satisfaction	Users' reports of success during the library visit, ease of use, and satisfaction
Materials Availability and Use	Circulation, In-Library materials use, total materials use, materials availability, requested materials delay
Facilities and Library Use	Attendance, remote use, total use, facilities use rate, service point use, building use
Information services	Reference transaction, reference satisfaction, user satisfaction with online search

Source: Adapted from Van House, Weil, and McClure, 1990, p. 5.

#### **2.4.3.1 Satisfaction studies**

Satisfaction as a construct encompasses the library user's subjective sense of contentment with services received and has been defined as "an affective or emotional reaction to a service encounter or a series of such encounters" (Hernon, 2002, p. 227). Satisfaction surveys can ascertain satisfaction with a specific service or with the library as a whole (Cullen, 2001).

However, Van House, Weil, and McClure note that user perceptions of satisfaction may vary depending on the service in use on a given visit and suggest that satisfaction surveys be limited to assessing a specific encounter (Van House et al., 1990, p.45). To do so, they recommend the survey identify which services the patron used on a given visit, the user's perception of their success, how easy the library was to use on that visit, the motivation behind the visit, and basic demographic variables. Responses to satisfaction studies are typically scored using Likert scales. Point of use satisfaction measures may have great utility to the manager seeking defects in service delivery for purposes of improvement or training and can clarify a library's understanding of its users' needs (Cullen, 2001).

However, satisfaction measures have limited utility in communicating accountability to stakeholders. Peter Hernon and Ellen Altman point out that user satisfaction with a given service encounter, may have little to do with how well the service performed. For instance, a patron could be satisfied with the answer to a reference question, even though the answer itself may be incorrect (Hernon & Altman, 1996). Jennifer Cram provides several critiques of satisfaction measures as indicators of impact stating they are not measures of outcome, but "surrogate measures of service quality" (1999). Their inward looking nature and focus on current customers may also limit forward looking innovation (Cram, 1999).

#### **2.4.3.2 Service Quality**

In 1999, the Association of Research Libraries, recognizing that measures of capacity were inadequate for communicating accountability to the institutional mission, charged its Statistics and Measurement Committee to articulate new measures of effectiveness which emphasized outcomes (Cook, Heath, Thompson, & Thompson, 2001; ARL, n.d.). One of the instruments to emerge from this effort is LibQual+, a tool for evaluating service quality in research libraries.

Libqual+ is based on the Gaps Model of Service Quality (Parasuraman, Zeithaml, & Berry, 1985) which asserts the "quality that a customer perceives in a service is a function of the

magnitude and direction of the gap between expected service and perceived service” and the customer’s judgment of quality is the only judgment that counts (Zeithaml, 1990, p.46). Valarie Zeithaml and A. Parasuraman at Texas A&M University created the SERVQUAL survey instrument to measure service quality gaps in corporate settings. The instrument seeks to ascertain customers’ expectations for a service and their perceptions of its performance in five areas: (1) reliability, the ability to perform a service accurately; (2) assurance, the ability of employees to convey trust and confidence in customers; (3) empathy of customer service employees; (4) responsiveness; and (5) tangibles, including facilities, equipment, and personnel. The SERVQUAL instrument included 22 questions to ascertain customer impressions of service quality in terms of minimum service levels, desired service levels, and experienced service levels. The differences between minimum and desired service levels are considered zones of tolerance. Experienced service levels that do not fall within the zones of tolerance are gaps which must be closed (Cook, Heath, Thompson, & Thompson, 2001, p. 106).

Texas A & M libraries administered SERVQUAL over six years to assess library service quality and identified three valid dimensions of library service quality: tangibles, reliability, and affect of library service (Cook & Thompson, 2000; Cook & Heath, 2001). The questions and response categories used in the Texas A & M studies were refined to create the LibQUAL+ instrument first tested and implemented at Texas A & M (Cook, Heath, Thompson, & Thompson, 2001) and implemented by ARL in 2001. Delivered as a web-based or paper-based survey the current version of LibQUAL+ includes 22 questions focused on the dimensions of information control, affect of library service, and library as place on a scale of 1 to 9. Libraries can also add up to 5 local service quality questions and a comments box for open-ended responses. The responses are stored and processed on ARL servers. Libraries receive detailed reports revealing minimum, expected, and experienced levels of service quality reported by characteristics of respondent including academic status (faculty, graduate students, and undergraduate student),

discipline, gender, and age (e.g. Duke University Libraries, 2007). ARL also reports norms for all ARL libraries on a protected portion of its website for comparison purposes.

Libraries have reported several benefits from using LibQual+ gaps scores to support strategic planning and to focus on improving specific services. As an example, the Notre Dame libraries used the instrument in 2006 and identified the largest satisfaction gaps in the area of information control among faculty. Satisfaction gaps among faculty responses were observed on three service areas related to adequacy of journal and monograph collections and the adequacy of the library web-site to support “locating information on their own” (Kayongo & Jones, 2008, Table 2). To further understand the phenomenon, LibQual+ scores for all ARL libraries were analyzed compared with selected ARL statistics where they found that total expenditures on information resources, expenditures for document delivery and interlibrary loan, and staffing levels were found to be to identify institutional characteristics that correlated with LibQUAL scores on information control dimensions. They also used LibQUAL+ norms to identify the libraries whose patrons reported the highest levels of “web-site” adequacy, to identify web-sites that may be effective in this area to guide improvements at Notre Dame (Kayongo & Jones, 2008).

#### **2.4.3.3 Measuring outcomes and impact**

Satisfaction and service quality are indeed user-oriented methods of understanding library effectiveness. While universities may desire that their libraries provide high levels of service quality; that is not the reason for which libraries are funded. Libraries are funded to contribute to the teaching, research, and service mission of the university (Association of College and Research Libraries, 2011). Detecting these contributions has proven to be a significant challenge.

Unarguably, undergraduate education is one of the central purposes of colleges and universities. Broadly, colleges and universities are responsible for providing students with opportunities to acquire knowledge, to gain skills, to improve their broad abilities such as reasoning and critical thinking, to prepare for success in a profession, and to contribute to society.



Student outcomes and student learning outcomes are evidence that these opportunities are provided, conditions are established to encourage student success, and a portion, at least, of the student body is availing themselves of these opportunities. According to Peter Hernon and Robert Dugan student outcomes are aggregate statistics that refer to groups of students in terms of retention, graduation, and job placement. Student learning outcomes are concerned with “attributes and abilities both cognitive and affective, which reflect how the student experiences at the institution supported their development as individuals” (Hernon and Dugan, 2002).

#### **2.4.4 Candidate outcomes associated with academic library use**

Hernon and Dugan (2002) outline three levels of institutional outcomes to which libraries might contribute, a) easy to gather measures, b) lower order outcomes, and c) higher order outcomes. The easy to gather measures include retention and graduation rates, preparation for the workplace as assessed by employers, and the number of graduates pursuing post-graduate education. These measures could be correlated with library use but direct connections are difficult to make. Hernon and Dugan define lower order outcomes as evidence of skills learned, such as awareness of resource availability or skills in using information gathering tools. Higher order competencies are defined as critical thinking and problem solving skills. Evidence of connections to library services are yet even more difficult to make at this level. Hernon and Dugan also note that

“higher order competencies, require direct evidence of achievement ... [and] their achievement can be neither assumed or inferred, rather the connection or association must be established” (Hernon & Dugan, 2002, p.103).

Writing in 1992, Ronald Powell exhorted researchers to develop methods for exploring and communicating the ways in which the academic library provides value to its users. He suggested several candidate outcomes including grades, critical thinking skills, communication skills, graduation, and retention (1992). Powell identified several methods useful for identifying outcomes including focus groups, interviews, and user panels. Poll recommends the use of both qualitative methods (surveys, interviews, focus groups, user self-assessments of gains) and

quantitative methods for “finding correlations between library use and a person’s academic success” including pre and post-tests, performance monitoring and data mining, unobtrusive observation, analysis of citation data over time, and comparison of data about user success (e.g. graduation, grades) with library use data (Poll, 2007, p. 33 – 34). Numerous authors suggest libraries focus on the assessment of information literacy outcomes (e.g. Smith, 2007; Hernon & Dugan, 2002).

In recent decades some progress has been made in identifying the ways undergraduates benefit from interactions with the library. The next sections of this paper review this literature. Outcomes considered include retention, academic performance, gains in information literacy skills, and the degree to which student-library interactions correlate with known ‘best-practices’ in higher education.

#### **2.4.4.1 Retention**

There is evidence that library use correlates with retention. Kramer and Kramer (1966) found a positive relationship between library use and persistence, as non-readers dropped out 40% more often than readers. Elizabeth Mezick (2007) used library expenditures, student FTE figures, and library staffing data from *ARL statistics 2002-2003* and *ACRL Library Trends and Statistics 2003* and retention data from the Integrated Postsecondary Educational Dataset (IPEDS) to explore correlations between library expenditures and student retention. She found moderate relationships between total library expenditures ( $r^2 = 0.205$ ,  $p < 0.001$ ), total library materials ( $r^2 = 0.237$ ,  $p < 0.001$ ), and expenditures on serials ( $r^2 = 0.211$ ,  $p < 0.001$ ) and student retention. A major weakness to this study is that Carnegie Classification was the only control variable used in the analysis and the limited number of variables in the model. Stanley Wilder (1990) and Darla Rushing and Deborah Poole (2002) report a different type of library influence on undergraduate retention: holding a job in the library. Wilder suggested that working in the library “demystifies” library work, possibly reducing anxiety associated with library research and being associated with academic role models could be contributors to retention (1990). Rushing and Poole (2002)

reported that efforts to provide students with meaningful work and involving them in the life of the library may be factors contributing to retention. The finding that holding a student job in the library is tied to retention is in alignment with Vincent Tinto's Theory of Student Departure which suggests that retention is related to the degree to which a student integrates into the academic and social life of the campus (Tinto, 1975, 1993). Holding a campus job, especially in an organization that supports the academic mission, is a form of integration that has been found to be related with "higher levels of effort and involvement" including "use of the library, interactions with faculty, involvement in learning through coursework, writing experiences and activities, [and] other curricular and extracurricular activities" as well as higher estimates of self-reported gains (Aper, 1994).

#### **2.4.4.2 Objective measures of academic performance**

Several pre-1990 studies as reviewed by Charles Harrell (1988) investigated grade point average as a predictor of library use, and without exception found a low if significant relationship. Harrell (1988) in his doctoral dissertation studied the role of several independent variables as predictors of library use and he too found that grade point average was not a significant predictor of library use. Several studies investigating this issue have switched the dependent and independent variables by exploring the linkages between student use of library materials and academic performance and found weak to no correlation. Jane Hiscock (1986) examined the relationship of library use to grades and found only that use of the library catalog was a predictor of academic achievement. James Self (1987) found that use of reserve materials was not a useful predictor of academic performance. Karin de Jager (1997) investigated linkages between student use of materials on reserve for a given class and those students' final exam grades. In de Jager's study she compared short loan (reserves) and open shelf circulation records with final exam grades for students in 2 History courses, one economics course, and one group of sociology students. A significant positive correlation was found between open-shelf reading patterns and final exam grades for the two history groups and the sociology group. However,

there was no correlation between use of the short loan collection and final exam grades for any of the groups. Shun Han Rebekah Wong and T.D. Webb reported on a large-scale study with a sample of over 8,700 students grouped by major and level of study. In sixty-five percent of the groups, they found a positive relationship between use of books and A/V materials borrowed from the library and GPA (2011). And in a large-scale study, researchers at the University of Huddersfield (Stone, et al., 2011, 2012) using data from eight universities demonstrated correlations between book checkouts and electronic article downloads and graduating with honors.

#### **2.4.4.3 Library skills and information literacy as dependent variables**

Libraries have provided instruction to users for generations, but an emphasis on library instruction picked up steam in the 1990s in part to instruct users how to use new digital resources. Some authors argue that more instruction is needed (Head & Eisenberg, 2009) while others argue that as information systems become easier to use instruction will no longer be needed (Wilder, 2005). Interest in information literacy outcomes emerged in the 1990s in parallel or perhaps in response to calls for learning outcomes assessment in higher education institutions (American Library Association, 1989). The Information Literacy Competency Standards for Higher Education issued by the Association of College and Research Libraries (American Library Association, Association for College and Research Libraries, 2000) codified information literacy learning outcomes for academic libraries and established criteria for assessment. Megan Oakleaf (2008) identified three main categories of information literacy assessment gains: fixed choice tests, performance assessments, and rubrics. Affective impacts and changes in behavior are other impacts of information literacy instruction that have been measured.

#### ***Fixed choice tests***

Changes in students' information seeking abilities are most often assessed through locally developed tests. A few examples are shared here. Donald Barclay (1993) constructed a local test

using free response questions in combination with a survey to evaluate the increase in library use skills and attitudes following library instruction to freshman writing classes. Elizabeth Carter (2002) also used locally developed tests and survey questions to measure the effectiveness of library instruction for students in a Psychology class. Barclay found improvement from pre-tests to post-tests, but Carter did not. Chris Portmann and Adrienne Rousch (2004) conducted similar research using pre-tests and post-tests investigating the utility of a one-hour library instruction for community college students in a Sociology class and found there was no increase in skills following the session. Heidi Julien and Stuart Boon (2004) assessed through pre-test, post-test, and post-post-test the impact of one-hour library instruction sessions with six groups at five different institutions. Statistically significant increases were found for four groups between the pre-test and post-test, however, one group showed a statistically significant decline in the post-post-test administered three to four months after the instruction.

The high levels of effort and skills required for the local development of reliable tests is a significant obstacle to continuous assessment of library instruction efforts. Standardized tests developed by professional testing agencies should reduce overall costs and increase reliability. Two such tests are worth mentioning, though results of their utility in the field are still emerging. Hosted at Kent State, the Standardized Assessment of Information Literacy Skills (SAILS) is a web-based testing instrument designed to answer three questions: (1) Are students information literate? (2) Does the library contribute to information literacy? and (3) Does information literacy contribute to retention and academic success (Kent State University, 2008). The test questions are based on the ACRL Information Literacy Competency Standards for Higher Education and have been tested and validated (ACRL, 2000). To date however, few institutions have used the tool to assess student learning of information literacy. The Educational Testing Service has developed, iSkills, a standardized test available for subscription by interested institutions (Educational Testing Service, 2008). Institutions such as the University of Central Florida (Beile, 2008), Colorado State University Libraries (2008), and California State University system

(Brasley, 2008) have used the tool to establish baseline data regarding students' information literacy skills and set information literacy curriculum goals. Researchers in library impact should monitor applications of iSkills and assess it as a valid measure of information literacy outcomes.

### ***Performance assessment***

Megan Oakleaf (2008) defines performance assessment as “qualitative forms of assessment that require students to perform real-life applications of knowledge and skills” (p. 239). Performance assessment can be supported through the investigation of portfolios of student papers (Barclay, 1993). In this approach, student portfolios of finished academic work are analyzed to determine if the quality of resources cited has improved following library instruction. Unlike testing, this approach investigates the application of information literacy skills in the execution of academic work. Mark Emmons and Wanda Martin (2002) describe a representative “evidence of use” study conducted at the University of New Mexico that explored the effectiveness of a library instruction program launched in 1999 for a writing course for first-year students. In their study, they analyzed 250 research portfolios from the first-year writing seminar collected from 1996 to 2001. Papers were evaluated by citation distribution (number, format, age, and accuracy) in the first phase of analysis. In the second phase of analysis, papers were evaluated for relevance, credibility (students are critical of sources and their author's viewpoints), and engagement (student supports arguments with evidence, challenges source's ideas). Emmons and Martin found no significant improvements over time in the portfolios they assessed and saw the need to revise their instructional methods (Emmons and Martin, 2002). Loanne Snavelly and Carol Wright (2003) report on an effort to use ‘research portfolios’ to assess student performance in a semester long library research credit course for honor's students. The authors found the portfolio enhanced their ability to grade student's work and students reported that the use of the portfolio offered opportunities to reflect on their work through the semester.

### ***Rubrics***

Oakleaf (2008) describes rubrics as “descriptive scoring schemes to guide analysis of student work” (p. 245). Rubrics describe expectations for specific tasks associated with a learning objective and may describe high, medium, and low performance for those tasks. Rubrics are shared with students to provide guidance when completing the assignment and then faculty use rubric to judge the quality of completed student work (Oakleaf, 2008, p. 246). Relatively few librarians have used rubrics to assess information literacy efforts. Elizabeth Choinski, Amy Mark, and Missy Murphy (2003) used a rubric to analyze students’ reflection papers to assess information seeking skills and found students performed poorly on items requiring higher order thinking such as evaluating web sites or differentiating between popular and scholarly resources. Emmons & Martin also used rubrics in their effort reported above. Davida Scharf et al. (2007) describe a project creating and applying an information literacy rubric at the New Jersey Institute of Technology that drew criteria from the ACRL standards for information literacy. Scores on the information literacy rubric were correlated ( $r = .497, p < .01$ ) with scores on a writing rubric used by faculty who teach the seminar. However, no significant associations were found between their model and SAT scores or GPA. Lorrie Knight and Kimberly Lyons-Mitchell (2006) graded student bibliographies using a rubric tied to the ACRL Information Literacy Standards. The method simplified grading, offered opportunities for collaborating with faculty, and provided students with “up-front clearly defined levels of success.” Challenges though include the amount of time it took to develop the rubric and the amount of time it took to rate each student’s bibliography.

### ***Affective and behavioral changes***

Several studies seek to connect student participation in library instruction to positive affective outcomes and changes in behavior. Heidi Julien and Stuart Boon (2004) for instance followed up their testing with interviews of students who had participated in library instruction. Eighty two % of respondents reported improved confidence when performing research related to

either an increase in skills or a willingness to ask questions when needed (p. 130). Though Julien and Boon found no increase in information literacy skill levels among students who participated in a 50-minute library instruction class, those students did report they would be more likely to use the library in the future for their research (2004). While JoAnn Jacoby and Patricia O'Brien's report (2005) is not strictly a study of library instruction, they did study the impact of reference services to undergraduate students through a survey distributed to students using the Social Sciences library at the University of Illinois at Urbana-Champaign. Students were asked to rate their confidence in their ability to find information independently" before and after the reference encounter on a Likert scale from 1 – 6. Paired t-tests were conducted and the mean difference in confidence (1.65) was found to be statistically significant ( $t(68) = 8.26, p < 0.0001$ ). Open-ended survey responses reinforced the role the reference encounter played in increasing the students' confidence and multiple regression analysis revealed that the approachability of the librarians contributed to gains in confidence.

Clearly, students are in need of help in learning how to find, evaluate, and use information (Head & Eisenberg, 2009) and library instruction should be an essential component of the academic library outreach strategy today (Lewis, 2007). However, promoting information literacy outcomes as the library's sole contribution to undergraduate student learning is problematic and sells the library short for several reasons. First, current assessment approaches use cross-sectional approaches to assess changes in skill levels due to exposure to instruction in a single session, over a single semester, or in an academic year. Experts in college impact note that some learning gains may not be manifest until the conclusion of the college experience or even afterwards (Astin, 1973; Gonyea, & Kuh, 2003; Pascarella & Terenzini, 2005). As illustrated above, these efforts have yielded mixed results. Second, the literature suggests that information literacy skills are very closely related to other general education and discipline-specific skills taught and assessed by faculty. If these skills are interrelated, it will be difficult or impossible for a single assessment tool to determine where faculty influence ends and library influence begins.



Finally, it is unclear if information literacy skills are universally recognized by stakeholders in higher education. Information literacy outcomes are recognized as such in some standards such as the AAC&U's list of Essential Learning Outcomes (2007). Yet, as Megan Oakleaf reported in 2011, other standards do not explicitly cite information literacy outcomes but refer to similar skills using different terms such as critical thinking. Laura Saunders found three of six regional accreditation agencies specifically name information literacy as a desired outcome and assert the library's prominent role in information literacy instruction and assessment of related skills. Others rarely use the term "information literacy" in their standards. Instead, competencies such as "evaluating and using information ethically" appear in these standards as general education outcomes to be taught and assessed throughout the college curriculum (2007). Megan Oakleaf and Neal Kaske (2009) reported similar findings.

#### **2.4.4.4 Exploring self-reported gains in learning and cognitive development**

The College Student Experiences Questionnaire (CSEQ), discussed in section 2.1 and 2.2, is a means of measuring from student reports both the amount and quality of effort that students expended in their college coursework (Pace, 1984; Trustees of the University of Indiana Bloomington, 2012a). Several authors have had varying degrees of success using CSEQ data to understand effects of interactions with the library on self-reported gains in learning and cognitive development. Lamont Flowers (2004) explored the self-reported experiences of 7,923 African-American students who completed the CSEQ between 1990 and 2000 and found that using the library as a place to study had a positive effect on gains on the Personal and Social Development scales, Thinking and Writing Skills Scale, and the Vocational Preparation Scale. When they developed a bibliography for a paper, gains were achieved in the Arts and Humanities Scale, Personal and Social Development scale, Thinking and Writing Skills scale, and the Vocational Preparation scale. Browsing in the stacks and locating items referred to by another author were associated with gains in all five scales except the Personal and Social Development scale.

Ethelene Whitmire (1998) used CSEQ data gathered in 1992-1993 from 18,157 students to study relationships between students' use of the library and self-reported gains in critical thinking skills. Use of the library, on its own, was not a significant predictor of gains in critical thinking. However, students engaged in "focused library activities" such as checking citations, reading basic references or documents, browsing the stacks, and checking out books reported significantly higher gains in critical thinking ( $b = 0.03$ ,  $p < 0.001$ ). Students more active in engaging faculty regarding their academic work ( $b = 0.03$ ,  $p < 0.001$ ) and those engaged in active learning ( $b = 0.26$ ,  $p < 0.001$ ) were also more likely to report higher gains in critical thinking scores. Whitmire examined this relationship again during the 1996 IPEDS and CSEQ data sets (Whitmire, 2002b). In this study of 7,958 students from 32 institutions of all types she found two variables that were significant predictors of self-reported critical thinking gains: academic year and engagement in active learning experiences. There was a slight positive correlation between academic library resources and self-reported critical thinking skills at Research Universities, but no relationship was found between the use of library resources and perceived gains in critical thinking skills. This study is weakened by the fact that most of the students in the study were first and second year students, who may not have been given assignments that required use of the library (Whitmire, 2002b).

Robert Gonyea and George Kuh (2003) used CSEQ data to investigate changes in library use over time and the effects of library use on three outcome variables: (1) gains in information literacy, (2) overall gains in college, and (3) satisfaction with the college experience. The first variable, INFOLIT encompasses six "estimate of gain questions" that "approximate the skills and competencies ACRL considers important for information literacy (p.261)." The second variable, GAINSUM, is the sum of all "estimate of gain" questions and is intended to reflect the student's perception of overall gain in college. The study included data from two samples from the CSEQ Research Program. The first sample included 300,000 responses from students at 300 institutions who completed the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> editions of the CSEQ between 1984 and 2002. The second

sample included responses from 80,000 full-time students who completed the 4<sup>th</sup> edition of the CSEQ between 1998 and 2002. None of the Gonyea and Kuh models (2003) indicated that specific library activities had a significant impact on any of the three outcome variables. A particularly disturbing finding from this study is that library experiences did not contribute to increases in information literacy. The authors suggest three explanations. First, the CSEQ items used as a proxy for information literacy may not have been valid measures of information literacy attainment. Second, the lack of baseline measures for information literacy or other gains make it “difficult to draw conclusions from student self-reported gains,” (Gonyea & Kuh, 2003, p.267) especially since students at different institutions in different majors may have started college at different levels of information literacy. Finally, they note that as with most gains in college, a wide variety of factors both inside and outside of the classroom contribute to learning gains. However, the authors report that library use was a predictor of five scale items associated with Level of Academic Challenge: put together different facts and ideas ( $d = 0.08$ ); worked on project integrating ideas from various sources ( $d = 0.19$ ); applied class material to other areas in life ( $d = 0.08$ ); worked harder than I thought to meet faculty expectations ( $d = 0.10$ ); and worked harder due to instructor feedback ( $d = 0.11$ ).

#### **2.4.5 Summary**

“[It] is not surprising, as rarely does any single experience or set of activities during college affect student learning and personal development one way or the other; rather, what is most important to college impact is the nature and breadth of a student’s experiences over an extended period” (Gonyea & Kuh 2003, p. 269–270).

Library impact assessment tools should library use to student learning outcomes defined by faculty and valued by stakeholders, generate credible evidence that libraries contribute to those outcomes, and identify factors of library use that influence student achievement. As noted in section 2.1 and 2.2, stakeholders and employers are expecting evidence of student learning in terms of broad abilities and skills as well as discipline-specific knowledge and skills. As is clear from this review, past methods have not succeeded in linking library use to these types of

outcomes. The library profession has invested a lot of time and money into assessing and promoting information literacy outcomes as the libraries sole contribution to the teaching and learning mission of their parent institution. These outcomes are important, but not the sole contributions the library makes to student learning. Peter Brophy says it best perhaps that the most important issue is demonstrating how the “information literacy program contributes to the achievement of university objectives ... through ... enabling specific course and module learning outcomes” (Brophy, 2006, p. 71). Clearly, there still remains work to do.

## **2.5 Lessons from literature of information needs, seeking, and use**

“An information science firmly founded upon an understanding of information users in the context of their work or social life is also likely to be of more use to the information practitioner, by pointing the way to practical innovations in information services, and to potentially beneficial associations with other communication/information related subsystems” (T.D. Wilson, 1981, p. 12)

“A fundamental finding is that the participants in the work-planning process did not think of information or actions to collect, process, or use information as something separate from the task or problem at hand. Attention to this fact suggests that information systems that exist to support tasks in social settings need to be integrated into organizational or institutional designs. Otherwise, such systems are likely to exist, consume resources, and divert attention away from basic issues, problems, and sense making of tasks and situations.” (Solomon, 1997b, p.1)

New approaches are needed to close the academic library value gap. This section of the literature review considers contributions from the literature of information needs, seeking, and use which may guide the creation of new tools.

### **2.5.1 The user-centered paradigm**

Brenda Dervin and Michael Nilan (1986) wrote of a coming paradigm shift in the study of information behavior from a focus on documents and systems to a focus on users and their needs. The older traditional paradigm portrayed “information as objective” and users “as input-output processors of information” (p. 16). Research questions in this paradigm, they write, are framed from the perspective of the system and ask “what” questions, such as “what systems and services do people use?” (p. 16). This user-oriented alternative paradigm sees information as

constructed by users and focuses on “how people construct sense” (p. 16). Research in the alternative ‘user-centered’ paradigm approaches problems from the user’s perspective asking “how questions” such as “how individuals define needs, present those needs to systems, and make sense of what systems offer them” (p. 16). Dervin and Nilan wrote that the time was right for the alternative user-centered paradigm as the older paradigm was poorly equipped to support efforts to improve the usefulness of information services, to support systems design, and communicate accountability (p. 6-7). Writing of public libraries, Douglas Zweizig (1977) agreed on this last point, asserting that “use studies alone will not justify public support” and that the proper focus is on the patron “so as to understand the role of the library in the life of the user” (p. 6-7). Dervin wrote in 1977 that more important than knowing if a system helped a user “is determining how information helped or why it did not” and that answers to these questions will reveal the “basis on which [a user] will judge whether the library is a good one for him” (Dervin, 1977, p. 26).

Scholars such as Robert Taylor and T.D. Wilson noted that it was not enough to focus on the user, but that researchers needed to take into account the influence of a user’s context when seeking to understand information behaviors. Writing five years after Dervin and Nilan, Taylor stated

“These approaches [technological and content-based] need to be tempered by an approach that looks at the user and the uses of information, and the contexts within which those users make choices about what information is useful to them at particular times ... based not on subject matter, but on other elements of the context within which a user lives and works” (Taylor, 1991, p. 218).

### **2.5.2 Value-in-use**

Robert Taylor (1986) asserted that designing and building information systems that truly meet user needs required an understanding of how information comes to have value. From his perspective, information has no inherent value; but it has potential value, unlocked only in use. In Taylor’s view, information has value-in-use, where the information user is the judge of information value as it relates to its usefulness in fulfilling a need, solving a problem, or saved for some time in the future (p. 4, 203). The challenge for system designers then is matching potential

users with information of value to their particular need. This is not a straightforward proposition as there are numerous variables in a user's context that determine what may be valuable. Taylor proposed a construct he called the Information Use Environment (IUE) as a vehicle for exploring the variables impacting value-in-use (Taylor, 1986, 1991).

Taylor formally defines the IUE as “the set of those elements that (a) affect the flow and use of information messages into, within, and out of any definable entity; and (b) determine the criteria by which the value of information messages will be judged” (Taylor, 1991, p. 218). In other words, information behaviors are affected by the characteristics of the IUE. Taylor described three types of IUEs, geographical, organizational, and social-intellectual-contextual. There are four components to the IUE: sets of people, types of problems considered important and typical by this set of people, a setting which includes rules and resources, and “the conscious and unconscious assumptions made as to what constitutes a solution” (Taylor, 1991, p. 221).

*Sets of people* in IUEs use information in different ways and have different expectations of information systems. Taylor suggested that these differences were driven less by the subject matter of their work domain, than by the “kinds of problems and concerns” specific to this set of people. As examples he states that engineers would have far different expectations of an information system than would undergraduate students or medieval scholars (p. 38). The *setting* describes the nature of the context in which the group works, which influences the purpose of an organization, its “domain of interest,” the accessibility of information within the organization, and its history. An IUE with limited access to information poses special challenges to its users, restricting their options and limiting the possible solutions to their problems. Taylor focuses especially on the nature of problems associated with an IUE, observing that problems change over time and each “IUE has its own discrete class of problems.” He proposed a set of criteria called *problem dimensions* which can be used to characterize the relevance of information to meet the need associated with a given problem (MacMullen & Taylor, 1984). Proposed problem dimensions are abstract criteria and will be illustrated with examples. One problem dimension

labeled ‘well-structured/ill-structured’ described problems that could be solved through algorithms or with hard data or those that “are not well understood and require more probabilistic” information to resolve. Other dimensions were related to the complexity of a problem, the familiarity or newness of a problem and the techniques required to solve it, and whether or not assumptions were agreed upon by IUE participants (Taylor, 1991, p. 226).

These three components of the IUE, people, setting, and their problems determine the range of *acceptable solutions*, which is the final component of the IUE. Taylor outlined 8 types of information use appropriate to solving problems including enlightenment and problem understanding, procedural, factual and conformational, projective, motivational, and personal or political. He then proposed that information possessed traits, beyond subject, that “were related to problem dimension and the needs of people” (Taylor, 1991, p. 231). These *information traits* do not resemble the common subjects and material descriptions common in our libraries and information systems. In all, Taylor recommended nine categories of information traits that meet particular needs (Taylor, 1986, p. 45). Two are shared here as examples. In the *focus continuum* trait for instance, “precise information is useful for a situation which is well-defined” whereas diffuse information “is an asset if a problem is not well understood ... [and] can be used to orient or gain a perspective on a situation” (Taylor, 1986, p. 46). On the *temporal continuum* historical information would support litigation needs whereas a mix of historical and future oriented data would support financial planning needs (Taylor, 1986, p. 45). The problem, as Taylor saw it, was that the IUE and the System Environment (library, computer system, etc.) were separated by an interface or negotiation space. Within this negotiation space the user’s problem dimensions are met or not met by the services of the system. The “dynamics of the negotiating space” Taylor said “define the time, effort, and initiative (cost)” a user must invest to “extract information of use from the system (benefit)” (Taylor, 1986, p. 33). Ultimately, Taylor hoped, information systems could be constructed in such a way that information could be described using information traits to better meet the needs of problems specific to individuals in an IUE, narrowing the distance

between the IUE and the system environment, and improving the cost-to-benefit ratio for information users (Taylor, 1986, p. 47).

### 2.5.3 Context

Taylor's ideas about the information use environment preceded and informed efforts in the 1990s and early 2000s to shape a perspective called information seeking in context.

Christina Courtright cites several definitions of "context" from the literature including "setting", "life-world," and "information grounds," but suggests "frame of reference within which information behaviors take place" is the most common understanding of the term (Courtright, p. 276). Donald Case defines context for the purposes of his 2007 review to be "the particular combination of person and situation that served to frame an investigation." He continues by noting that the information use literature has a long history of framing investigations around the categories of occupation, role, and demographic categories which serve as contexts of information use (Case, 2007, p. 13). As noted earlier, Taylor described three types of IUEs, geographical, organizational, and social-intellectual-contextual (1991). Diane Sonnenwald provides examples of contexts such as family, work, academia, and citizenship. Sonnenwald asserts that each context has its own boundaries, constraints, and privileges and that each individual interprets boundaries of context differently. Sonnenwald acknowledges though, many individuals probably would agree on the boundaries of a given context (Sonnenwald, 1999, p. 179). Courtright notes that *situation* has developed a meaning distinct from context. She quotes Colleen Cool (2001) who says that "contexts are frameworks of meaning, and situations are the dynamic environments within which interpretive processes unfold, become ratified, change, and solidify" (Courtright, 2007, p. 276). Sonnenwald agrees, defining context as "the quintessence of a set (or group) of past, present and future situations" (Sonnenwald, 1999, p. 179).

Courtright reviews three definitions of context currently in use in the literature. "Context as container" approaches conceive of context as existing objectively around the user, yet do not truly explain variations in information behavior, and merely serve as a setting or backdrop.

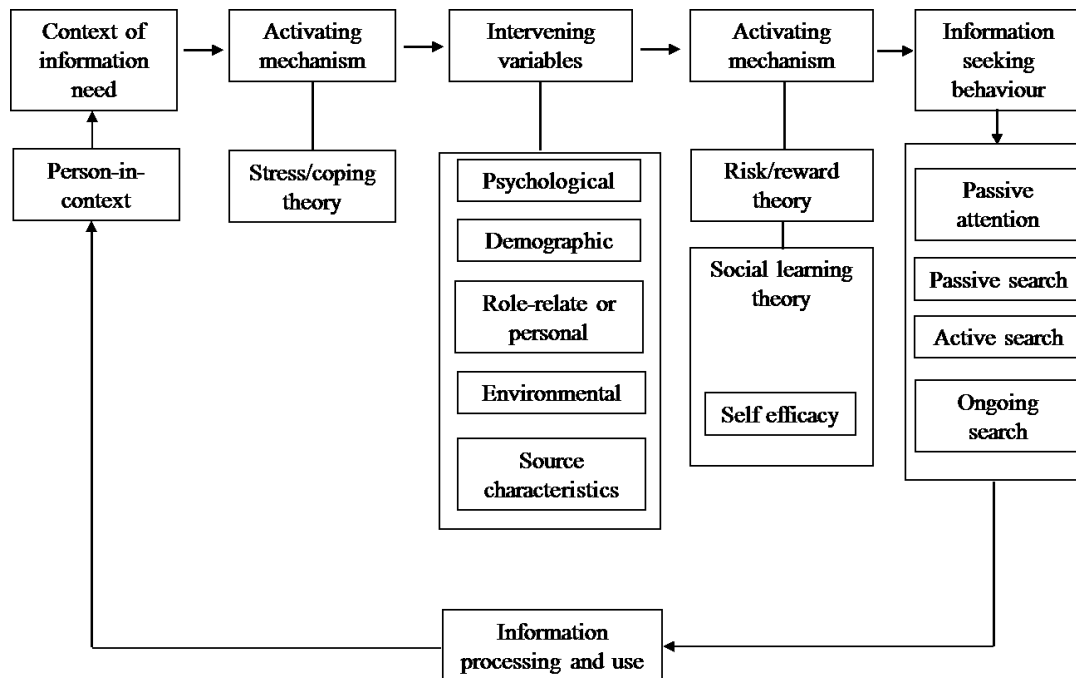


“Person-in-context” approaches treat context from the perspective of the actor wherein “information activities are reported in relation to contextual variables and influences, largely as perceived and constructed by the information actor” (p.287). A third approach emphasizes the information actor (Courtright’s term) as “social beings that construct information socially and not just inside their heads” (p.287).

#### **2.5.4 Person-in-context models**

Like Taylor, T.D. Wilson’s person-in-context models propose that individual’s information behaviors are shaped by the context of use. Citing deficiencies in user studies conducted from the information provider perspective, Wilson stated that “the search for factors related to needs and information seeking behaviors must be broadened to include aspects of the environment within which the work role is performed” (p. 10). Wilson’s 1981 person-in-context model is grounded in the notion that information needs are secondary needs, triggered by deeper physiological, affective, and cognitive needs. Wilson even suggests that the term information needs could be restated as “information seeking toward satisfaction of needs” (p. 8). These needs are further influenced by the context or environment in which the needs arise and the role that an individual plays in that context (see Figure 2.3).

Feedback and dynamism are other hallmarks of Wilson’s models. Feedback from an information use can modify or alter the need, thereby leading to different seeking and use behaviors, which may encounter different or new barriers (Wilson, 1981, 1999). Wilson recognized that this shift toward a holistic view of the user (Wilson, 1981, p. 10), which takes into consideration the multi-dimensional aspects of the user’s needs (physiological, affective, and cognitive) and the ever-shifting nature of the user’s context would pose methodological challenges. He asserted that ultimately a “generally applicable theory of information behavior” would support qualitative methods applied in “in-depth studies of well-defined user groups [that developed explanatory concepts]” (p. 11). Ultimately these efforts would support “practical innovations” to improve service.



Source: Adapted from Wilson, 1999, p. 257

Figure 2.3 Wilson's 1996 Information Behaviour Model

Wilson (1996, 1999) recognized that numerous fields besides information science, including sociology, psychology, and communications studies could contribute to an understanding of information behavior. Wilson revised his model to include these perspectives as seen in Figure 2.3. New elements, labeled activating mechanisms, were introduced to connect the “person-in-context stage” with the decision to seek information (1996, p. 36), which draws on a stress and coping model. Wilson states that stress, a situation in which a user has “exceeded his resources” can trigger coping behaviors to “master, reduce, or tolerate ... demands created by stressful situations” (1996, p. 8). Wilson notes that Dervin’s sense-making methodology could support exploration of these motivators. In his 1981 model, Wilson spoke of ‘intervening variables’ that served as barriers to information seeking behaviors. He proposed that risk/reward theory and self-efficacy theory provide explanations for mechanisms that mediate decisions about choosing information sources and ways users may go about using them. Risk/reward theories applied to information behaviors would suggest that users will continue information seeking

behavior until the risk of not doing so has abated. Wilson cites examples of several types of risks including performance, financial, physical, social, ego, safety, and time loss risks from the field of consumer research (1996, p. 23-24). The impact of a given type of risk on an information behavior is of course, dependent upon the context. For instance, the financial or performance risks of conducting a less than exhaustive patent search are obvious in a special library context (Wilson, 1996, p. 24). Self-efficacy is defined by Anthony Bandura as “a person’s estimate that a given behavior will lead to certain outcomes ... and entertaining doubts about the certainty of an outcome can compromise performance” (Wilson, 1996, p. 26). Clearly, an individual with estimates of low self-efficacy with regard to information seeking might try fewer sources, take fewer risks, and perhaps cease seeking altogether.

#### **2.5.5 Sense-making: a method for information behavior research**

Brenda Dervin’s Sense-making Methodology (Dervin, 1992, 2005a,b) is a conceptual framework and a set of methodological tools for exploring communication and information use. Dervin describes Sense-making as a metatheory, a methodology, and a “coherent set of theoretically derived methods for studying human sense-making” (Dervin, 1992). Dervin defined an information need “as a time when we have run out of sense” when individuals are confronted with new information that does not match their existing view of the world. Sense-making then is an everyday action that individuals consciously or unconsciously take to “make sense” of their reality at a given place and time. At the core of the metatheory is the notion that people face discontinuities throughout their existence. Individuals experience discontinuities between “reality and human sensors, human sensors and our brains, between mind and tongue, between tongue and message, between message created and channel, and between individuals and groups” and our culture at large (Dervin, 1992, p. 62). These are points in time and space when individuals must make sense through information behaviors and practices so “information can be conceptualized as that sense created at a specific moment in time-space by one or more humans” (p. 63). In this framework, “information does not exist apart from human behavioral activity” but

is subjective. The notion of context as externally imposed is dismissed in this framework, instead “individual use of information and information systems is responsive to situational conditions as defined by that individual” (1992, p.67).

Dervin states that the implication of this perspective for information behavior researchers is that “human use of information and information systems needs to be studied from the perspective of the actor, not from the perspective of the observer” (p.64). Sense-making methods focus attention on the micro information behaviors which Dervin calls “step-takings, or communicatings, that beings undertake to construct sense of their world.” Since the behaviors take place across time-space individuals are continually confronted with discontinuities shaped by the ways “people construct ideas of each moment” ... these discontinuities, or gaps, require continuous constructing of reality to overcome them. These continuous acts of construction require that research methods focus on the processes of communication and information behavior, instead of user state (p. 65).

Dervin uses a situation-gap-use metaphor to describe these discontinuities and ‘step-takings’ (see Figure 2.4). *Situation* represents the context in which the user encounters the discontinuity. *Gaps* refer to the information needs that must be resolved to overcome the discontinuity. And *use* or *helps* represents the ways in which information received from various sources helped one to create a new sense and to bridge a gap (Savolainen, 2006). Dervin provides a visual model of this situation-gap-use metaphor that describes each sense-making moment in the individual’s experience.

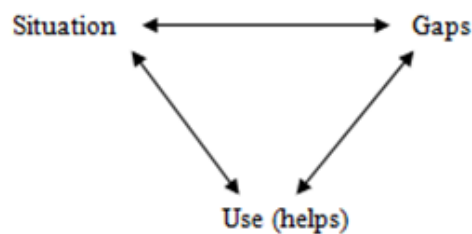


Figure 2.4 Dervin’s Sense-Making Triangle

Coping mechanisms at each moment are defined as gap-defining, gap-facing, and gap-bridging activities. In different situations, users may use different communication and information seeking tactics to overcome the gap. Dervin states “the essence of that sense-making moment is ... addressed by focusing on how the actor defined and dealt with the situation, the gap, the bridge, and the continuation of the journey after crossing the bridge” (p.70). Sense-making accepts the proposition that structural elements of an individual’s environment (context) will limit their choice of communicative responses. However, this context is not completely objective, as Dervin notes “the individual’s self-construction of these structures shapes their relationship to that structure and their responses” (Dervin, 1992, p. 67). A core method in the sense-making toolkit is the micro-moment timeline interview in which the participant is asked to “reconstruct a situation in terms of what happened in the situation,” the gaps faced, how they were defined, how they were dealt with, and the helps individuals used along the way. For instance, an abbreviated time-line interview method focuses on a single, most memorable situation. A help-chain interview focuses on “how the respondent constructs the connection between information, system, or structure and self” and includes probing to isolate the factors that helped or inhibited closing the gap (Dervin, 1992).

Sense-making has been used in numerous information use and communications studies (Dervin, 2005b). Its use is illustrated in an example. Reijo Savolainen and Jarkko Kari (2006) used Sense-making methods to investigate the ways in which participants overcome gaps in web searching. They used semi-structured interviews with 18 participants to understand how the participants used web searching and then videotaped the users conducting searches. Participants were encouraged to “think aloud” during their searches and search topics were self-chosen. Seven searches were chosen as “case searches.” Gap-facing and gap-bridging behaviors were derived from the coded think-aloud transcripts. Gap categories included problematic content (finding no relevant material), insufficient search competence, and problems with the search

environment. Notably almost 20% of the gaps were affective in nature. Search behaviors such as following links and using a search engine were considered gap-bridging activities.

Sense-making approaches have had influences in library services and research as well. Brenda Dervin and Patricia Dewdney (1986) applied sense-making techniques in the development of a neutral questioning technique for reference interviews. Neutral questions, as opposed to closed questions, encourage patrons to fully discuss their information need using their own words. During neutral questioning, the librarian learns about the situation and potential use of the information requested and will be in a better position to provide the needed answer or support to the patron. The potential of a sense-making approach to making library service models more user-centered is also explored in a think-piece by Ruth Morris (1994). Sense-making methods were used recently in a study of information use by 409 faculty and students in central Ohio (Dervin, Reinhard, Kerr, et al., 2007) to understand how information sources helped in five recent life-facing situations “a troublesome situation in university/college life, a scholarship situation, a troublesome situation in personal life, a university/college situation involving mainly electronic sources, and a personal life situation involving mainly electronic sources” (p. 1). Interestingly, this study used information resource use, instead of gaps, tasks, or individuals as units of analysis. Treated in more detail in section 2.5.8.1, Prabha, et al. (2007) used data gathered in the same Ohio-based study using sense-making methods to investigate the conditions under which students and faculty stop an information search (OCLC, 2006b).

There are several methodological lessons to be learned from Sense-Making. In sense-making “information is constructed by the user” suggesting research methods should focus on the experiences and goals of the user instead of distinct information use transactions. The flexibility of the situation-gap-use metaphor suggests that a researcher can ask how and why questions at multiple levels of analysis (e.g. project, task, moment-by-moment) depending on the purpose of the study. Sense-making methods focused on the user have the liberty of asking how and why

questions suggesting Sense-making's utility in identifying user-centered outcomes and blockers and helps.

## **2.5.6 Holistic approaches to understanding information seeking**

### **2.5.6.1 Library anxiety**

Constance Mellon (1986, 1988) conducted a large-scale study in which she detected the effects of library anxiety on the information seeking effectiveness of college students. During this 2-year study, English instructors of 20 composition classes assigned library search journals. Mellon analyzed these “diary-like” writings using the constant comparative method to detect emergent themes in the texts. The purpose of the study was to collect data to improve the teaching of “search strategy and tool use” in 50-minute library instruction sessions. However, Mellon detected the students’ feelings of fear that prevented initiating a search or devoting enough time to “master the search process” (Mellon, 1986, p. 163). Mellon found four causes of library anxiety: being intimidated by the size of the library, lacking the ability to find resources, lacking the knowledge of what to do, and not knowing how to start the information search process. Furthermore, students had a misperception that they alone were the only students lacking the ability to use the library. This increased their frustration and served as a source of shame that prevented asking for help. However, Mellon also found that interactions with librarians, especially during library instruction sessions, helped build student trust in librarians and alleviate anxiety. Classifying these fears and their antecedents, *Library Anxiety*, Mellon used the findings to modify library instruction sessions to encourage trust-building. Teaching faculty members were also encouraged by the findings to incorporate library instruction into the curriculum more deeply. This study simultaneously legitimized Library Anxiety as a phenomenon worth studying and demonstrated the effectiveness of qualitative research methods for generating grounded theory within LIS.

Sharon Bostick extended Mellon's work by identifying five factors contributing to library anxiety: barriers with staff, affective barriers, comfort with the library, knowledge of the library, and mechanical barriers. These factors were operationalized in the Library Anxiety Scale (LAS), which contains forty-three items for assessing levels of library anxiety among students (Bostick, 1992; Onwuegbuzie, Qun, and Bostick, 2004). The Library Anxiety Scale has been verified and used in several studies. Qun Jiao, Anthony Onwuegbuzie, and Art Lichtenstein (1996) conducted an empirical study collecting responses to the Library Anxiety Scale (LAS) and the Demographic Information Form (DIF) from 493 university students. The DIF's questions included standard demographic questions plus questions about academic and library experiences, study habits, computer usage, work, and residence providing the independent variables for the study. The authors conducted step-wise regression analysis and found that age, sex, native language, GPA, work-status, frequency of library use, and reasons for library visits were significant predictors of library anxiety ( $F(12, 471) = 5.22, p < 0.0001, R^2 = 0.21$ ). Students with the highest levels of library anxiety were young, male, and high academic achievers, yet infrequent users of the library. The authors conducted ANOVA tests and found a main effect by year ( $F(4, 479) = 3.86, p < 0.01$ ) where library anxiety was at its highest in freshman year and then declined in a linear fashion throughout the college experience, corroborating Mellon's findings. Jiao and Onwuegbuzie reported in 1999 on a study that established library anxiety as a real situation-specific state that was not associated with the proclivity to exhibit anxiety, also known as trait anxiety. One-hundred-fifteen graduate students completed the LAS and the State-Trait Anxiety Inventory. The authors found no correlation between Bostick's constructs of library anxiety, barriers with staff ( $r = 0.03$ ), affective barriers ( $r = 0.14$ ), comfort with the library ( $r = 0.18$ ), knowledge of the library ( $r = 0.08$ ), or mechanical barriers ( $r = 0.08, p > 0.05$ ) with trait anxiety.

#### **2.5.6.2 Carol Kuhlthau's Model of the Information Search Process**

Carol Kuhlthau (1991, 2004) developed a model of the information seeking process through a small-scale qualitative study conducted with high school students (1983), longitudinal



studies using the case study approach (1988a, 1988b), and verification studies with high school students, public library users, and academic library users (Kuhlthau et al., 1990). Labeled the Information Search Process (ISP), the model provides a holistic explanation of information seeking behaviors associated with the completion of an academic research paper. The model consists of six stages: initiation, selection of a topic, exploration, formulation of a focus, collection of resources to support focus, and presentation. The model is holistic in that it incorporates the impact of an individual's thoughts and feelings on information seeking actions and eventual success. Kuhlthau derived the 'uncertainty principle' from a constructivist viewpoint and the findings of the ISP studies. The model's focus on process aids understanding of the factors that influence individuals' performance, leading to recommendations for recasting library service models.



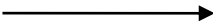
Kuhlthau states that the bibliographic paradigm portrays the information search process as acts of locating and collection information. Instead, Kuhlthau depicts information seeking as a learning process in which individuals interpret new information to alter personal constructs. Kuhlthau noted that library and information science lacked appropriate theory to inform this work, so she borrowed from John Dewey's theories on learning, George Kelly's Personal Construct Theory, and Jerome Bruner's theories regarding interpretive tasks (Kuhlthau, 2004). Kuhlthau draws from Dewey's five phases of reflective thinking, which are (1) suggestion, in which doubt and uncertainty may prevail, (2) intellectualization in which the new information is conceptualized, (3) a hypothesis stage where the individual creates a tentative interpretation of the new information in light of existing constructs, (4) the exercise of reasoning informed by facts followed by (5) action based on the newly reformed construct. According to Kelly, constructs are "patterns that one formulates to make sense of the world" (Kuhlthau, 2004, p. 16). Individuals form and reform constructs as they encounter and assimilate new information throughout our lives. Personal constructs determine how individuals anticipate future events and "determine the choices one makes" (Kuhlthau, 2004, p. 17). Kelly stated that forming new constructs can cause

anxiety and therefore the process of learning has cognitive and affective influences. Kelly labeled this process the act of construction, which consisted of 5 phases. Confusion or doubt reign in the first phase where an individual encounters a new experience or new information incompatible with previously held constructs. Third, the individual forms a tentative hypothesis based on the new information, which can be tested. Finally, the individual confirms or rejects the hypothesized construct in an act Kelly called “reconstructing.” Jerome Bruner held that individuals are active selectors of information for the purpose of forming hypotheses and attaining understanding. In his model of interpretive tasks including perception, selection, inference, prediction, and action individuals “suspend disbelief” to consider possible worlds (Kuhlthau, 2004, p. 23). Kuhlthau, drawing on these models of learning, asserts “... learning is not a simple cognitive process of assimilating new information. Affective experiences of uncertainty and confusion complicate the process” (Kuhlthau, 2004). Since the ISP is considered an act of construction, it too is dynamic, individual, and cyclical.

Kuhlthau generated the categories and stages of the ISP model through a qualitative study with twenty-five high school students working on research papers. In an initial data gathering phase, the students recorded their experiences in journals and search logs and wrote short statements about topic formulation. A case study with six of the students used interviews, concept maps, timelines, flowcharts, and a perceptions survey to derive the initial ISP model. Students made important decisions at two points in the process, topic selection in stage two and focus formulation in stage four. Kuhlthau found that students were especially vulnerable at these points due to uncertainty and apprehension regarding the topic and their ability to move to the next stage. Successful resolution at stages two and four alleviated anxiety, boosted confidence, and supported eventual success. Inability to select a topic or formulate a focus, however, decreased the likelihood of success. A longitudinal study was conducted with four of the original six case study participants to detect changes in students’ perceptions of the ISP over four years of high school and four years of college (Kuhlthau, 1988) to verify the model. The model

was then verified using process and perceptions surveys and concept maps with 147 high school students (Kuhlthau, 1989). Notably, these students reported statistically significant gains in confidence as they moved through the ISP ( $r^2=.11$ ,  $<.001$ ) (Kuhlthau, 1991), p. 365). The model was also verified with public library and academic library users, and again confidence levels rose throughout the stages of the ISP (Kuhlthau, 1990). The refined model resulted from these studies is presented in Table 2.12.

Table 2.12 Kuhlthau's Model of the Information Search Process (ISP)

Tasks	Initiation	Selection	Exploration	Formulation	Collection	Presentation
Feelings (affective)	Uncertainty	Optimism	Confusion/ frustration/doubt	Clarity	Sense of direction/ confidence	Satisfaction or disappointment
Thoughts (cognitive)	Vague				Focused	Increased interest 
Actions (physical)	Seeking relevant information Exploring				Seeking pertinent information Documenting	

Source: Adapted from Kuhlthau, 2004, p. 82.

Kuhlthau claims that ‘uncertainty’ lies at the root of the affective responses seen prior to stages two and four in these studies. Kuhlthau’s ‘Uncertainty Principle’ holds that “Uncertainty is a cognitive state that commonly causes affective symptoms of anxiety and a lack of confidence” (p. 92). The process corollary to the principle suggests “the process of information seeking involves construction in which the user actively pursues understanding and meaning from information encountered over a period of time” (p. 103). At the center of the process is an act of formulation in which a user is developing an understanding and redefining constructs possibly accompanied by cognitive shifts from ‘vagueness’ to ‘clarity’ and affective shifts from ‘anxiety’ to ‘confidence’ (p. 103) and ultimately moving from uncertainty to understanding (p. 105). Anxiety can be mediated by an individual’s prior experience, tolerance for uncertainty, mood, and interest.

Kuhlthau criticizes library services based on the bibliographic paradigm, which involves assisting users with location and collection use activities. Instead, in her view, library services

should support users during their act of construction, when they are most vulnerable and in need of assistance in what she terms ‘Zones of Intervention’ (p. 129). The uncertainty principle, according to Kuhlthau, provides a holistic framework for designing this type of service.

### **2.5.7 Social construction of information in context**

In her review, *Context in Information Behavior*, Christina Courtright identified a genre of information behavior research that emphasizes information actors (Courtright’s term) as “social beings that construct information socially and not just inside their heads” (2001, p.287). Studies of social impacts on information behaviors and the roles individuals play in their contexts may provide methodological clues for understanding academic library impact and relate to what we know about the impacts of social integration on undergraduate retention, graduation, and norm setting within academic disciplines on student achievement. This section reviews a few approaches which offer guidance.

#### **2.5.7.1 Information Horizons**

Diane Sonnenwald (1999) proposed that individuals in a given situation and context act within an “information horizon.” The framework consists of five propositions. 1) Information behavior is shaped by and shapes individuals, social networks, situations, and contexts. 2) Individuals or systems within a particular situation or context may perceive, reflect, and or evaluate, reflect and or evaluate change in others, self and or their environment. Information behavior is constructed within this flow. 3) “Within a context and situation is an information horizon in which we can act”. However, the information horizons and the resources in them are “determined socially and individually,” are different in different contexts, and “may be bounded by social economics and politics” (Sonnenwald, 2005, p. 193). 4) Human information seeking behavior can be seen as “collaboration among an individual and their information resources” with the goal of sharing information and alleviating information needs. 5) Because there are many actors in an information horizon, there are multiple solutions to a given problem and Sonnenwald

writes “the information-retrieval problem expands from determining the most efficient path to the best solution, to determining how to make possible solutions visible to the individual and other information resources” (2005, p. 195).

A new tool for exploring this concept was created called “information horizon mapping,” in which study participants draw a map of the resources they use in a given context. Diane Sonnenwald, Barbara Wildemuth, and Gary Harmon (2001) evaluated the utility of information horizon maps with eleven undergraduates and nine scientists. Study results included the identification of the resources used most frequently or not at all. Resources were classed as nodes that received and/or passed on information expanding the students’ information horizons. The researchers also ranked the resources by the number of connections shared with other information sources. Resources with several outgoing connections are recommender resources that represent starting points or possibly sources of incomplete information. Those resources with more incoming connections than outgoing connections are described as focusing sources within the information seeking process. Interestingly, the university library was ranked sixth in the number of connections among information providers, and the authors concluded it “was not a preferred resource” (p. 14). Students also responded to a typical ‘library resource’ use survey and the results were compared to the findings of the mapping study. Students mentioned a wider variety of resources in the mapping study than they did in the survey, mentioning resources such as parents, friends, popular magazines, and television among information sources not typically provided as options on ‘library use surveys.’ Results from interviews however, served to confirm findings from the mapping exercise, as 93% of the resources drawn on a horizon map were also mentioned in the interviews.

From a methodological perspective, this suggests that survey questions about what resources are used, how they helped, and how they hindered support for user goals should allow respondents to add their own response categories. The use of multiple methods demonstrates the feasibility of using qualitative methods to collect confirmatory data. Further, as in other studies

reported here, the qualitative component of the method supports asking the all-important “how and “why” questions of impact.

#### **2.5.7.2 Structuration**

Anthony Giddens’ Structuration Theory has been used to explain the effect of social norms within a group or organization on the information behaviors of individuals. These approaches, described by Howard Rosenbaum (1993, 1996) and Paul Solomon (1997a, 1997b, and 1997c) provide methodological insights into understanding social influences on undergraduate information behaviors.

Giddens defines structure as the “rules and resources” which influences the production and reproduction of social systems “and has temporal existence only when they are instantiated into action” (Rosenbaum, 1993, p. 240). Structure then exists “out of time and space” but when instantiated in social settings, this structure produces the rules and resources that influence human conduct. Social systems are perpetuated over time and space because the acts of individuals, influenced by the rules and resources of structure, reproduce that structure in what Giddens calls Structuration (Rosenbaum, 1993, p. 240-241).

Taylor’s IUE is dynamic and changes over time due to the changing nature of sets of people and their settings. Howard Rosenbaum (1993) explains the dynamism of the IUE construct using Giddens’ theory of structuration (Rosenbaum, p. 242). Rosenbaum writes “as users interface and engage in information behaviors, they draw upon and make use of the rules and resources of the IUE [structure], simultaneously reproducing these elements as conditions which allow them to engage in information behaviors” (p. 242). The IUE is instantiated when people participate in information behaviors that are themselves social actions that reinforce the rules of the IUE. For instance, the act of valuing “makes use of those rules of the IUE which define a range within which types of information are considered acceptable or valuable.”

According to Rosenbaum, the act of applying these rules reproduces and perpetuates the rules, thereby explaining the dynamic and interactive nature of the IUE and providing the mechanism

by which organizational culture is preserved. Rosenbaum conducted a study in 1995 (Rosenbaum, 1996) investigating the IUE of managers in a public sector organization. The IUE had four components: a set of rules, resources used by the managers, problems, and solutions. In this study, a set of general and evaluative information rules emerged, which define the type and scope of problems that emerged in the setting and ultimately defined the range of solutions that were viable in the IUE (1996).

Paul Solomon (1997a, b, c) reports on a three-year project investigating the “role and impact of information on the sense-making process” related to work planning in a public natural conservation agency. As a participant-observer Solomon used multiple sense-making data collection methods including observation, participant journals, meeting transcripts, and analysis of internal documents. Solomon identified three clusters of factors that contributed to failures in the work process related to time and timing, social perspectives, and personal styles of information behavior. One of the significant findings from this study is that “conscious and unconscious rules of information behavior were organizationally defined.” In Solomon’s study, these rules determined preferences for information sources (people vs. documentary sources for instance) and communicative acts that in turn reinforced the rules of information behavior within the organization (Solomon, 1997b), affirming Taylor’s notion that the setting itself and the range of acceptable solutions to problems codify rules of information behavior.

As noted in section 2.2, there is evidence that faculty created norms and reward systems within the academic major influence student behaviors (Weidman, 1989; Holland, 1997; Smart & Umbach, 2007). Rosenbaum and Solomon demonstrate how these norms may translate into discipline-specific information behaviors. Solomon’s study also provides guidance on selecting units of analysis. Participants in the work planning process indicated that information behaviors are not distinct from work tasks (Solomon, 1997b), suggesting that the unit of analysis in academic library impact studies should not be individual or groups of information seeking acts, but the work tasks (assignments and papers perhaps) which students engage in.

### **2.5.8 Bounding the information seeking process, when ‘enough is enough!’**

Intentional information seeking for undergraduate students comes at a cost, chiefly in effort. As proposed by Wilson, ‘intervening variables’ in his model may explain why some users expend a high degree of effort to obtain information and why others do not. Satisficing behavior and task complexity may be a source for these intervening variables.

#### **2.5.8.1 Satisficing**

The Principle of Least Effort (PLE) is attributed to George Zipf, who proposed that when humans carry out tasks they expend the “probable least average of their work” (Case, 2005). Donald Case distinguishes between the PLE and cost-benefit analysis, noting that cost-benefit analysis describes “conscious decisions regarding the expenditure of effort to achieve some goal” (Case, 2005, p. 290). Wilson’s example of a patent search justifying extensive searching is an application of “cost-benefit” thinking. Instead, the PLE predicts users will allocate the minimum amount of effort necessary to acquire information, “even if it means accepting a lower quality or quantity of information” (Case, 2005, p. 291). Thomas Mann (1993) provides a broad review of LIS literature that demonstrates the PLE in action in numerous cases where ease of use, accessibility, and convenience are more important than quality of information to information users.

The concept of ‘satisficing’ is related to the PLE and cost-benefit frameworks. Herbert Simon, who developed the construct, notes that in a completely rational situation an individual would have complete knowledge regarding the consequences of a decision and be aware of all possible alternatives. However, Simon argues that individuals exist in a state of ‘bounded rationality’ “limited by [our] cognitive capabilities and constraints that are part of the organization” (Choo, 1998, p. 164). That is, an individual’s knowledge is always incomplete and she can only be aware of or act on a few of the alternative behaviors that are associated with a decision. Chun Wei Choo (1998) adds, that to compensate for our ‘bounded rationality,’ we practice “reductionist strategies that allow [us] to simplify their representation of the problem



situation” (p. 165). One of these behaviors is satisficing, which is the selective choosing of an “alternative that exceeds some minimum criteria” instead of seeking to know all options. This simplifies making decisions in complex situations. From an information search perspective, satisficing can be construed as a conscious decision to optimize the amount of effort to expend in the search by “comparing the benefits of obtaining ‘more information’ against the additional cost and effort of continuing to search” (Prabha, et al. 2007).

Several authors have reported satisficing behaviors among information seekers. Lisl Zach (2004), found that arts administrators made the decision to stop a search when they felt they had adequate information to make a decision or complete a task “even if they knew there might be more information available” (p. 31). The impact, importance, and risk of the decision associated with the information seeking task were external factors that most influenced levels of effort and stopping criteria; time constraints were not considered to be a significant factor in stopping searches associated with high-impact decisions (p. 32). Ethel Auster and Chun Wei Choo (1993) studied the environmental scanning practices of thirteen CEOs using the Critical Incident Technique. They found CEOs drew on personal and printed sources of information depending on the role they were playing in a given situation. Available time and the importance of the decision to be made were also factors impacting the selection of information sources.

Chandra Prabha, Lynn Silipigni Connaway, Lawrence Olszewski, and Lillie R. Jenkins (Prabha, et al., 2007) explored the criteria students and faculty use to decide when they have found enough information to meet their need and can stop a search. The authors found that undergraduates apply quantitative and qualitative criteria when making a decision to stop a search. The quantitative criteria are mostly tied to the demands associated with the particular assignment, such as identifying the minimum required number of citations, writing the minimum number of pages acceptable for a paper, and the time available. Qualitative criteria included assessments of information accuracy, finding similar information repeated in multiple sources, and deciding that sufficient information was gathered (p. 81). Students in this study were more

likely to apply quantitative criteria associated with the requirements of the assignment instead of opting for a more “thorough” search, in other words they ‘satisficed’. Students also reported that the effort expended was proportional to the reward (grade) associated with the paper or project.

Prabha and her colleagues observed similar behaviors among faculty, although they used different qualitative criteria for stopping. Reasons for faculty information searching activities varied from scholarship, to preparing for lectures or teaching, and responding to reviewer’s comments. Deadlines were the most common quantitative reason for stopping for faculty, while qualitative criteria focused on extensiveness of the search including “every synonym and combination were searched, current or cutting-edge research was found, same information was repeated, and exhaustive collection of information sources was discovered” (p. 83). Prabha, et al. (2007) suggest that role theory explains why students and faculty have different standards for stopping a search. Prabha et al. (2007) borrow a definition of role theory from Abercrombie, et al.

“When people occupy social positions their behavior is determined mainly by what is expected of that position rather than by their own individual characteristics.” In the context of a university, for instance, a person may play the role of a student or a faculty member and different expectations are held for each.” (Prabha, et al., 2007, p. 75)

Undergraduate students work in the context of an academic course shaped by expectations associated with the discipline and reward structures established by their professor. The authors interpret that the students are acting rationally and according to the rules of their context when they meet the minimum requirements and stop. These findings are consistent with results of recent information behavior studies that found student selection of resources is heavily influenced by faculty preferences and recommendations (e.g. Urquhart & Rowley, 2007; Rowley & Urquhart, 2007; Hampton, et al. 2009; Head & Eisenberg, 2009, 2010). Faculty members in this study, on the other hand, are also affected by deadlines of a different sort, but exercise extensive search behaviors when justified by the task, again exercising satisficing behaviors.

There are several methodological implications of these studies. Situational and contextual factors influence information searching behaviors and that those influences can be

predicted to a degree by the role played by the individual in that context and the importance associated with a given task. Deadlines, page limits, and citation requirements found by Prabha and colleagues can be seen as examples of rules in Taylor's IUEs, constraining and delimiting information behaviors. Time pressures and risk or reward were observed to be influences on information behavior as well. Finally, Prabha and her colleagues demonstrated the utility of the sense-making protocol for examining information seeking behaviors.

#### **2.5.8.2 The influence of work roles and tasks on information needs and uses**

Gloria Leckie, Karen Pettigrew, and Christian Sylvain (1996) derived a general model of information seeking practices of professionals based on a review of information use studies of engineers, health care professionals, and lawyers. Their review revealed that "information needs arise out of situations pertaining to a specific task that is associated with one or more of the work roles played by the professional" (p. 182). The authors identified five types of roles played by professionals including service provider, administrator, manager, researcher, educator, and student. Work tasks then vary by the role the professional is playing at a given time, which drives the type of information necessary to complete the task. Numerous other factors influence information behavior including personal attributes (demographics, age, specialization, and experience), contextual factors (characteristics of the need), the frequency with which the need emerges (recurring versus new), whether the need is anticipated or unanticipated, and the importance and complexity of the need. Finally, characteristics of information resources themselves influence behaviors including its source, the professional's awareness of or familiarity with the resource, the accessibility of the resource, and the timeliness of the information related to the need. Their general model of the information seeking practices of professionals takes into consideration all of these variables, yet allows for a feedback loop where the professional either completes the task or attempts a different information behavior (p. 180).

While, undergraduate students may not share many characteristics with engineers, lawyers, and health-care professionals in their daily activities, this general model of information

seeking provides theoretical support for taking into consideration the role played by the student and aspects of the need when exploring information behaviors.

### **2.5.8.3 Task complexity as an influence on information behavior**

Katrina Byström and Kalervo Jarvelin's "theory of information activities in work tasks" has theoretical roots in organizational psychology and in the work of several information behavior theorists including Taylor, Wilson, and Belkin. Byström and Jarvelin developed and revised the theory in a study conducted in two Finnish local government organizations engaged in work related to their missions (Byström & Jarvelin, 1995; Byström, 2000). In these studies, work tasks serve as the unit of analysis and diaries and interviews were used as data collection methods. Tasks were analyzed for their complexity, the information types used to resolve the tasks, and the types of information sources chosen such as people or documentary sources (Byström, 2000, p. 86-88). Task complexity is determined by the types of information acquisition actions required for the task: automatic information processing tasks which do not require information acquisition but arrive 'pre-packaged' for the individual, normal information processing tasks that required the acquisition of task specific information, tasks that required task specific and domain specific information acquisition, and decision tasks that required additional information to support task resolution. As task complexity increases, managers acquired more types of information, were more likely to consult people than documents, and when first approaching the task, were less likely to be able to predict where needed information may come from (Byström, 2005).

The researchers developed a model (Byström & Jarvelin, 1995; Byström, 2000, 2005), which incorporates task complexity as a factor influencing information types sought and channels selected. The model begins with a task as perceived by a user. Aspects of the task, personal factors, and characteristics of the situation interact to influence a determination of information needs and the choice of channel to meet that need. Following the choice of action to meet the need, the individual re-evaluates the value of the information for meeting the determined need

and whether or not the task could be completed. A feedback loop then ensues, in which the results of the immediate information use can mediate the perception of the task and the determined need. Though the empirical basis for this model is in the world of work, the notion of task complexity would seem to have applicability to understanding behaviors toward the completion of academic work as well.

Methodological lessons from this work are that the work-task itself is a valid and functional unit of analysis for information behavior study and that instruments should be able to differentiate between academic tasks requiring automatic information gathering such as a textbook based assignment versus those of greater complexity that require gathering a wider range of information types and sources.

### **2.5.9 Summary**

This brief review of the information seeking and information use literature has revealed numerous methodological lessons for meeting the challenge of detecting the influences of library use on undergraduate student learning outcomes.

Based on the findings of this review ‘academic library value instruments’ should:

Be shaped by a user-centered approach in which information is seen as subjective and that users actively construct information (Kuhlthau, 2004) and define the value of information resources due to their usefulness, instead of imposing a system centered viewpoint (e.g. Zweizig, 1977; Dervin, 1977; Taylor, 1991; Wilson, 1999).

“Focus on processes and dynamics instead of entities and states” (Dervin, 1992).

Respect influences associated with social roles played by information users (Prabha, et al., 2007) and (ideally) take into consideration social influences on information behavior (Rosenbaum, 1993, 1996; Solomon, 1997b; Sonnenwald, Wildemuth, & Harmon, 2001).

Respect the iterative nature of the information search process as students continuously refine their questions in light of new information encountered (e.g. Taylor, 1968; Wilson, 1999; Kuhlthau, 2004).

Respect the sequential nature of the information search process in which students progress through stages possibly accompanied by feelings of discomfort or anxiety (e.g. Kuhlthau, 2004).

Select units of analysis which will help answer ‘how’ and ‘why’ questions, recognizing that students may not think in terms of information behaviors as separate from their work tasks (Solomon, 1997; Zach, 2004). Select academic projects or tasks that students complete toward their academic work places the lens at the epicenter of purposive information use where influences, constraints (Prabha et al., 2007), benefits, and blockers can be revealed (Byström, 2000; 2005; Solomon, 1997a, b, c). Further, selected methods should support probing for factors that influence information behaviors undertaken to accomplish those tasks (Dervin, 1992; Solomon, 1997).

Support investigation of affective influences on task performance and information behaviors (e.g. Mellon, 1986; Bostick, 1993; Kuhlthau, 2004).

Ask “how” and “why” questions to identify connections between information use and task success or failure (Dervin, 1992).

Ask open-ended and neutral questions (Dervin, 1992; Solomon, 1997a, b, c).

### **3. Theoretical and methodological perspectives for the current study**

#### **3.1 Bounding definitions for the current study**

Kim Cameron provides guidelines (1986) for bounding definitions of effectiveness for structuring an evaluation project. Cameron's guidelines are applied below to define a project for developing tools for assessing library impact on student learning.<sup>1</sup>

*What is the purpose of the evaluation?*

This project is intended to create library assessment tools intended to identify and communicate evidence that an academic library contributes to institutional objectives for student learning. Borrowing the definition of library impact from section 2.4, the instruments should “connect student use of the library with institutional goals for undergraduate outcomes, while isolating and articulating the conditioning factors of library use that influence student achievement of intended outcomes.” The project's results should support both accountability to stakeholders and internal improvement efforts.

*From whose perspective is effectiveness being judged?*

The academic library has numerous internal and external stakeholders each having different perspectives on library effectiveness. For accountability's sake, however, the perspectives of customers, university managers, and oversight agencies are most relevant and undergraduate student learning outcomes are a key deliverable of interest to these groups.

*On what domains of activity is the judgment focused?*

Undergraduate student effort toward expected learning outcomes is the domain of interest for this project. However, we need guidance on narrowing the focus in a manageable way. There is

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<sup>1</sup> The use of Cameron's framework was inspired by McDonald and Micikas (1994).

evidence that the norms of the academic major are a significant source of variation in pedagogy, reward structures, and the academic environment with very strong influences over student behavior. The literature of information seeking and use also supports this view. Models of information ‘use in context’ proposed by Wilson (1991, 1999) suggest that information behaviors are influenced by individual motivations, needs, and abilities as well as social norms and expectations associated within an individual’s organizational role. This project will focus on the experiences of students enrolled in undergraduate history courses.

Research also suggests that students who engage in ‘high-impact’ practices such as experiential or service learning, residential learning, writing-intensive courses, and capstone coursework are related to higher self-reported gains in learning and personal development. Students who engage in these practices also report higher levels of engagement and effort in college (Kuh, 2008, p. 14-15). Therefore library impact assessment tools should focus on student effort in high-impact academic work within the academic major when students develop and demonstrate expected competencies.

*What level of analysis is used?*

The information needs, seeking, and use (INSU) literature supports the choice of the work task, as opposed to discrete information uses, as a unit of analysis (e.g. Leckie, Pettigrew, and Sylvain, 1996; Byström & Jarvelin, 1995; Byström, 2000; Solomon, 1997b). Therefore, assessment tools should focus on the work tasks or ‘learning activities’ associated with high-impact learning experiences as the level of analysis.

*What time frame is employed?*

Seminars, writing-intensive courses, independent studies, and culminating senior experiences are the most common high-impact practices available to students pursuing history majors. Therefore, the assessment tools should focus on student experience during these experiences. Culminating senior experiences (capstone courses) are specific high-impact



practices that make a logical fit for an assessment project, suggesting assessment will occur later in a student's academic career.

*What type of data is sought?*

Assessment tools should demonstrate evidence that student interactions with library services and resources contribute to undergraduate student learning (effects). Credible connections should be made between students' information behaviors and the expectations for student learning associated with high-impact coursework. Tools should generate an understanding of the factors of library use that contribute to or inhibit student learning. This understanding can support improvement efforts. Quantitative data about the volume and types of library use are needed. Qualitative data about how and why students use the library should be collected to complement and reinforce other findings.

*What is the referent against which effectiveness is judged?*

Assessment tools should demonstrate the library contributes to general education and discipline-specific student learning outcomes expected of college graduates. Where possible, assessment tools should link library use to recognized learning outcomes frameworks which support assessing and communicating library impact on student learning within and among institutions. Examples of such frameworks are the Essential Learning Outcomes and accompanying rubrics defined by the AAC&U (AAC&U, 2007) and discipline-specific outcomes such as those generated by Tuning projects (ICHE, 2010), which will be used in the current project.

### **3.2 The Critical Incident Technique (CIT)**

The Critical Incident Technique (CIT) is a research method that is well-suited to this type of research problem and addresses several methodological issues raised in the literature review. The CIT is a systematic method of learning from observations of human behavior to derive a general understanding of the activity in question. This primarily qualitative technique was an outgrowth of work done in the Aviation Psychology Program of the U.S. Army Air Forces during

World War II, to “develop procedures for the selection and classification of aircrews” (Flanagan, 1954). During the years that followed World War II, its methods were codified through numerous job analysis studies. In these studies, workers, foremen, or managers would be interviewed or surveyed about events or experiences that were critical in their line of work. Data about these observations were classified, categorized, and analyzed to make generalizations about a given activity. In the context of job analysis, for instance, a participant could be asked to think back to a time when operations ran very poorly. Questions and probes would then inquire about the actions a team member or leader took to improve the situation and other aspects about the event. Flanagan initially intended observation to be the primary method for collecting data, but interviews, focus groups, and surveys are now typical methods used for CIT studies. Over the past fifty years, the method has been adapted for use in a wide range of fields including job analysis, performance assessment, medicine, counseling, education, and outcomes assessment (Butterfield, Borgen, Amundsen, & Maglio, 2005).

### **3.2.1 Components of the Critical Incident Technique**

Flanagan recommended researchers follow five steps to implement the CIT in a study. The first step, determining the general aim of the activity based on expert opinion in the field, is of great importance in focusing the study for both researchers and participants. Participants who understand the intent of the activity will be in a position to “speak meaningfully” about conditions or aspects of the incident relevant to the activity (Kain, 2004). It follows that in step two, plans and specifications for collecting information regarding incidents should be developed. In Flanagan’s day, managers were seen to be in the best position to address job analysis requirements since they observed workers in the field. However, now it is typical to interview or survey participants themselves. Step three involves selecting research methods. Depending on the context, the choice of methods and the frequency of data collection may vary. Interviews, focus groups, and surveys are the most common methods of data collection today. In the data-gathering phase, participants are asked to recount “critical incidents” where they were particularly

effective or ineffective in some activity. Details to be gathered regarding the incident include their context, details of individuals' behavior, and the significance of factors contributing to the success or failure of the activity in question. It is important that individuals recount the characteristics of a specific event so that adequate detail can be collected from a wide variety of participants, yielding a collection of incidents that are representative of the activity in question. Vague recollections however, are a sign that the incident "is not well remembered and that some of the data may be inaccurate" (Flanagan, 1954, p. 340). Data collection should continue until an adequate number of incidents were gathered to cover the full range of behaviors and conditions characteristic of the activity (Kain, 2004). This figure varies depending on the activity of course, but Flanagan's rule was that "if adding 100 critical incidents" only adds one or two critical behaviors, the data collection can stop (Flanagan, 1954), however, there is no hard and fast rule. This issue is addressed further in the section of this paper focusing on the validity and reliability of this method.

Step four, analysis, includes classifying the incidents and associated factors to facilitate inference "while sacrificing as little as possible of their comprehensiveness, specificity, and validity" (Flanagan, 1954, p. 334). The classification scheme for the analysis is shaped by the frame of reference that will support the purpose of the study. For instance, Daniel Kain notes that "if the target use will be training, the frame of reference builds a classification system that translates easily into a training course" (Kain, 2004, p. 76). Second, categories are created through inductive methods using recursive analysis and grouping of events, behaviors, and factors. Categories may emerge from the data, but often categories are also drawn from the purpose of the research, theoretical propositions, and the influence of prior work. Incidents are then placed in those categories and themes are developed. Step five involves interpreting and reporting the results of the study, including making inferences. Flanagan also cautions researchers to report any evidence of bias or other factors in the study that would limit generalizing the results to other groups. Giving away his positivist roots, Flanagan suggested the

aim of a CIT study would be to generate “a statement relating to all groups of this type” (p. 345). Kain, however, notes that Flanagan’s admonition to “describe fully and carefully” is consistent with current stances in qualitative research, which see generalization as a “case of reader-based transferability of the findings of a study” (Kain, 2004). Reports of CIT studies typically use methods consistent with qualitative approaches, such as case studies and rich description of themes using participant quotes and vignettes and quantitative methods through counting category membership to detect the strength of factors.

### **3.2.2 Strengths and weaknesses of the CIT**

There are several strengths and weaknesses to this method. Marie Radford notes that the CIT allows a researcher to gather rich details about an event detecting the “nuances of quality that are lost in most survey data collection” (Radford, 2006). Daniel Kain adds that the CIT is “connected to real-world behaviors and activities minimizing the subjective input of the researcher” (Kain, 2004). Furthermore, Kain adds that the technique’s effectiveness is perhaps tied to the simplicity of its approach relying on the “accessible discourse of the narrative: ‘tell me about the time when’” (Kain, 2004, p. 78). The method is also useful during the exploratory stage of a research program when theories and models are being formed. Flanagan’s CIT framework is intended to be flexible in terms of data collection, analysis, and reporting methods providing researchers with the capability to shape a study to meet a specific purpose and special circumstances. However, the technique has its critics. The method relies on self-reports of participants and therefore suffers from claims that self-reports are inaccurate due to faulty memory. Also, the success of the method depends on the strengths of the researcher who is typically the data collection instrument (Kain, 2004) and also responsible for inductive analysis and reporting results.

Several safeguards have been suggested to communicate the validity and reliability of this method. Bengt-Erik Andersson and Stig-Goran Nilsson (1964) provided an early report of several approaches to determine the validity and reliability of CIT studies. Saturation and

comprehensiveness measures can be used to indicate that most if not all aspects of the activity in question were revealed in the study. Andersson and Nilsson recommend tracking the growth in the number of new categories as more incidents are reviewed. In their analysis of a CIT based study, 95% of all categories were identified in two thirds of the incidents; “suggesting that data collection had probably not stopped too early” (p. 400). They recognize too that categorization is a subjective process and that an obvious classification system should be used to minimize errors. Inter-coder agreement can also be assessed to determine the integrity of the categories (Andersson and Nilsson, 1964). Butterfield et al. (2005) recommend other approaches for establishing the validity and reliability of a CIT study. Some methods are in line with earlier work including secondary analysis of transcripts, forms of inter-coder agreement checks, and exhaustiveness tests. Two approaches involve participants in the process in which they are re-interviewed or participate in cross-checking of results. Finally, Andersson and Nilsson recommend experts in the domain or in the CIT method review a sample of the incidents for content validity and credibility checks (Butterfield et al., 2005).

### **3.2.3 Applications of the CIT in LIS research**

The CIT has been used widely within the field of Library and Information Science (LIS) to conduct information behavior research to derive categories of ways in which public librarians help patrons (Carr, 1980), to classify the impact of MEDLINE use on clinical problem solving (Wilson, Starr-Schneidkraut, & Cooper, 1989), to explore manager’s environmental scanning behaviors (Auster & Choo, 1993), to study nurses’ use of community information (Pettigrew, 1996), to construct a taxonomy of academic library value (Saracevic & Kantor, 1997a, 1997b), to identify types of electronic information services used, purposes, influences on use, and barriers to use (Urquhart et al., 2003), and to understand how academic faculty use journal literature (e.g. Tenopir, King, & Bush, 2003). Marie Radford used the CIT to explore the aspects of interpersonal communication that affected the success or failure of reference encounters (Radford, 1996) and schoolchildren’s perceptions of interactions with school librarians (Radford,

2006). Joan Durrance, Karen Fisher, and Marian Hinton detailed their methods for identifying User-Centered Outcomes in Public Libraries, in *How Libraries and Librarians Help* (2005). Though not described as such in this book for practitioners, their methods seem to follow Flanagan's Critical Incidents stages including defining the service to analyze, identifying ideal or expected outcomes, conducting interviews or focus groups to collect data, identifying themes and sub-themes, and organizing and reporting the results. Durrance and Fisher demonstrated the utility of the method in field studies in four public libraries (Durrance & Fisher, 2003).

Lisl Zach's study of arts administrator's information seeking behaviors (2004) is typical of studies that use the CIT in exploratory research of information behaviors. Zach interviewed twelve arts administrators regarding their information gathering behaviors in support of various management tasks using a pre-tested structured interview instrument. Each interview recording was transcribed, analyzed, and coded prior to the next interview. Results of the analysis of each interview informed the researcher's approach in the next interview. The interviews produced twenty critical incidents for analysis. Zach used saturation analysis and participant review to establish the comprehensiveness and reliability of the approach. The study revealed several categories including the purposes for an information search, the types and sources of information used, and factors that influenced the level of effort expended on the search, as well as stopping criteria.

While many CIT projects use interviews for data gathering, many CIT instruments have been converted to surveys. Urquhart & Hepworth (1995) provide an example of a critical incident survey used to assess the effectiveness of information services at 11 hospitals. Participants described the purposes for using information sources, how they obtained information, and the value they received from interlibrary loan requests, MEDLINE searches, and end-user searches. Notably, the survey instrument initially used in a pilot study was found lacking and improved following interviews with participants. The unit of analysis in this study was a specific information use. David Carr (1980) collected 120 critical incidents from 39 librarians using a

survey instrument. Don King and Carol Tenopir (e.g. Tenopir & King, 2002; Tenopir, King, & Bush, 2003; Tenopir, King, Edwards, & Wu, 2009; Tenopir, n.d.) have conducted over fifty studies of journal use by academics using a variant of the CIT delivered in survey format. Their survey focuses on information use, the reading of a journal article, as the unit of analysis. Participants in their studies are encouraged to recall the last scholarly journal article read. Subsequent questions inquire about the source of the article, how it was found, the effort put into reading the article, and the purpose for which the article was read. Further, the participant is asked if he or she would seek out this article if it hadn't been available in its original form and if so, how much time and money they would expend to retrieve the article (e.g. Tenopir, n.d., UT Faculty Survey). Joanne Marshall (1992) reported on the Rochester Study of physician and resident use of information during patient care in 15 hospitals near Rochester, New York. The CIT survey used in this large-scale study focused on library-supplied information and its impact on clinical decision making (p. 172). Over 2,000 responses were used in this study. The Rochester Study was replicated in 2009 (Dunn, Griggs, Marshall, & Solenberger, 2009) with a far larger sample.

### **3.2.4 A method for the current study**

A CIT survey is proposed for assessing the impact of the academic library on student learning outcomes. As noted in section 3.2.3, the CIT has been used to investigate the value of information services to people in several studies and is an appropriate tool for meeting the methodological challenges outlined in section 3.1. The first of Flanagan's stages is to determine the aim of the activity, which in this case is undergraduate student learning in upper-level and capstone courses in the academic major. Methodological conclusions about the domain of interest from the literature of college impact were used to refine the focus of the CIT study on student effort in writing-intensive and capstone courses pursued toward the student major. Choosing these activities as the focus of the study provides numerous benefits. Capstone courses are high impact, culminating experiences for undergraduate students in which they complete a

project in their academic major “that integrates and applies what they’ve learned” (Kuh, 2008, 11). This is a time when students are demonstrating the competencies stakeholders and employers expect of graduates. A capstone student experience within a course of study should be a memorable activity for students, focusing participants’ attention on a specific and meaningful achievement in their academic experience. The choice of academic project as the ‘critical incident’ of interest bounds the evaluation in terms that are familiar for respondents and are likely to be similar for all participants, leaving little doubt about the purpose of the activity for participants.

The CIT has a user-centered focus which values the perspectives of participants over gathering system-oriented metrics or information artifacts. A combination of open, partially open, and closed questions may be used in a CIT survey allowing for a structured instrument that still allows the participant’s voice to be heard. A focus on a specific project and open-ended questions should also support gathering information about students’ affective state during and after their effort. Choosing the academic project as the unit of analysis, instead of specific information uses, will allow “how” and “why” probes to determine at which stage of the project students exercised gap-facing, gap-defining, and gap-bridging information behaviors. This arrangement also makes possible questions and probes about benefits and problems associated with student use of library resources, services, and facilities as they relate to the goals associated with the project. Finally, the academic project or assignment is the smallest unit within which student learning objectives are defined and assessed, creating a natural method for connecting student experience in the library with student learning outcomes defined and assessed by faculty.



#### **4. Qualitative pilot studies**

Two qualitative pilot studies evaluated the Critical Incident Technique for exploring library impact on undergraduate student learning.<sup>2</sup> The first study tested an early version of the ULI protocol at a small liberal arts college and included interviews with librarians, faculty, and students. The project evaluated the Revised Taxonomy of Educational Objectives (Krathwohl, 2002) as a framework for communicating library impact on student learning. The second study was conducted at a public university and also involved interviews with librarians, faculty, and students. Again the Revised Taxonomy of Educational Objectives was evaluated as a framework for communicating library impact on student learning. The CIT survey used in the current study was derived from the interview protocol tested in the second pilot study.

##### **4.1 Pilot study A**

A pilot study was conducted in the summer and fall of 2005 at a small liberal arts college. The purpose of the study was to evaluate the utility of the Critical Incident Technique for exploring student use of library resources and services during their academic work. The study design followed that outlined by Joan Durrance and Karen Fisher (2004) and included interviews with librarians, faculty, and students.

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<sup>2</sup> Portions of this chapter were reported in (Rodriguez, 2006) and (Rodriguez, 2007).

#### **4.1.1 Design**

Step one involved a focus group interview with five librarians. The discussion focused on the digital library services and resources the institution provides for students and librarian perceptions of the benefits students may enjoy in their use.

Step two involved interviewing members of the teaching faculty. Four faculty members from across the college in the Humanities, Social Sciences, Sciences, and the Fine Arts were invited to participate. Two were male and two were female and each teaches first-year through senior seminar level courses. The interview discussions focused on the courses they teach, the assignments students complete in the courses, and the learning objectives associated with each assignment.

Step three involved 30 to 45 minute interviews with twelve students during the summer and fall of 2005. Ten of the participants were female and two were male. All of the respondents were white. One student was of Hispanic origin. Eleven of the students had declared a major at the time of the interview. Fifty percent of the students in the sample majored in the humanities and 33% majored in Biology. Ten of the twelve participants were enrolled as seniors or graduated from the institution in 2005. Informed consent for all participants was obtained according to procedures approved by the UNC Chapel Hill Human Subjects Institutional Review Board.

The students were first asked to complete a brief survey regarding their library use. This encouraged the student participants to think back over their academic experience so they would have projects in mind for the second part of the interview and to help the researcher understand the library use habits of students in the sample. During the interviews, students were asked to discuss a significant academic assignment or project. Cumulatively, the participants discussed 33 projects or papers (critical incidents).

The Revised Taxonomy of Educational Objectives, a well-known system for classifying statements regarding student learning goals provided a way for comparing faculty goals for student learning and student perceptions of those learning gains in this study. The taxonomy has

its roots in work conducted by Benjamin Bloom and a team of educational researchers (Bloom, 1956), who designed a taxonomy of cognitive educational objectives beginning in the late 1940s. The team sought to classify student behaviors at varying points in their learning consistent with “present understanding of psychological phenomena” (Bloom, 1956, p.14). It was a descriptive scheme that classified specific student behaviors sought by an instructor. In the original taxonomy there were six cognitive dimensions: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. The usefulness of the taxonomy extended to curriculum and assessment design. The taxonomy has had far reaching influences in educational research and instructional design since its publication. In 1994, work began on a revision of the taxonomy (Anderson & Sosniak, 1994). In 2001, the Revised Taxonomy of Educational Objectives was completed (Anderson, et al., 2001; Krathwohl, 2002).

The revised taxonomy classifies statements of learning objectives along the Knowledge and Cognitive Process dimensions. The levels of the Knowledge Dimension, also called the “nouns” of learning, include factual, conceptual, procedural, and metacognitive knowledge. The Cognitive Process Dimension includes the “verbs” of learning including Remember, Understand, Apply, Analyze, Evaluate, and Create in increasing order of complexity. Each dimension is said to build upon the previous dimension, such that if a student is expected to understand a fact for instance, they would of course remember it. In practice, a learning objective is classified in both the Knowledge and the Process Dimensions, thereby revealing its “noun” and “verb.” The Knowledge and Process Dimensions of the Revised Taxonomy are outlined in Appendix D.

#### **4.1.2 Analysis**

Faculty interviews were recorded, transcribed, and analyzed for emergent themes regarding assignment types and learning objectives. Statements regarding learning goals associated with each assignment were classified using the Knowledge and Cognitive Process dimensions of the Revised Taxonomy of Educational Objectives (Anderson, et al. 2001). Sixty-five statements regarding learning objectives were gathered and classified according to the

Revised Taxonomy. Student interviews were also recorded, transcribed, analyzed, and reviewed for “repeating ideas” using procedures outlined by Carl Auerbach and Louise Silverstein (Auerbach & Silverstein, 2003, p. 54-66). Descriptive, interpretive, and pattern codes were developed using guidance from Matthew Miles and A. Michael Huberman (1994) to categorize incidents, learning objectives statements, types of library use, ways the students benefitted from resources and services (helps), and problems they encountered. Interview transcriptions were reviewed and coded sequentially, so questions could be rephrased and findings in one interview could be probed further in the next interview.

#### **4.1.3 Results**

The students discussed 33 projects or papers in the interviews. Sixty-three percent of the incidents were in the humanities disciplines and almost 30% were in the sciences. An overwhelming majority of the project types were research papers, essays, or theses (~72%). The finished product in 27 of the 33 incidents (81.8%) was written work including papers, essays, theses, lab reports, grant proposals, and web site creation projects. The themes that emerged from the interviews are reviewed below.

##### **4.1.3.1 Digital library resources**

Twenty-four of the incidents included 131 passages that made explicit mention of digital library resource use, benefits, or problems. The types of resources mentioned include the online catalog, electronic indexes, electronic journals, electronic books, online research guides prepared by librarians, digital libraries, and electronic articles delivered via interlibrary loan. Students mentioned from one to five resources per incident. The protocol included probes to explore specific benefits students accrued to the use of digital library resources. The student responses to this question fell largely into the theme of access to resources. Access sub-themes included access to a variety of materials by language or publication date and by bridging geographical

boundaries by making the location of the resource or the researcher irrelevant. Convenience in the form of saving time also emerged as a theme.

Access was explicitly mentioned as a benefit 13 times in 10 incidents. The wealth of materials available to students can contribute to their success, while the dearth of materials can be seen as an obstacle or a deterrent to success. Student 11 made this case the most clearly when stating, “I think that without those databases I would be severely limited in the amount of scholarly work that I could look at.... I would get a very different perspective and it [the research paper] wouldn’t be nearly as complete.” Access via services like interlibrary loan (ILL) extends and strengthens the offerings in the physical collection: “There is no way the library can have everything and ILL helps here.” Students mentioned other ways in which digital library services increased access to materials including a wider diversity of resources by language. Digital library services also bridge geographical boundaries allowing students to access primary materials that otherwise would be unavailable: “The document itself is in a museum in London. I would never have found it if it hadn’t been scanned and I could just click on it” (ST-P-12). Seven students mentioned convenience as being a significant aspect of digital library resources. Saving time through the use of digital library resources was mentioned as a benefit in nine of the 33 incidents. Time and spatial independence is also a contributing factor: “I can study from my dorm room while the library is closed” (ST-P-11).

Students also mentioned specific attributes of digital library resources that make them helpful. Aspects related to digital interfaces were mentioned 24 times in 15 incidents. Effective search tools and multiple access points such as hot-linked subject headings increase access to materials and allow more refined queries in a sea of information. Six of these comments indicated that a digital library resource interface posed difficulty. Reasons include misleading information in a citation, as noted in student interview 1: “it wasn’t clear what part of the document was in which language;” a difficult to use interface “there are a lot of steps in the

database to get an actual document” (ST-P-12-C); or a poor fit of the interface to the material searched for (ST-P-12-B).

#### **4.1.3.2 Traditional resources**

Traditional resources are defined in this study to be non-digital materials including books, print periodicals, print indexes, microforms, and audiovisual materials. Eleven of the twelve students made twenty-eight references to traditional resources in the course of the interviews. Eleven students in fourteen incidents referenced the use of books from the collection in meeting their learning objectives. Four students explicitly mentioned the use of print periodicals. Three students mentioned the use of microforms. One student mentioned the use of print indexes.

How did they help? Several themes emerged regarding print materials and their use. The use of books tends to be a natural starting point in these incidents. Aspects that were important to the students included the strength of the collection for the subject area of interest and availability of materials as for interviewees six and one. Comments regarding interface issues of print indexes were split. One student mentioned a preference for the flexibility of searching with keywords and Boolean operators in electronic indexes instead of using print indexes. One student however, mentioned that the ability to browse subject headings was easier with print indexes than electronic indexes. Another mentioned the use of printed bibliographies for finding relevant citations.

#### **4.1.3.3 Library Facilities and Equipment**

All twelve students said that they studied or performed research in a campus library more than once per week. The importance of the library as a place to study and perform research was mentioned in five incidents. Four of the incidents indicated the library was a comfortable place to work or was convenient because it was close to the materials needed for research.

#### **4.1.3.4 Library services**

Thirty-two passages mentioned the use of traditional library services including reference services, library instruction classes, research consultations, and interlibrary loan. Students noted specific contributions from traditional services to their work:

“I definitely talk to the librarians here which helps” (ST-P-11-A).

“I wouldn’t be able to do this without ILL people” (ST-P-12).

“I mean I could have spent a week figuring out which [topic] had more information but I think the librarian really helped me” (ST-P-4-B).

Library instruction was explicitly mentioned by six of the interviewees. The chief benefits received from this service are opportunities to gain facility with research tools and to learn when to use specific tools. Particular mention was made of gaining skills with digital library resources: “The librarian showed us how to use Biological Abstracts and how to narrow down our research. It was helpful” (ST-P-07). Some noted that the service had helped with a specific assignment: “And then the librarian had us just search ... and I ended up finding almost all of the resources that I cited ... in that 20 minutes in the room” (ST-P-2-A). Others discussed a more cumulative effect from attending library instruction classes where experience and instruction builds over time to improve their expertise as researchers (ST-P-12).

The use of interlibrary loan was mentioned eleven times in these incidents, for requesting articles, books, and microforms. The chief benefits of this service are increased access to materials and convenience as noted by student 6: “So I would get the ILL request through the Internet and then I would click on the PDF and it was just great and the article is right there. That is much better than having to wait for the article to come in” (ST-P-06).

#### **4.1.3.5 Independence as a researcher**

A theme emerged in the interviews related to a drive to develop independence as a researcher. Four students made explicit reference to this desire and three mentioned contributing factors. Factors contributing to independence include personal feelings about one’s own research

skills and responses to aspects of library resources and services. Personal aspects that contribute to achieving independence include reducing anxiety and increasing confidence. Availability of resources and approachability of staff are two aspects of the digital and traditional library that also contribute or limit achieving independence as researchers.

Anxiety while conducting research was mentioned as an obstacle to academic achievement thirteen times in the interviews. Four students recalled times when they actually experienced anxiety, though five students mentioned contributing factors. The primary cause of anxiety is materials availability either in the form of too many choices or resources to choose from (mentioned by 4 students) or a real or apparent lack of resources to meet a given learning objective (3 students). Also a lack of skill or confidence in one's abilities (2 students) can contribute to anxiety.

Twenty-three passages were coded for contributions to confidence building or reducing anxiety. Factors contributing to an increase in confidence were practice with the research process or specific tools (6 students), gains in skill (1), familiarity with resources and prior success (4), and expertise from a librarian (6). Reference contact also eased anxiety: "So I always felt that if I spoke with a librarian first, it calmed my anxiety, no matter how many classes or reference visits you go to, they can always pull things up" (ST-P-06-C). If such contact occurs regularly it contributes to confidence and achieving independence as a researcher: "It helps to have the research consultation every year. I mean because I have built this up [skill] over time ..." (ST-P-12-C). The approachability of librarians plays an important role here. Two students explicitly noted that the approachability of librarians at the pilot institution contributed to their being comfortable doing research and decreasing their anxiety with research.

#### **4.1.4 Learning objectives**

Students commented on specific learning objectives associated with assignments in 28 (85%) of the incidents. These learning objectives were mapped to the knowledge and process dimensions of the Revised Taxonomy of Learning Objectives and placed in a contingency table



(see Table 4.1). The numerals in each cell represent the number of times a passage was coded for a particular Knowledge and Process Dimension. Percentages represent the proportion of all objectives that mapped to a particular cell. As can be seen there is strong representation along the conceptual knowledge dimension. Twenty percent of the learning objectives statements were associated with creating conceptual knowledge, which is not surprising since a high proportion of the students were working on senior theses. These findings suggest that students are indeed capable of remembering academic course work and interpreting learning objectives associated with that work.

Table 4.1 Faculty and student perceptions of learning goals, pilot A

<i>Knowledge Dimension</i>	<i>Cognitive Process Dimension</i>				
	Remember	Understand	Apply	Analyze	Evaluate Create
Factual Knowledge		4 (6.6%)			
Conceptual Knowledge		5 (8.3%)	1 (1.6%)	16 (26.6%)	2 (3.3%) 11 (20%)
Procedural Knowledge			20 (33.3%)		
Metacognitive Knowledge					

#### 4.1.5 Reliability and exhaustiveness checks

Two methods for checking reliability were used in this study. Inter-coder agreement was conducted with 25% of the transcripts to evaluate and improve the coding. Second, exhaustiveness tests were conducted to determine the point at which new content categories “stopped emerging” from the data (Andersson & Nilsson, 1964; Butterfield, et al. 2005, p. 487). Forty-nine separate codes were developed to classify the themes found in the pilot interviews of twelve students. After reviewing 50% of the interviews, 92% of the codes had been expressed.

#### 4.1.6 Implications

The Critical Incident Technique proved to be well-suited for exploring student experience during the process of completing academic work. Students recounted highly detailed experiences using information resources and library services during the completion of their work, suggesting

the authenticity of the accounts. Further, the semi-structured interview process supported probing for benefits and problems associated with library use and allowed the voice of the students to be heard. The project revealed four categories of library use, electronic and traditional resources, library services, and library facilities that were used during academic work. The theme ‘independence as a researcher’ emerged early in the study. Students spoke clearly about the roles of anxiety and confidence in that development and the ways aspects of library resources and services contribute to or hinder gaining that independence. These resource categories and factors of use are summarized in Tables 4.2 and 4.3.

Table 4.2 Categories of resources, services, space, and facilities use, pilot A

Electronic information resources	Traditional information resources	Services	Facilities
Library catalog; electronic indexes, e-journals; e-books; online research guides; electronic services; and digital libraries	Books; print periodicals; reference materials; microfilm	Reference services; research consultations; library instruction; and interlibrary loan	Space to study and watch videos; library computers for

Table 4.3 Factors of use that contributed or hindered students in their work, pilot A

Electronic information resources	Traditional information resources	Services	Facilities
Access, yielding time savings and geographic flexibility; saved money; resource availability; search interfaces	Ease of use; availability; collection strength	Taught new skills; helped find information; calmed student down; access to information (ILL); approachability of staff	Convenient (close to resources and computers)

## 4.2 Pilot study B

### 4.2.1 Design

Following the pilot study, the interview instrument was refined and a second study site was identified. During the fall of 2006 the “Understanding Library Impacts” protocol was

evaluated at a research university in the southeastern U.S. with the cooperation of the campus' library administration and librarians. The study followed a similar approach to that taken in pilot study A. Initially, two focus group interviews with librarians were held to understand the types of services offered by the library, to gain librarians' perspectives on student use of the library, and to identify target disciplines. After consulting with the librarians, the History and English departments were chosen as the target disciplines for the study. Interviews with five faculty and 13 students were held during the fall of 2006. Ten of thirteen student interviewees identified undergraduate History as one of their academic majors, so the experience of these students was emphasized in the study. Informed consent was obtained according to procedures defined by the UNC-CH Human Subjects Institutional Review Board.

#### 4.2.2 Analysis and results

##### 4.2.2.1 Faculty interviews

Interviews with the faculty members from the History department were transcribed and analyzed for emergent themes regarding undergraduate learning goals associated with the major itself and with specific courses central to the major. Learning goals were classified in two ways. First, cognitive learning goals were grouped into four clusters: introduction to research, applying research skills, reading critically, and generating and communicating original ideas. Each cluster was then mapped to knowledge and process dimensions of the Revised Taxonomy.

Table 4.4 Learning outcomes classified using the Revised Taxonomy, pilot B

Faculty participant A	Faculty participant B	Classified learning objectives
<i>Introduction to research</i>		
Increase familiarity with sources and the library through library instruction	Understand how archives work; Understand the structure of literature and sources	Understand – Facts
<i>Applying research skills</i>		
Encourage student to exploit the structure of historical literature through the use of bibliographies	Use archival materials	Apply - Factual Knowledge

*Continuing*

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Require students to do primary research	Apply library research skills	Apply - Procedural Knowledge
Become an expert in an area and share that knowledge with the class	Find a book in the library, review it, and present it	Apply - Procedures, Analyze - Concepts, communicate findings
<i>Reading critically</i>		
Be attuned to differences of interpretation between different scholars and schools of thought	"introduce them to the various history methodologies"	Understand – Concepts
Adopt a questioning approach, think critically	Read critically "deconstruct an article," determine relevance to their thesis	Analyze – Concepts, Evaluate – Concepts
<i>Generating and communicating original ideas</i>		
Create strong research questions, develop an original thesis	Create strong research questions	Create - Concept
Formulating Research questions and doing original research	Narrowing down the topic	Create - Concept
"Learning how to construct a logical and integrated argument that is based on proof"		Create - Concept
Go from the "raw source material of history and process it through their own intellects to come up with their own interpretations"	A term paper that should use a combination of secondary and primary resources	Create - Concept
	Practice documentation style; good writing skills	Apply - Procedure

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**4.2.2.2 Student interviews**

The student population for this study included students enrolled as undergraduate History or English majors at the study site during the fall semester of 2006. At the time of the study, the registrar's office reported 385 undergraduate students majoring in English and 422 undergraduate students majoring in History. Students were invited to participate by email and through 'snowball recruiting' methods. The ten interviews with History majors were held between November 3 and December 1, 2006. Six interviews were conducted in person. Four interviews were conducted by telephone. In-person interviews were held in group study rooms at the campus Library. Identical protocols were used in in-person and telephone interviews (see

Appendix E). Nine of the ten History majors received gift certificates to the campus coffee shop as inducements.

Student participants presented diversity in gender, six women and four men, and academic standing, five were seniors, three were juniors, one was a sophomore, and one was a freshman. Two students were born outside of the U.S. Four were “nontraditional” students who were older than the typical undergraduate and pursued their studies while raising families, working full-time jobs, or in retirement. Four students transferred to the university from another institution to complete their degrees. Four students were associated with the history honors program and four were pursuing double or triple (1) majors.

The student interview portion of the protocol consists of three sections: a survey of patterns of library use, student perceptions of learning objectives associated with the academic major, and questions and probes regarding the ways library services and collections were used to achieve academic work toward the major. Students then discussed significant academic papers or projects and the learning goals associated with these assignments. The students discussed 19 projects, 18 of which involved a written product such as article reviews, research papers, critical essays, thesis proposals, and theses. Six projects involved oral presentations.

### ***Library resource, service, and facility use***

Students were asked if they used library resources or services during the completion of their assignments. Information resources are divided into two groups: traditional resources such as books, videos, print finding aids, archives, or print journals and digital resources such as library catalog, online databases and finding aids, digital libraries, and electronic journals. As seen in Table 4.5, all ten History majors reported using traditional and digital resources in their studies. Traditional resources (books, videos, finding aids) were used in 79% of the assignments and digital resources were used in 68% of the assignments. Two students reported using library video viewing rooms to watch a video. Two thirds of the students reported having face-to-face interactions with librarians during the completion of 12 out of 19 assignments in this study. Two

students mentioned using electronic means to communicate with a librarian. One student's comments on this issue may help explain this discrepancy though other factors may be at play. Student six stated a preference for communicating with a librarian in person "because when you have a question, you may email a question and get back an answer. But when you look at that answer you have ten more questions. So when you talk to the librarian in person you get it all done at one time" (ST-06-B).

Table 4.5 Library use when completing History assignments, pilot B

	Number of Students	% of students	Number of Assignments	% of assignments
<i>Resources</i>				
Traditional resources (Books, Archives, Print Periodicals, etc.)	10	100%	15	79%
Digital resources (Electronic finding aids, indexes, and catalogs; electronic resources, digital libraries, etc.	10	100%	13	68%
Space in the library	2	20%	2	10%
<i>Services</i>				
Spoke to a Librarian in person	6	60%	12	63%
Used Interlibrary Loan	3	30%	3	16%
Had email communication with librarian	2	20%	4	21%
Used a library computer	2	20%	2	11%

A set of questions and probes examined the ways in which using library resources, services, and facilities helped the students in their academic work. Students who answered these questions mentioned that digital library resources and traditional services extend access to relevant information. Time and geographic independence, time savings, breadth of content, and diversity of content by publication date and language were the principal aspects that contributed to extending access among these students. Internet-accessible digital resources allowed students to access needed research independent of time and geography. Time independence was important to interviewee 10 who said, "I work a full-time job ... so being able to access the catalog any time day or night and find the information I need and being able to search things electronically is great" (ST-10-A). And interviewee seven noted that, "being a nontraditional student ... time is at

a premium ... so anytime I can access resources when I am away from campus is a big plus for me” (ST-07-B). Five students mentioned ease of use as a favorable aspect to using digital library resources. Interviewee 8 said that research using digital resources “was quick and efficient. I got in and got out and did exactly what I needed to do” (ST-08-A).

Interactions with librarians were helpful to several students. Interviewee 11 described a library instruction class as a place to learn: “this is what you need to do when you are researching a paper ... having someone teach us that was good” (ST-11-C). Interviewee 1 suggested that library instruction should be required of all first and second year students as “professors shouldn’t have to waste their time telling us ‘this is how you go to JSTOR’” (ST-1-B). Interactions with librarians through reference interactions and research consultations are also beneficial. Reference librarian responsiveness (ST-06-B) was noted by one student and a multimedia center staff member helped a group get started on a multimedia presentation (ST-07-A). The approachability of librarians emerged as a significant factor of importance to students. Eight history majors made eight statements about the helpfulness and availability of librarians. Interviewee 4 noted that interaction with a librarian helps alleviate anxiety related to locating relevant resources:

“They know of databases and sources that you would not think of. I think one of the most difficult parts of finding things is knowing what your particular library has available. Say newspapers, you might need a newspaper from this date to this date. Or this periodical from here to there. That is what is difficult. And that is when it is helpful having a research librarian who can say yes we have it, no we don’t, we can get it for you, no we can’t” (ST-04-B).

Library space is also important to students as a good place to study. Interviewee seven, a nontraditional student with a family and a full-time job, mentioned that the fact that the library stayed open until midnight made a difference to him because of his work schedule.

A separate question focused on problems using the library. Problems related to materials availability came up in seven (37%) of the History projects. Three students mentioned occasions when specific periodical citations appeared to be relevant but the article itself wasn’t available to them because the library didn’t subscribe to a given electronic journal. One student mentioned

the need to view a video but that it was checked out the first time he went to view it. Three History majors mentioned difficulties finding books in the library. Interviewee 6 expressed frustration because in the general collection recently acquired materials are in the open stacks while older materials are stored in compact shelving. Because items related to her topic were stored in two locations, she was limited in her ability to practice her preferred information behavior of browsing for items on a similar topic (ST-06-A). Others were frustrated that they couldn't find books and couldn't get help. Two students said, "no one will go with me to find the books" (ST-01-A) and (ST-11-B). Ease of use issues with print and electronic resources emerged as minor barriers to students in this study.

A question based on the contingent valuation method was used to find out what students would do if the library couldn't offer the most important resource or service for their project. Geographic and time independence were two important benefits of access that students ascribed to electronic resources. This is not surprising, as several of the student participants are nontraditional students who work full-time or part-time jobs, have families, and commute. Student 4 said that if she didn't have access to the electronic resources from home "I would cry. I rely so much on them because I work at home ... I would be pretty devastated if I didn't have electronic resources" (ST-04-A). Convenience and aspects of digital resource interface were mentioned as aspects of digital resources that extended access to information. Interviewee six noted that electronic access encourages spontaneity "sometimes I'm in the middle of writing and I'll say 'what about this?' ... and I'll hop on the library's web site to see if I can find an article that will give me some background on it" (ST-06-A). When asked what she would lose if she had to go back to using print finding aids interviewee four said "I think I you lose the connection. [Where] articles are tied into each other. The keywords and being able to quickly search for things and find other routes to things ... I don't think it would be as fast or as convenient to do that" (ST-04-A).



One question focused on the student's affective state during the interview. Early in the interview the students were asked how they felt when they started the project. Nineteen answers to this question were gathered for 15 of the 19 history projects discussed in the interviews. Ten of the answers exhibited positive feelings and nine represented negative feelings toward the class or anxiety about the project. Academic issues, problems with sources, and unspecified factors influenced these answers. Positive academic influences include interest in the topic (4) and confidence in project group peers (1). Anxiety about academic ability, "I had never written a paper this long" (ST-11-A) and "who am I to think I'm an expert on this topic" (ST-04-C), contributed to negative feelings in four projects. Three students recalled feelings of anxiety when they started their project because they perceived they wouldn't find enough resources. Uncertainty about which source to use for a project can also cause anxiety. Participant five noted, "I'm still unclear as to which ones [databases] I should be choosing. There is a whole list of them and I would just read the title of the database and the brief description and hope it would help me find something" (ST-05-B). Two students expressed confidence because they did not foresee obstacles due to lack of availability of sources. To a degree this question turned out to be a primer, setting up the discussion of affective responses later in the interview.

### *Learning objectives*

Students were asked to discuss their projects and to explain in their words the learning goals behind the assignment. History majors made 57 statements regarding learning objectives associated with their academic projects. Student learning objectives statements were grouped into five academic activities: research, reading, analyzing, writing, and presenting. As seen in Table 4.6, these groupings closely mirror those found in the faculty interviews.

Table 4.6 Faculty and student observations regarding academic activities, pilot B

<i>Learning objective by type of activity</i>	
<i>Faculty</i>	<i>Student</i>
Introduction to Research	Research
Applying Research Skills	
Reading Critically	Reading Analysis
Generating and communicating original ideas	Writing Presentation

Seventy-nine percent (79%) of the students' statements were classified using the Revised Taxonomy and placed in a contingency table along with faculty observations regarding learning outcomes. As can be seen in Table 4.7, the faculty and student learning outcomes cluster along the conceptual knowledge dimension. Consistency between these distributions suggests that students are working toward the department's intended learning objectives.

Table 4.7 Mapping faculty and student perceptions of learning goals, pilot B

<i>Knowledge Dimension</i>	<i>Cognitive Process Dimension</i>					
	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual Knowledge		F1, F2 S=6	F1,F2 S=4			
Conceptual Knowledge		F1, F2 S=10	S=4	F1, F2 S=3	F1, F2 S=5	F1, F2 S=10
Procedural Knowledge			F1, F2 S=3			
Metacognitive Knowledge			S=1			

### 4.2.3 Implications

In this study the Critical Incident Technique was evaluated for its utility in exploring the ways in which students use the academic library to attain learning objectives associated with their academic major. The protocol identified the range of resources students reporting using during these projects and the factors of use that helped or were problematic during completion of academic work. A new question in this version of the protocol helped understand the affective state of students during the research process. Another question which asked students what they would do if their most important resource had not been available drew rich responses about factors of use that matter deeply to students. The sample in this study varied from that of pilot A,

in that four of ten students were nontraditional, defined as having one or more of these traits: being older than the typical college student, married or with families, or working a full-time job. The categories of use (resources, services, and facilities) and themes from the second study were congruent with those found in the pilot study.

The categories and themes that emerged in these studies are consistent with those found in other studies, lending criterion validity to study results. Tefko Saracevic and Paul Kantor (1997a, 1997b) derived a taxonomy of academic library value associated with patrons' use of the library (see Table 4.8) through a study using the Critical Incident Technique. They identified *reasons*, *interactions*, and *results* of those interactions. The interaction categories that emerged in the qualitative pilot studies, including traditional resources, electronic resources, services, and facilities, match up well with those reported in the derived taxonomy. Issues of materials accessibility and availability impacted patron success in Saracevic and Kantor's study and in the pilot studies. Aspects of staff interactions also emerged in all three studies. Finally, participants in Saracevic and Kantor's study reported cognitive and affective results of interactions with library services and reported time and money savings as benefits of their visits. Each of these categories emerged from the pilot studies A and B as well.

Colleen Cook and Fred Heath (2001) conducted interviews with faculty, graduate students, and undergraduate students at research libraries to understanding user motivations in the research library, expectations of library services, and expectations of library as a place. One finding which emerged from this study was a desire by participants to be self-reliant in the use of the library and retrieving information. This theme is consistent with the drive for independence as a researcher found in the first pilot study. As reported above, the studies conducted by Constance Mellon (1986) and Carol Kuhlthau (2004) revealed the strong roles that anxiety and confidence play in students' use of the library. The affective responses students have during library research and the supportive influences of librarians encountered in pilot studies A and B are consistent with Mellon and Kuhlthau's findings.

Table 4.8 Saracevic and Kantor's Derived Taxonomy of library value

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<i>Reasons for using a library or information service</i>
<ul style="list-style-type: none"><li>• Task or project</li><li>• Personal reasons</li><li>• Cognitive</li><li>• Affective</li><li>• Reasons for substitute choice</li><li>• Get an object or perform an activity</li><li>• Physical objects</li><li>• Intangible objects</li><li>• Perform an activity</li></ul>
<i>Interaction with a library service</i>
<ul style="list-style-type: none"><li>• Resources (availability / accessibility)</li><li>• Use of resources / services</li><li>• Operations and environment (policies, facility, equipment, staff interaction)</li></ul>
<i>Results of using service</i>
<ul style="list-style-type: none"><li>• Cognitive</li><li>• Affective</li><li>• Accomplishments in relation to task (reason)</li><li>• Expectations met</li><li>• Time saved – or wasted</li><li>• Money saved – or spent</li></ul>

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Source: Saracevic & Kantor, 1997b, p. 549.

## **5. Research design**

In this project I am evaluating a suite of instruments for assessing library impacts on undergraduate student learning. The project was conducted in two phases during 2011. The design includes two instruments: a ‘critical incident survey’ and a ‘learning activities crosswalk’. The survey draws response categories from the instrument developed in the interview-based pilot studies reported in chapter 4 and informed by several sources in the literature. The crosswalk was constructed using content analysis of curriculum maps, rubrics, and syllabi from phase 1 of the project described in section 5.1 and reported in chapter 6. The crosswalk was also informed by the stages of Carol Kuhlthau’s Information Search Process (2004) and content analysis of standard definitions of student learning outcomes in History (e.g. ICHE, 2010).

Phase one of the study was conducted during the spring of 2011. The instrument and data analysis procedures were reviewed and refined in this study to prepare for a broader study that took place during the fall semester of 2011. The timelines for these studies can be found in section 5.6.

### **5.1 Population and sample**

Two study sites were identified for phase 1 of the study conducted during the spring of 2011. Four sites participated in phase 2 of the study, conducted during the fall of 2011. Library directors and librarians at each site served as liaisons to campus administration, campus institutional review boards, and faculty in each History department.

#### **5.1.1 Phase 1: Spring 2011 study sites**

Site A is a selective liberal arts university in the southeastern United States with an undergraduate student population of approximately 5,000 students. The population for the study

from institution A includes senior History majors who participated in capstone courses in the fall semester 2010 and spring semester 2011 and sophomores and juniors participating in research methods classes in the Spring semester of 2011. The study population included approximately 60 students.

Site B is an all-women's selective liberal arts college attended by approximately 2,000 students. The study population included senior history majors participating in a two-semester long capstone course involving the writing of a thesis during fall 2010 through spring 2011. There were four sections of the capstone course offered during the 2010-2011 academic year and the population consists of approximately 48 students.

### 5.1.2 Phase 2: Fall 2011 study sites

Four sites participated in phase 2 of the research project conducted during fall 2011.

Table 5.1 Sites participating in phase 2

Site	Description	Carnegie Class*	Study population
Site C, parts 1 and 2	Master's university in the southeastern U.S.	Master's L	Part 1: 6 capstone seminars taught during spring and summer 2011 (N=57) Part 2: 5 capstone seminars taught during fall of 2011 (N=~60)
Site D	Research university in the midwest of the U.S.	High research university (RU/H)	Two seminars fulfilling the Baccalaureate Writing requirement (N=~35)
Site E	Research university in the southeastern U.S.	Very high research (RU/VH)	Four capstone senior seminars (N=~80)
Site F	Liberal Arts College in the midwest of the U.S.	Bac/A&S	One senior seminar in, three seminars fulfilling the Baccalaureate Writing requirement (N=~40)

\* Source: The Carnegie Classifications of Institutions of Higher Education, 2010

## **5.2 The Learning Activities Crosswalk: data collection and analysis**

The learning activities crosswalk for the current study is intended to connect library use to student learning outcomes and consists of four components:

- 1) learning activities,
- 2) student learning outcomes expectations (SLOs) associated with capstone coursework,
- 3) elements from the AAC&U Value rubrics, and
- 4) the Tuning learning outcomes for history generated during the Indiana Tuning project

(ICHE, 2010). Multiple coders created mappings between the components of the crosswalk and inter-coder agreement was assessed. The crosswalk data model and connections are stored in the ULI database to support analysis.

### **5.2.1 Learning activities**

The learning activities associated with capstone history assignments were shaped by findings from qualitative pilot study B (Rodriguez, 2007) and informed by the stages of Carol Kuhlthau's Information Search Process (2004):

- getting oriented
- choosing a topic
- developing a thesis statement
- gathering evidence from primary sources to support my thesis
- finding secondary sources
- creating a bibliography or documenting my work
- writing or creating the final product for the assignment
- preparing for an oral presentation (added in phase 2)

### **5.2.2 Student learning outcomes**

Faculty members at the study sites contributed capstone course syllabi, assessment rubrics, and departmental curriculum maps for analysis. Student learning objectives (SLOs) associated with capstone coursework were extracted from those documents and unitized in preparation for content analysis. A common set of capstone SLOs were distilled from these documents. A mapping process using content analysis techniques created links between learning activities and associated SLOs from the common set.

### **5.2.3 VALUE rubrics**

The second link in the crosswalk identified associations between the SLOs and elements from four AAC&U VALUE Rubrics: critical thinking, inquiry and analysis, information literacy, and written communication. Capstone expectations for the elements of these rubrics are reproduced in Appendix F.

### **5.2.4 Tuning outcomes**

The third link in the crosswalk paired SLOs with learning outcomes identified in the Tuning for History project conducted in Indiana (Indiana Commission for Higher Education, 2010). These discipline-specific outcomes cover a range of competencies expected of college graduates with history majors including historical knowledge, thinking and analytical skills, communication skills, and personal motivation and initiative. Student learning outcomes distilled from the Indiana Tuning project are reproduced in Appendix B.

An example of a crosswalk mapping would be: ‘A student uses primary sources’ (library use) when ‘gathering evidence for a thesis’ (activity) which helps students achieve the learning outcome ‘provides compelling evidence to support thesis’ (outcome). Further, the achievement of this outcome could be assessed with an element from the Critical Thinking VALUE Rubric: ‘Information is taken from source(s) with enough interpretation/evaluation to develop a comprehensive analysis or synthesis’ or a similar outcome from the Tuning framework. This mapping enables links between student reported use of the library and multiple frameworks for assessing student learning outcomes.

## **5.3 The critical incident survey**

A critical incident (CIT) survey was used to explore student experiences during the completion of academic work and factors of information resource use that helped or hindered student achievement. A survey was chosen for this part of the study so that the protocol could work at scale and it could be deployed as a tool for assessment and accountability purposes in



academic libraries. The questions and probes were derived from the instrument used and refined in the two qualitative pilot studies reported in chapter 4. The web-based questionnaire was designed using Dillman's 'tailored survey design method' (Dillman, Smyth, and Christian, 2009) administered via the web using the Qualtrics online survey system (Qualtrics, 2011). Pre-testing included a cognitive interview, the use of survey and statistical consulting services at the Odum Institute for Social Science Research at the University of North Carolina at Chapel Hill, and a pilot test with members of the target population for the Spring 2011 portion of the project. The instrument as used in phase 2 is reproduced as Appendix G.

### **5.3.1 Recruiting and data collection**

Library directors or Associate University Librarians at the sites supported initial contact with local IRB chairs and History departments to initiate the study. Ultimately contacts in the libraries and history departments helped facilitate instrument review, collecting documentation of learning objectives for the researcher, and recruiting for the project. Students who responded to the survey were eligible to win a gift certificate for \$25 in a drawing. Three students at each study site received gift certificates. Funding for participation incentives was provided, in part, by a Carnegie Grant for graduate student research at the UNC School of Information and Library Science.

### **5.3.2 Instrumentation**

The CIT instrument for this study includes four parts: a series of questions focusing on a significant paper or project in an undergraduate History course, a series of questions focusing on a particularly challenging time the student encountered during the project, demographic questions, and then a bank of questions drawn from the NSSE and the CSEQ surveys. Partially closed and open question formats are used throughout to support and encourage respondents to provide responses that could form new categories for future versions of the instrument. Data

from the critical incidents were stored in the Understanding Library Impacts (ULI) database to support analysis and reporting.

As explained in section 3.2, the Critical Incident Technique is a valuable procedure for understanding the factors that are helpful or problematic for accomplishing a task. The first section of the instrument encourages respondents to think back to a significant academic project completed during the current semester. The instrument gathers data about the project including related deliverables, course and section, and the student's interpretation of the learning objectives associated with the assignment. Three questions focus on the student's anxiety and confidence before starting the project as illustrated in Table 5.2. A second set of questions inquire about students' anxiety during the project and confidence after completing the project.

Table 5.2 Questions probing respondents' affective state

<i>Please complete this sentence: "At the beginning of the project ..."</i>	
I was worried about being able to find enough information	Construct preAnxiety
I knew how to get started	preAbility
I had confidence in my research skills	preConfidence
<i>Please rate your agreement with these statements</i>	
At times during this project I became anxious about finding information	duringAnxiety
I would be confident in my abilities to conduct research for a similar project in the future	postConfidence
1 – 5 (1= strongly disagree, 2 = somewhat disagree, 3 = neither agree nor disagree, 4 = somewhat agree, 5 = strongly agree)	

The core of the instrument includes four blocks of questions regarding the use of non-electronic information resources, electronic information resources, library services, and library facilities or equipment during the student's work for this course. Students are asked to identify which types of resources, services, or facilities were used in the project. Examples of categories from the electronic resources block included the 'online library catalog', 'electronic journals', and 'electronic books'. Respondents were then asked to identify their 'most-important' electronic resource, traditional resource, library service, and facility used during the project. The remainder of each block included questions about the stage of the research project the student was attempting to complete when using this most important resource, service, or facility, how its use

helped them, and what problems they encountered. The item responses for the stages of research, ‘learning activities’, were identified during the qualitative pilot projects and informed by Carol Kuhlthau’s model of the information search process (2004). Open-ended questions at the end of each question block offer the respondent the opportunity to comment further on their experience. At the conclusion of these blocks the respondents are asked, ‘what was the most important resource, service, or facility for your project?’ and, ‘what would you have done if the library hadn’t made this available to you?’ These questions, when used in the interviews conducted in the qualitative pilot studies, were effective at identifying the factors that were most critical to students during their academic work and for drawing out affective responses. A series of mostly-open ended questions address a significant ‘challenge’ the student faced during the project, characteristics of the challenge, and if and how they overcame the challenge. This series of questions, inspired by Brenda Dervin’s Sense-making methodology, is designed to identify negative factors of the student’s experiences that hindered their progress, strategies used to overcome these obstacles, and the influence of the challenge on the success of the project.

Demographic questions gather personal attributes such as gender, age, race or ethnicity, academic major, and academic year. Five questions regarding the student’s current age, their age when they began their college career, place of residence, course load, and hours worked at a job in a typical week are used to identify students who exhibit traits of the ‘nontraditional ‘ student. Most of the variables representing these responses are dichotomous. Scales were used to compute variables related to a student’s age, course load, and hours worked. A nontraditional student scale was constructed following Horn and Carroll’s guidelines (1996). Students exhibiting one or more nontraditional characteristic are considered ‘minimally nontraditional,’ those students exhibiting two or three characteristics are considered ‘moderately nontraditional’, and ‘highly nontraditional’ students exhibit four or more characteristics.

The final block of questions includes questions drawn from the National Survey of Student Engagement (NSSE) ‘Deep Learning Scale’ and the College Student Experiences

Questionnaire. The NSSE questions are intended to measure how often students engaged in behaviors associated with higher order, integrative, and reflective learning. The Deep Learning Scale questions are discussed in detail in section 2.1.4 and included in Appendix A. The responses to the Deep ‘higher order’, ‘integrative’, and ‘reflective’ questions can be used to compute sub-scale scores on each group and a single Deep Learning Scale score. For each question, 3 points are assigned to responses of “very often”, 3 points to responses of “often”, 2 points for responses of “occasionally” and one point for responses of “never.” The scale score is computed for each item using the following formula:  $\text{score} = \frac{1}{3} * 100$ . The mean of all items in a sub-scale is computed to determine the individual’s sub-scale score. A mean of the three Deep learning sub-scales is computed to derive an individual’s Deep Learning Scale score (NSSE, n.d., Scale Syntax).

The CSEQ Library Experience Scale questions measure the level of effort which the student applied performing library related activities during the course of their academic career. A library effort score can be constructed from the scale where 4 points are assigned to responses of “very often,” 3 points to responses of “often,” 2 points for responses of “occasionally,” and one point for responses of “never.” Therefore a respondent’s library effort score can range between 10 and 40 points (Pace, 1990, p. 18). The questions that make up the scale are included in Appendix C.

### **5.3.3 Data analysis**

Data analysis is intended to answer eight research questions. The first three questions tested assumptions about the ULI framework’s focus on student effort during high-impact experiences in the undergraduate major for examining library impact on student learning. The last five questions are used to evaluate the instruments themselves. Qualitative and quantitative methods were used to address the study’s eight research questions.

- Research Question #1: What library resources, services, facilities, and equipment (hereafter types of library use) do students in this study use to complete their projects?
  - Descriptive statistics regarding library use are generated to demonstrate the proportion of students reporting each use. New categories identified by responses to open-ended and partially open-ended questions are analyzed in addition to the fixed categories of the survey.
- Research question #2: Does the choice of resource type vary by academic product (e.g. research paper vs. senior thesis), by stage of the research process, by demographic categories, or by Deep and CSEQ scores?
  - Three indices of library and information use were created to identify groups of users with similar information use profiles. Diversity of library use is measured using the ‘top\_total’ variable, use of in-person services is measured using the ‘inperson\_user’ variable, and ‘nonuser\_total’ measures non-use of the library. Most of the independent variables in these analyses are nominal. The Deep and CSEQ responses are based on Likert-style responses. Responses were converted to scale scores and bins to support non-parametric statistical analysis. A nontraditional student scale was constructed using responses to questions about respondents’ current age, their age when they started their college career, place of residence, course load, and hours worked at a job in a typical week. Non-parametric statistical test are used to explore relationships between the independent and dependent variables.
- Research question #3: What aspects of library use are found to help or hinder student efforts to achieve learning objectives associated with their academic work?
  - Participation rates and exhaustiveness tests are used to determine the strength and validity of the factors (helps and problems) associated with library use.

- Research question #4: A premise of the ULI framework is that focusing on library use during high-impact coursework in the academic major will be an effective approach for demonstrating library impact on student learning. Does the ‘Learning Activities Crosswalk’ provide support for this assertion?
  - The learning activities crosswalk was constructed using content analysis methods carried out in multiple rounds of coding and inter-coder agreement testing. Assertions made about the validity and reliability of the crosswalk were corroborated through the analysis of quantitative and qualitative data collected in the project. Observations were also made regarding needed improvements in future iterations of the crosswalk.
- Research question #5: Are the CIT survey content categories and item response categories representative of respondents’ experiences using library related resources, services, and facilities in the course of their academic work?
  - Several methods were used to answer this research question. Participation rates for response categories were measured to detect the strength of the themes found in the data. Analysis of responses to partially open questions and feedback gathered during participant checks were used to generate new response categories. Qualitative analysis of responses to open-ended questions is conducted to detect the recurrence of themes found in the quantitative data and to detect the emergence of new themes.
- Research question #6: Do open-ended questions in the CIT survey gather information about library impact that complement and augment data gathered in other parts of the instrument?
  - Content analysis methods were used to identify themes emerging from these responses to determine if the responses reinforced or augmented findings from

other portions of the instrument. Inter-coder agreement testing was also conducted. Participation rates were also used to address this question.

- Research question #7: Do students' reports of their behaviors regarding academic challenge and effort expended in library-related activities as measured using responses to the NSSE and CSEQ questions correlate with responses in other parts of the survey? If not, can retaining the NSSE and CSEQ questions in future versions of the CIT instrument be justified?
  - Chi square tests of independence and Kruskal-Wallis tests are used to answer this question.
- Research question # 8: Timing of the survey and participant recall. Do students recall incidents from 1 semester or one year ago as clearly as they recall incidents from the current semester? Do student responses regarding completed projects vary from those that are currently in progress?
  - This research question was addressed by comparing response rates and strength of themes found in the critical incidents gathered in the study.

#### **5.3.4 Reliability and validity**

Four reliability and validity checks were used in this study:

An exhaustiveness check is used to determine the point at which new content categories “stop emerging” (Butterfield, et al. 2005, p. 487). This approach was used when assessing the validity of factors of library use.

Validity of themes emerging in the survey is assessed by dividing the number of incidents categorized in a given theme by the total number of students in the population at each study site. Butterfield et al. (2005) cite 25% as an acceptable rate. Strength of theme is measured in this manner for library use, factors of use, and learning activity categories.

Inter-coder agreement tests were used in the construction of the crosswalk and in content analysis of the open-ended responses in the survey. Multiple coders were recruited for the project based on their familiarity with information behavior research and qualitative research methods.

Finally, participant cross-checking was conducted with a subset of the sample. Survey respondents who left an email address and indicated their availability were contacted and requested to participate in a follow-up phone call to discuss their responses to the survey.

#### **5.4 Ethical concerns**

In any research endeavor the rights of participants need to be protected and all efforts need to be made to assure confidentiality. This study poses minimal risks to participants for several reasons. First, the survey's questions regarding information use toward academic work are not inherently personal or embarrassing. Second, participation is voluntary, participants could stop at any time, and at no time were respondents coerced or required to answer survey questions. Specific measures were taken to assure anonymity. The only link between a participant's response and their identity was an optional email address participants could enter on the survey to be eligible to for a drawing. Email addresses were only used for the gift certificate drawing and participant checks. They were removed from the dataset before analysis began. And at no time were email addresses used in reports based on this research project. A further consideration is that the institutions participating in the study were not named in this report.

#### **5.5 Project timelines**

Site recruiting, data gathering, and analysis were conducted over an eighteen month period beginning in September 2010 and concluding in February 2012 in timelines shared in Tables 5.3 and 5.4.



Table 5.3 Phase 1 timeline

Project event	Completion dates
Recruit study sites A & B for spring 2011	Fall 2010
Hold conference calls with study sites and PI	Fall 2010
Identify sections (course numbers and faculty) of courses to be surveyed during spring 2011	Fall 2010
Gain administrative and IRB approval at study sites	Winter 2010
Gather documentation of student learning objectives defined at the program level, gather syllabi and rubrics from courses/sections in the study	February – March 2011
Generate ‘Learning activities crosswalk’ from SLOs, relate to AAC&U Rubrics and Tuning outcomes	March – April 2011
Survey is distributed to students for completion	April 2011
Inter-coder agreement testing for crosswalk	June 2011
Analysis of survey results	May – June 2011
Reporting to study sites, revision of instruments	June 30, 2011 through fall 2011

Table 5.4 Phase 2 timeline

Activities	Completion dates
Recruit study sites C, D, E, & F for phase 2	March – May 2011
Hold conference calls with study sites and PI	April – May 2011
Gain administrative and IRB approval at study sites	April – August 2011
Gather documentation of student learning objectives defined at the program level	May 2011 – September 2011
Identify sections (course numbers and faculty) of courses to be surveyed during fall 2011	May 2011 – September 2011
Revise survey instrument and mapping methods based on results from Spring 2011 studies	Summer – Fall 2011
Gather syllabi and rubrics from courses/sections in the study	Spring 2011 – Sept 15th, 2011
Generate curriculum maps from SLOs, relate to AAC&U Rubrics and Tuning outcomes; repeat inter-coder agreement testing	Summer – Fall 2011
Gather enrollment information (email addresses) in preparation for survey distribution	~September 15th, 2011
Survey is distributed to students for completion	Site C, July – August, 2011 Sites C, D, E, and F: November - December, 2011
Analysis of survey results	Winter 2011 – 2012
Reporting to study sites	February – 2012

## **6. Results**

This chapter reports the results of a project to evaluate the Understanding Library Impacts protocol conducted at six colleges and universities in the U.S. in 2011 (sites A through F). The study was conducted in two phases during spring and fall of 2011. During phase 1, a learning activities crosswalk was constructed to demonstrate connections between student-reported information behaviors and faculty and stakeholder expectations for student learning. In phase 2, the learning outcomes identified in the crosswalk were compared with expectations for student learning derived from syllabi, program level outcomes, and published sources for undergraduate student learning outcomes in history. During both phases, students enrolled in upper-level and capstone history courses at each study site completed a ULI survey. The survey responses were used in conjunction with the learning activities crosswalk to identify 1) library uses associated with student learning outcomes defined and assessed by faculty and 2) factors associated with that library use which helped or hindered student effort toward achieving those learning outcomes.

### **6.1 Learning activities crosswalk**

The learning activities crosswalk (crosswalk) was developed during phase 1 of this study. The construction of the crosswalk is discussed in section 6.1.1. The crosswalk was evaluated in phase 2 of the study where learning expectations from the crosswalk were compared with expectations extracted from syllabi and curriculum maps provided by site C through F.

#### **6.1.1 Constructing the learning activities crosswalk**

The ‘Learning Activities Crosswalk’ was generated in four parts. First, syllabi and rubrics from study sites were analyzed to identify student learning outcomes expectations (SLO) for history majors. Second, those outcomes expectations were mapped to related learning

activities, elements of the VALUE rubrics (AAC&U, 2007), and outcomes from the ICHE Tuning process for history (ICHE, 2010).

Six coders participated in two rounds of content analysis during crosswalk construction. Coders were doctoral students enrolled at the School of Information and Library Science and were recruited for their experience with qualitative research methods and their familiarity with studies of information use behaviors. One volunteer brought a background in academic history to the project. Each coder received an introduction to the project and training in a specific coding task. Coders completed their tasks and delivered the results to the researcher. The researcher compared the results of his coding with that provided by each coder and discussed the results with each coder. Code definitions and crosswalk components were revised following the first round of coding which took place in June 2011. A second round of coding using identical methods was completed in September 2011. Agreement among coders was assessed to determine the reliability of crosswalk mappings. Krippendorff's alpha reliability coefficients were computed for the second round of coding and are reported in 6.1.1.6 (Krippendorff, 2004, 2011; Hayes and Krippendorff, 2007).

#### **6.1.1.1 Student learning outcomes**

A common set of student learning outcomes was derived from documentation provided by the two study sites, evidence from qualitative pilot study B as reported in chapter 4, and recommendations for student learning outcomes in History defined by the Bologna and Indiana Tuning projects (Tuning, 2005; ICHE, 2010) projects, Katz and Grossman (2008), and Galgano (2007). Study site A provided a curriculum map describing the learning outcomes expected of students completing research papers in the research methods course and the senior seminar. Study site B provided a list of expectations for all four sections of the senior seminar as presented in a shared syllabus. The common set of student learning outcomes for capstone coursework in History included four clusters:

- discipline-specific skills,

- evidence and analysis,
- thesis and argument, and
- writing and citation.

Each outcome in the common set was coded SLO001, SLO002, etc. for use later in crosswalk construction as depicted in Table 6.1.

Table 6.1 ‘Common set’ of student learning outcomes (SLOs) derived for phase 1

SLO code	SLO expectations
<i>Discipline-specific skills</i>	
SLO001	Locates secondary sources
SLO002	Locates primary sources
SLO003	Distinguishes among sources - Primary vs. secondary
SLO004	Distinguishes among sources - Scholarly vs. non-scholarly
<i>Evidence and analysis</i>	
SLO005a	Use of secondary sources demonstrates understanding of historiography (ie. The methods of history)
SLO005b	Uses secondary sources to provide context
SLO006	Evaluates and interprets primary sources
<i>Thesis and argument</i>	
SLO007	Selected topic poses a worthwhile question answerable with available evidence
SLO008	Develops an original thesis
SLO009	Advances argument in support of thesis using evidence from primary sources
SLO010	Meets minimum standards for evidence (e.g. minimum number and quality of sources)
<i>Writing and Citation</i>	
SLO011	Communicates argument in a coherent, well-written paper
SLO012	Follows discipline-specific style standards
SLO013	Follows discipline-specific citation standards
SLO014	Meets minimum page length requirements

#### 6.1.1.2 Learning activities

The learning activities used in the pilot study were generated during the qualitative pilot studies reported in chapter 4. These activities were also informed by syllabi and learning outcomes rubrics from the study sites and stages of Carol Kuhlthau’s Information Search Process (2004). Seven activities were used in phase 1.

Table 6.2 Learning activities used in phase 1

Activity codes	Definitions
1 - getting oriented	Similar to the ISP's <i>initiating task</i> in that the student may be coming to terms with the scope of the assignment and the range of information resources appropriate for their project.
2 - choosing a topic	Similar to the ISP's <i>selection</i> and <i>exploring</i> stages. The student is actively looking for a topic now and they may be analyzing and evaluating primary and secondary sources in part to look for a topic and also to be assured that there are adequate resources available to support a significant research paper.
3 - developing a thesis statement	Similar to the ISP's <i>formulation</i> stage. The student is creating his or her argument and will likely be in the process of writing a research proposal for his or her professor's review and approval.
4 - gathering evidence to support my thesis	Similar to the ISP's <i>collection</i> stage. The thesis is likely already decided upon and the student is pulling together resources to support their argument. This stage likely includes acts of finding, evaluating, analyzing, and using primary materials to back up their argument.
5 - finding other relevant sources	Similar to the ISP's <i>collection</i> stage. This is an open-ended category that refers to locating other resources that may help the paper. Resources could be primary or secondary sources.
6 - creating a bibliography or documenting my work	Similar to the ISP's <i>presentation</i> stage. This is a discrete deliverable in the writing of a research paper, but information use activities in support of this task can occur throughout the research and writing process.
7 - writing or creating the final product for the assignment	Similar to the ISP's <i>presentation</i> stage. While writing likely occurs throughout the project, much of this activity probably occurs during preparation of proposals, drafts, and then the final product.
8 - other (write in)	Respondents may write in their own activities

### 6.1.1.3 Crosswalk: Mapping activities to the common set of outcomes, phase 1

Coders were instructed to map learning activities to learning outcomes in the common set by answering the following question for each activity: “Do you think student effort in activity X would help students achieve the learning outcome Y?” Coders could map one, more than one, or no activities to each learning outcome. The results of this mapping are displayed in Table 6.3.

Table 6.3 Activity codes to mapped to SLOs in the common set, phase 1

Activity codes	Learning outcomes expectations	
getting oriented	SLO001	Locates secondary sources
	SLO002	Locates primary sources
choosing a topic	SLO001	Locates secondary sources
	SLO002	Locates primary sources
	SLO007	Selected topic poses a worthwhile question answerable with available evidence
developing a thesis statement	SLO008	Develops an original thesis
gathering evidence to support my thesis	SLO002	Locates primary sources
	SLO003	Distinguishes among sources - Primary vs. secondary
	SLO006	Evaluates and interprets primary sources
	SLO009	Advances argument in support of thesis using evidence from primary sources
	SLO010	Meets minimum standards for evidence (e.g. minimum number and quality of sources)
finding other relevant sources	SLO001	Locates secondary sources
	SLO003	Distinguishes among sources - Primary vs. secondary
	SLO004	Distinguishes among sources - Scholarly vs. non-scholarly
	SLO005b	Uses secondary sources to provide context
creating a bibliography or documenting my work	SLO001	Locates secondary sources
	SLO002	Locates primary sources
	SLO013	Follows discipline-specific citation standards
writing or creating the final product for the assignment	SLO005a	Use of secondary sources demonstrates understanding of historiography (ie. The methods of history)
	SLO009	Advances argument in support of thesis using evidence from primary sources
	SLO011	Communicates argument in a coherent, well-written paper
	SLO012	Follows discipline-specific style standards
	SLO014	Meets minimum page length requirements

#### 6.1.1.4 Crosswalk: Linking the common framework and the VALUE rubrics, phase 1

Coders paired the learning outcomes in the common set with elements of four VALUE rubrics: critical thinking, inquiry and analysis, information literacy, and written communication. The rubrics are duplicated in Appendix F. Each coder was provided with the rubric names, the element names, and the capstone performance expectations for each element. Coders were asked the question: “Which of the rubric elements would you think appropriate for assessing each

student learning outcome in this list?” Again, coders could pair one element, more than one element, or no elements at all to each outcome. The completed map is demonstrated in Table 6.4.

Table 6.4 Crosswalking learning outcomes to VALUE rubric elements, phase 1

SLO code	Learning outcomes expectations and associated elements from the VALUE rubrics
<i>Discipline-specific skills</i>	
SLO001	Locates secondary sources <i>- Information Literacy IL-1 Determine the Extent of Information Needed</i> <i>Effectively defines the scope of the research question or thesis. Effectively determines key concepts. Types of information (sources) selected directly relate to concepts or answer research question.</i> <i>- Information Literacy IL-2 Access the Needed Information</i> <i>Accesses information using effective, well-designed search strategies and most appropriate information sources.</i>
SLO002	Locates primary sources <i>- Information Literacy IL-1 Determine the Extent of Information Needed</i> <i>Effectively defines the scope of the research question or thesis. Effectively determines key concepts. Types of information (sources) selected directly relate to concepts or answer research question.</i> <i>- Inquiry and Analysis IL-2 Access the Needed Information</i> <i>Accesses information using effective, well-designed search strategies and most appropriate information sources.</i>
SLO003	Distinguishes among sources - Primary vs. secondary
SLO004	Distinguishes among sources - Scholarly vs. non-scholarly
<i>Evidence and analysis</i>	
SLO005b	Use of secondary sources demonstrates understanding of historiography (ie. The methods of history)
SLO005b	Uses secondary sources to provide context
SLO006	Evaluates and interprets primary sources <i>- Information Literacy IL-3 Evaluate Information and its Sources Critically</i> <i>Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.</i>
SLO007	Selected topic poses a worthwhile question answerable with available evidence <i>- Inquiry and Analysis IA-2 Topic selection</i> <i>Identifies a creative, focused, and manageable topic that addresses potentially significant yet less explored aspects of the topic.</i>
SLO008	Develops an original thesis <i>- Critical Thinking C-4 Student position</i> <i>Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue.</i>

- SLO009 Advances argument in support of thesis using evidence from primary sources  
- *Critical Thinking C-5 Evidence*  
*Information is taken from source(s) with enough interpretation/evaluation to develop a comprehensive analysis or synthesis.*  
- *Inquiry and Analysis IA-3 Analysis*  
*Organizes and synthesizes evidence to reveal insightful patterns, differences, or similarities related to focus.*  
- *Written Communication W-3 Sources and Evidence*  
*Demonstrates skillful use of high-quality, credible, relevant sources to develop ideas that are appropriate for the discipline and genre of the writing*
- SLO010 Meets minimum standards for evidence (e.g. minimum number and quality of sources)

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*Writing and Citing*

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- SLO011 Communicates argument in a coherent, well-written paper  
- *Critical Thinking C-1 Explanation of issues*  
*Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.*  
- *Inquiry and Analysis IA-4 Conclusion*  
*States a conclusion that is a logical extrapolation from the inquiry findings.*  
- *Written Communication W-4 Control of Syntax and Mechanics*  
*Uses graceful language that skillfully communicates meaning to readers with clarity and fluency, and is virtually error-free.*  
- *Written Communication W-5 Content Development*  
*Uses appropriate, relevant, and compelling content to illustrate mastery of the subject, conveying the writer's understanding, and shaping the whole work.*
- SLO012 Follows discipline-specific style standards  
- *Written Communication W-2 Genre and Disciplinary Conventions*  
*Demonstrates detailed attention to and successful execution of a wide range of conventions particular to a specific discipline and/or writing task (s) including organization, content, presentation, formatting, and stylistic choices*
- SLO013 Follows discipline-specific citation standards  
- *Information Literacy IL-4 Access and Use Information Ethically and Legally*  
*Students use correctly all of the following information use strategies (use of citations and references; choice of paraphrasing, summary, or quoting; using information in ways that are true to original context; distinguishing between common knowledge and ideas requiring attribution) and demonstrate a full understanding of the ethical and legal restrictions on the use of published, confidential, and/or proprietary information.*
- SLO014 Meets minimum page length requirements
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#### **6.1.1.5 Crosswalk: Linking the common framework and Tuning outcomes for History**

Learning outcomes in the common set were paired with Tuning outcomes for History (ICHE, 2010) to complete the crosswalk. Coders were instructed to ‘identify the Tuning outcome(s) that most closely match each student learning outcome (SLO) for research papers.



Coders could apply one, more than one, or no Tuning outcomes with each SLO. The full complement of Tuning outcomes for History are provided in Appendix B.

Table 6.5 Mapping student learning outcomes to Tuning outcomes in phase 1

SLO code	Learning outcomes expectations and associated Tuning outcomes for History
<i>Discipline-specific skills</i>	
SLO001	Locates secondary sources <i>T011 Search for secondary sources</i> <i>Demonstrate ability to search for appropriate secondary literature, including the use of scholarly references, design and annotation of bibliographies, and address questions of genre, content, perspective and purpose to be assessed through specifically designed project assignments [written projects]</i>
SLO002	Locates primary sources <i>T012 Search for primary sources</i> <i>Demonstrate ability to conduct searches for primary sources to be assessed through specifically designed project assignments [written projects]</i>
SLO003	Distinguishes among sources - Primary vs. secondary <i>T011 Search for secondary sources (implied)</i> <i>T012 Search for primary sources (implied)</i>
SLO004	Distinguishes among sources - Scholarly vs. non-scholarly <i>T011 Search for secondary sources (implied)</i>
<i>Evidence and analysis</i>	
SLO005a	Use of secondary sources demonstrates understanding of historiography (ie. The methods of history) <i>T006 Demonstrate basic historiography</i> <i>Demonstrate broad understanding of basic historiography to be assessed through specifically designed project assignments [oral and written presentations]</i> <i>T009 Knowledge of historical research methods</i> <i>Demonstrate basic knowledge of major historical research methods, including quantitative and qualitative techniques to be assessed through specifically designed project assignments [oral and written presentations]</i>
SLO005b	Uses secondary sources to provide context
SLO006	Evaluates and interprets primary sources <i>T010 Find and handle information</i> <i>Effectively and efficiently find and handle information, data and evidence on complex historical problems to be assessed through specifically designed project assignments [written projects]</i> <i>T013 Evaluate texts and primary sources</i> <i>Read, analyze and critically evaluate texts and other primary sources to be assessed through specifically designed individual and group assignments [oral and written presentations]</i> <i>T018 Use basic interpretation and evaluation methods</i> <i>Demonstrate the ability to use basic historical interpretation and evaluation methods, to be assessed through specifically designed individual and group project assignments [oral and written presentations]</i>

*Thesis and argument*

SLO007	Selected topic poses a worthwhile question answerable with available evidence
SLO008	Develops an original thesis <i>T020 Formulate and test hypotheses</i> <i>Formulate and test plausible historical hypotheses and marshal an argument, to be assessed through specifically designed individual assignments [written projects]</i>
SLO009	Advances argument in support of thesis using evidence from primary sources <i>T020 Formulate and test hypotheses</i> <i>Formulate and test plausible historical hypotheses and marshal an argument, to be assessed through specifically designed individual assignments [written projects]</i>
SLO010	Meets minimum standards for evidence (e.g. minimum number and quality of sources)

*Writing and Citation*

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SLO011	Communicates argument in a coherent, well-written paper <i>T021 Communicate complex historical topic coherently</i> <i>Explain a complex historical topic in a coherent manner using terminology and techniques accepted in the historical profession, to be demonstrated through specifically designed individual and group project assignments [oral and written presentations]</i>
SLO012	Follows discipline-specific style standards <i>T019 Use genre specific techniques for document preparation</i> <i>Comment, annotate and/or edit documents correctly according to the critical canons of history, to be assessed through specifically designed individual assignments [written projects]</i>
SLO013	Follows discipline-specific citation standards <i>T019 Use genre specific techniques for document preparation</i> <i>Comment, annotate and/or edit documents correctly according to the critical canons of history, to be assessed through specifically designed individual assignments [written projects]</i>
SLO014	Meets minimum page length requirements

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#### **6.1.1.6 Reliability of crosswalk mappings**

Four coders and the researcher completed the crosswalk mapping tasks. Following the coding tasks, the researcher and coders discussed the results and identified areas of the crosswalk which needed tuning. Four tasks were completed:

- 1) mapping departmental learning outcomes to the common set of SLOs,
- 2) mapping activities to the common set of SLOs,
- 3) mapping the common set of SLOs to elements of four VALUE rubrics, and
- 4) mapping the common set of SLOs to the Tuning outcomes for History.

Agreement between coding completed by the researcher and volunteer coders was assessed by computing Krippendorff's alpha (k-alpha) and percent agreement for each crosswalk component (Krippendorff, 2004, 2011; Hayes and Krippendorff, 2007; Hayes, 2012). These values are reported in Table 6.6.

Table 6.6 Inter-coder agreement for crosswalk mappings, phase 1

	k-alpha	% agreement	mappings
Departmental SLOs to the common set of SLOs	0.421	85.70%	28
Activities to the common SLOs	0.5143	88.40%	26
Common SLOs to VALUE rubric elements	0.5352	92.50%	44
Common SLOs to Tuning outcomes for History	0.4527	83.30%	30

#### 6.1.1.7 Post-study modifications to the crosswalk

The results of the mapping activities were discussed with each coder to discuss interpretation of terms and disagreements. These conversations resulted in adjustments to the activities list and the common set of learning outcomes used in phase 2.

Coders had difficulties differentiating the learning activity 'Gathering evidence to support my thesis' from 'Finding other information.' These activities were adjusted after discussion with coders and faculty members at the study sites and after revisiting the ICHE Tuning outcomes, Katz and Grossman (2008), and Galgano (2007). The distinction between primary and secondary sources is important to historians, so the learning activities were adjusted to remove any ambiguity related to the use of these types of materials. The aspect of using primary sources was added to the gathering evidence activity and 'finding other relevant sources' was changed to 'finding secondary sources' for phase 2. 'Preparing for an oral presentation' was added to the list of activities used in phase 2 based on conversations with faculty and a review of syllabi.

Table 6.7 First round learning activities modifications

Pilot version	Modification
Gathering evidence to support my thesis	Gathering evidence from primary sources to support my thesis
Finding other relevant sources	Finding secondary sources
	Preparing for an oral presentation

Coders suggested stating each outcome as an ‘ability that could be demonstrated’ during an activity or assignment. Each outcome was revised accordingly, as in “Ability to locate secondary sources.” Coders found five statements from the common set to be ambiguous. Coders had difficulty distinguishing between outcomes 5 and 6, which refer to the use of secondary sources in support of writing. These outcomes have been collapsed into a new outcome: “SLO005 Ability to use secondary sources to place an argument in the context of previous scholarship.” Subsequent outcome codes have been renumbered. The language used in outcome 7 was awkward and this outcome has been modified to make clear the relationship between selecting a topic and posing an answerable question. Outcome 9 has been altered to read, “Ability to develop an original thesis statement.” The notion that a research paper should be *well-organized* was added to outcome 12. Finally, new learning outcome was added to capture expectations related to oral presentations.

Table 6.8 First round SLO modifications

Phase 1, pre-test version	Modifications as used in phase 2
SLO005a Use of secondary sources demonstrates understanding of historiography (ie. The methods of history)	Collapsed SLO005a and SLO005b into a single SLO: SLO005 Able to use secondary sources to place argument in the context of previous scholarship
SLO005b Uses secondary sources to provide context	
SLO006 Selected topic poses a question answerable with available evidence	SLO006 Able to select a topic and ask an ambitious yet answerable question
SLO008 Develops an original thesis	SLO008 Able to develop an original thesis statement
SLO011 Communicates argument in a coherent, well-written paper	SLO011 Able to communicate argument in a coherent, well-organized paper New: SLO015 Able to communicate argument in a coherent oral presentation

#### 6.1.1.8 Discussion

Several observations can now be made regarding the learning outcomes portion of the crosswalk. First, twelve of fifteen SLO expectations from the common set mapped to elements of the VALUE or Tuning frameworks. Two outcomes without mappings consisted of ‘minimum

standards' for evidence and page length often imposed by teaching faculty on undergraduate projects. These concepts were not present in the external frameworks. SLO005b 'uses secondary sources to provide context' was not mapped to either framework. Three of the 'non-minimum standards' common SLOs, SLO003, SLO004, and SLO005, did not have equivalents in the VALUE rubrics due to their 'discipline-specific' nature. However all of the 'non-minimum standards' SLO expectations, except for SLO005b, mapped to elements of the Tuning outcomes.

A review of the elements that were not mapped into the framework is worth consideration. The following VALUE rubric elements from the VALUE rubrics were not mapped into the crosswalk.

- Critical thinking C-2 *Conclusions and related outcomes* - Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.
- Critical thinking C-3 *Influence of context and assumptions* - Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.
- Information Literacy IL-5 *Use Information Effectively to Accomplish a Specific Purpose* - Communicates, organizes and synthesizes information from sources to fully achieve a specific purpose, with clarity and depth
- Inquiry and Analysis IA-1 *Existing knowledge, research, and/or views* - Synthesizes in-depth information from relevant sources representing various points of view/approaches.
- Inquiry and Analysis IA-5 *Design* - All elements of the methodology or theoretical framework are skillfully developed. Appropriate methodology or theoretical frameworks may be synthesized across disciplines or from relevant sub-disciplines.
- Writing W-1 *Context of and Purpose for Writing* - Demonstrates a thorough understanding of context, audience, and purpose that is responsive to the assigned task(s) and focuses all elements of the work.

When considering this list, it is difficult to understand how these items would not pertain to capstone projects in history. Differences in emphasis or even language between the two frameworks or different levels of familiarity with rubrics among raters may account for this discrepancy.

None of the ‘knowledge outcomes’ from the Tuning Framework were mapped into the crosswalk. These outcomes covered general goals for history majors such as ‘demonstrating a knowledge of the past’, understanding situations, respecting points of view, and understanding history as a discipline. These outcomes were too general to map to the common set of student learning outcomes. Some analytical skills such as ‘acquire broad historical knowledge and understanding’ and ‘understand development of human society’ also appear to have been too general for mapping into the crosswalk as well. Several items from the personal motivation section of the Tuning outcomes did not map to the crosswalk, including ‘analyze one’s point of view,’ ‘participate in and lead a group project,’ ‘write short scholarly articles,’ and ‘engage in peer teaching.’ One outcome, ‘write extended research paper’ was mentioned by each coder as pertaining to the entire project.

The mappings completed in phase one including all modifications are provided in tables 6.9 and 6.10.

Table 6.9 Learning activities mapped to SLOS, as modified following phase 1

Activity	Learning outcome expectation
getting oriented	SLO001 Ability to locate secondary sources SLO002 Ability to locate primary sources
choosing a topic	SLO001 Ability to locate secondary sources SLO002 Ability to locate primary sources SLO007 Ability to select a topic and ask an ambitious yet answerable question
developing a thesis statement	SLO008 Ability to develop an original thesis statement
gathering primary sources as evidence to support my thesis	SLO002 Ability to locate primary sources SLO003 Ability to distinguish among sources - primary vs. secondary SLO006 Ability to evaluate and interpret primary sources SLO009 Ability to advance an argument in support of thesis using evidence from primary sources

*Continued*

finding secondary sources	SLO001 Ability to locate secondary sources SLO003 Ability to distinguish among sources - primary vs. secondary SLO004 Ability to distinguish among sources - scholarly vs. non-scholarly
creating a bibliography or documenting my work	SLO001 Ability to locate secondary sources SLO002 Ability to locate primary sources SLO013 Ability to follow discipline specific citation standards
writing or creating the final product for the assignment	SLO005 Ability to use secondary sources to place argument in the context of previous SLO009 Ability to advance an argument in support of thesis using evidence from primary sources SLO011 Ability to communicate argument in a coherent, well organized paper SLO012 Ability to follow discipline specific style standards SLO014 Ability to meet minimum page length requirements
preparing for an oral presentation	SLO015 Ability to communicate argument in a coherent oral presentation

Table 6.10 SLOS mapped to learning outcomes frameworks, as modified in phase 1

Code	Student learning outcome expectation
SLO001	Ability to locate secondary sources
VALUE	<i>Information Literacy IL1 Determine the Extent of Information Needed</i>
VALUE	<i>Information Literacy IL2 Access the Needed Information</i>
Tuning	<i>T010 Find and handle information</i>
Tuning	<i>T011 Search for secondary sources</i>
SLO002	Ability to locate primary sources
VALUE	<i>Information Literacy IL1 Determine the Extent of Information Needed</i>
VALUE	<i>Inquiry and Analysis IL2 Access the Needed Information</i>
Tuning	<i>T010 Find and handle information</i>
Tuning	<i>T012 Search for primary sources</i>
SLO003	Ability to distinguish among sources Primary vs. secondary
Tuning	<i>T011 Search for secondary sources</i>
Tuning	<i>T012 Search for primary sources</i>
SLO004	Ability to distinguish among sources Scholarly vs. non-scholarly
Tuning	<i>T011 Search for secondary sources</i>
SLO005	Ability to use secondary sources to place argument in the context of previous Scholarship
Tuning	<i>T006 Demonstrate basic historiography</i>
Tuning	<i>T009 Knowledge of historical research methods</i>

*Continued*

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SLO006	Ability to evaluate and interpret primary sources
VALUE	<i>Information Literacy IL3 Evaluate Information and its Sources Critically</i>
Tuning	<i>T010 Find and handle information</i>
Tuning	<i>T013 Evaluate texts and primary sources</i>
Tuning	<i>T018 Use basic interpretation and evaluation methods</i>
SLO007	Ability to select a topic and ask an ambitious yet answerable question
VALUE	<i>Inquiry and Analysis IA2 Topic selection</i>
SLO008	Ability to develop an original thesis statement
VALUE	<i>Critical Thinking C4 Student position</i>
Tuning	<i>T020 Formulate and test hypotheses</i>
SLO009	Ability to advance an argument in support of thesis using evidence from primary sources
VALUE	<i>Critical Thinking C5 Evidence</i>
VALUE	<i>Inquiry and Analysis IA3 Analysis</i>
VALUE	<i>Written Communication W3 Sources and Evidence</i>
Tuning	<i>T020 Formulate and test hypotheses</i>
SLO010	Ability to meet minimum standards for evidence (e.g. minimum number and quality of sources)
SLO011	Ability to communicate argument in a coherent, well organized paper
VALUE	<i>Critical Thinking C1 Explanation of issues</i>
VALUE	<i>Inquiry and Analysis IA4 Conclusion</i>
VALUE	<i>Written Communication W4 Control of Syntax and Mechanics</i>
VALUE	<i>Written Communication W5 Content development</i>
Tuning	<i>T021 Communicate complex historical topic coherently</i>
SLO012	Ability to follow discipline specific style standards
VALUE	<i>Written Communication W2 Genre and Disciplinary Conventions</i>
Tuning	<i>T019 Use genre specific techniques for document preparation</i>
SLO013	Ability to follow discipline specific citation standards
VALUE	<i>Information Literacy IL4 Access and use information Ethically and Legally</i>
Tuning	<i>T019 Use genre specific techniques for document preparation</i>
SLO014	Ability to meet minimum page length requirements
SLO015	Ability to communicate argument in a coherent oral presentation
Tuning	<i>T021 Communicate complex historical topic coherently [oral presentation]</i>

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### **6.1.2 Testing the crosswalk**

In phase two the stability of the crosswalk was evaluated through content analysis of 19 documents including:

- Twelve syllabi provided by study sites C through F,



- Documents provided by two history departments (sites C and F) participating in phase two of the study articulating department –level expectations for student learning, and
- Capstone rubrics for History coursework used at the University of North Carolina Wilmington (University of North Carolina Wilmington, n.d.) and Utah State (Utah State University History Department, 2009). The Utah State rubric was developed during the Tuning project conducted in Utah in 2009 (McInerney, 2010). Neither of these institutions participated in the study.
- Recommendations from the American Historical Association (Galgano, 2007) and the NHC report to the Teagle Foundation (Katz and Grossman, 2008) as well as the Tuning Outcomes generated by the Indiana Commission on Higher Education (ICHE, 2010).

Expectations for learning were extracted from each document and were compared with the common set of student learning outcomes identified in phase 1. Expectations that were clearly stated in the documents were noted as explicit and implicit expectations were marked as such. Inter-coder agreement between the research and a volunteer coder was assessed with a sample of the documents: one syllabus, one departmental program outcomes document, and the capstone rubric provided by Utah State. Nominal k-alpha over 60 coding units was 0.88 with 95% agreement between coders.

#### **6.1.2.1 Comparisons with syllabi, program-level expectations, and published sources**

Twelve of 15 faculty members participating in phase 2 of the study shared syllabi with the researcher for analysis. Each syllabus was analyzed to identify the deliverables or assignments students were expected to complete and the learning expectations stated by faculty for students in each course. As seen in Table 6.11, the end-of-term research paper is a staple of these courses. Page length for these assignments ranged from 10 pages to 36 pages. In two courses, students could prepare web pages or multimedia exhibits as alternatives to research papers. In 8 of 12 courses, students were expected to prepare bibliographies separate from the

final research paper in addition to multiple shorter written assignments. Seven courses required oral presentations, typically to present an overview of the results of the research project at the end of the semester. Tests and exams were used in each of the baccalaureate writing courses but only in one senior seminar. Notably, four of the twelve syllabi provided no documentation of expectations for student learning at all.

Table 6.11 Deliverables expected of phase 2 courses

	<i>Baccalaureate Writing</i>	<i>Senior Seminar</i>	<i>Total</i>
Research paper	4	7	11
Separate bibliography – primary sources	1	7	8
Separate bibliography – secondary sources	7	1	8
Short written assignments	3	5	8
Oral presentation	1	6	7
Final exam	3	1	4
Mid-term exam	1	1	2
Alternate project (web page, video, etc.)	0	2	2
Quizzes	0	1	1
One minute paper	0	1	1
Documentary – group project	0	1	1
Poster	1	0	1
Tests	1	0	1

(Twelve syllabi were provided for analysis)

### ***Discipline specific skills***

Expectations of student competencies in locating secondary (SLO001) and primary (SLO002) sources were explicit in two thirds of the syllabi (Table 6.12), in both program-level curriculum maps (Table 6.13), and in the published sources of learning outcomes for history (Table 6.13). However, the expectations for distinguishing among primary and secondary sources (SLO003) and scholarly and non-scholarly sources (SLO004) were weakly represented in the program-level documents. Only the report from the Indiana Tuning process expressed these expectations explicitly. In 2 out of 5 documents, SLO003 was implied and in 2 out of 5 documents SLO004 was implied. For instance, Katz and Grossman (NHC) recommend that students gain skills in “discriminating among sources, sifting information, and determining

protocols of utility and relevance” (p. 19). Similar patterns emerged in the analysis of syllabi. Distinguishing between primary and secondary sources was implied in 7 of 12 documents while distinguishing between scholarly and non-scholarly sources was expressed in only 2 of 12 documents.

Table 6.12 Comparing phase 1 SLOS to expectations in phase 2 syllabi

	<i>Explicit mappings</i>	<i>Implicit mappings</i>	<i>Total</i>	<i>%</i>
<i>Discipline-specific skills</i>				
SLO001	6	2	8	67%
SLO002	6	2	8	67%
SLO003	1	7	8	67%
SLO004	1	1	2	17%
<i>Evidence and analysis</i>				
SLO005	5	1	6	50%
SLO006	7	1	8	67%
<i>Thesis and argument</i>				
SLO007	7	1	8	67%
SLO008	5	3	8	67%
SLO009	6	2	8	67%
SLO010	2	0	2	17%
<i>Communication and citation</i>				
SLO011	8	1	9	75%
SLO012	5	1	6	50%
SLO013	6	1	7	58%
SLO014	7	0	7	58%
SLO015	5	0	5	42%

### *Evidence and analysis*

The two expectations in this cluster are related to using secondary sources to place an argument in the context of previous scholarship (SLO005) and interpreting and evaluating primary sources (SLO006). Expectation SLO005 was present in 80% of program level documents and 50% of syllabi. Expectation SLO006 was present in 100% of program level documents and in two thirds of the syllabi.

### ***Thesis and argument***

The SLOs in this cluster are related to choosing a topic (SLO007), developing a thesis (SLO008), and building an argument using evidence to support the thesis (SLO009). There was nearly universal agreement across the program-level documents and the syllabi for these outcomes as seen in Table 6.12. Expectation SLO010, meeting minimum standards for evidence, was not mentioned at all in the program-level expectations and only mentioned twice in the syllabi.

### ***Communication and citation***

This final cluster of outcomes related largely to written and oral communication. Again there was broad agreement in the program level documents and syllabi with communicating the argument in a clear coherent written paper (SLO011) and adhering to discipline-specific style and citation standards (SLO012). A closer look at the deliverables expected in the syllabi from site E reveals some divergence from the standard '20 page research paper' in the curriculum. In one syllabus from site E, students were not expected to write a traditional research paper. Instead, they were asked to submit several 300 to 600 word essays and write brief wiki-entries on selected topics. Some of these written assignments were group projects. In another syllabus, students' research papers were to take the form of a chapter in a book compiled by all of the students in the class. In yet another course at site E, students could opt to build a web page or create a documentary in place of a 10+ page research paper. In each of these cases, the writing assignments were intended to support the campus' general education baccalaureate writing requirement. Expectations for abilities to deliver coherent oral presentations were expressed in 3 of 5 program-level documents and in 42% of syllabi. Finally, expectations for page limits for written work, (SLO014), were mentioned by 7 of 8 syllabi examined, but were not mentioned at all in program-level documentation.

Table 6.13 Comparing SLOS to program level frameworks and published sources

	Sources			Program-level outcomes		Agreement			
	AHA	NHC	Tuning Indiana	Site C	Site F	Explicit (X)	Implied (I)	Total	%
<i>Discipline-specific skills</i>									
SLO001	X	X	X	X	X	5	0	5	100.0%
SLO002	X	X	X	X	X	5	0	5	100.0%
SLO003	I	I	X		I	1	0	1	20.0%
SLO004	I	I	X			1	0	1	20.0%
<i>Evidence and analysis</i>									
SLO005	X		X	X	X	4	0	4	80.0%
SLO006	X	X	X	X	X	5	0	5	100.0%
<i>Thesis and argument</i>									
SLO007	X	X	X	X	X	5	0	5	100.0%
SLO008	X	X	X	X		4	0	4	80.0%
SLO009	X	X	X	X		4	0	4	80.0%
SLO010						0	0	0	0.0%
<i>Communication and Citation</i>									
SLO011	X	X	X	X	I	4	1	5	100.0%
SLO012	X	X	X	X		4	0	4	80.0%
SLO013	X	X	X	X	I	4	1	5	100.0%
SLO014						0	0	0	0.0%
SLO015	X	X	X			3	0	3	60.0%

X = expectation of student learning outcome is explicitly stated

I = expectation of student learning outcome is implied

### 6.1.2.3 Comparisons with capstone rubrics

Student learning outcomes derived in phase one were also compared with outcomes documented in two rubrics for scoring capstone history projects. The University of North Carolina-Wilmington History department's capstone rubric was designed in 2004 and has served as a model in the discipline. The Utah State University History department's capstone rubric was generated after the Utah Tuning project conducted in 2009.

As seen in Table 6.14, phase 1 SLOs are present in these documents with a few exceptions. First, expectations regarding distinguishing among scholarly and non-scholarly sources (SLO003) and primary versus secondary sources (SLO004) are not explicitly mentioned in the capstone rubrics. However, these expectations may be implied in statements like, "Student

evaluates and analyzes secondary sources” or “Student evaluates and analyzes secondary sources” from the Utah State University rubric. Further, minimum expectations for evidence and page length are not mentioned in either of these documents.

Table 6.14 Comparing phase 1 SLOS to expectations in capstone rubrics

Phase 1 SLOs	Utah State capstone rubric	UNC-W capstone rubric
<i>Discipline-specific skills</i>		
SLO001	X	X
SLO002	X	X
SLO003		
SLO004		
<i>Evidence and analysis</i>		
SLO005	X	X
SLO006	X	X
<i>Thesis and argument</i>		
SLO007	X	X
SLO008	X	X
SLO009	X	X
SLO010		
<i>Communication and citation</i>		
SLO011	X	X
SLO012	X	X
SLO013	X	X
SLO014		
SLO015	X	X

#### 6.1.2.4 Discussion

The SLOs identified in phase one were largely present in eight of twelve (66%) syllabi and in both program level expectations documents analyzed in phase two of the study.

Exceptions included the minimum-standards for evidence and distinguishing among sources, which were rarely observed in the documents. These levels of agreement suggest the discipline-specific, evidence and analysis, thesis and argument, and communication and citation clusters of learning objectives may be generally representative of expectations for History undergraduates competing capstone coursework in the phase two sample, with some caveats.

The research paper, although a staple of most course syllabi examined in this study is not the only assignment used to assess history majors’ competencies in these areas. The crosswalk

should take into consideration alternate modes for these assignments, such as web pages or multi-media presentations. Baccalaureate writing courses typically included mid-term and final exams; capstone seminars typically did not. The learning activities list should be supplemented with appropriate activities such as ‘preparing for exams’ in future iterations of the protocol.

Among this sample, learning expectations for history majors are not universally documented in program-level documents or in course syllabi. Three of the six History departments that participated in the study provided program-level documentation of learning expectations for history majors. And two of these departments produced standard rubrics used for program assessment purposes. Thirty-three percent (4 out of 12) of the syllabi provided during the project made no references to expectations for student learning at all. As Daniel McInerny noted regarding Utah State’s rubric development process, standards for assessment can remain ‘unarticulated’ across a program (McInerny, 2010). This study’s findings corroborate this assertion.

#### **6.1.2.5 Implications**

General agreement was found between student learning outcomes expectations generated in phase one and those extracted from program and course documents in phase two. However, the mapping process based on content analysis is time-consuming. The absence of standard documentation in syllabi leaves doubts as to the utility of this approach for determining a history department’s objectives for student learning. More explicit and less time-consuming methods for identifying the learning expectations are needed. The curriculum map provided by study site A is an ideal model for demonstrating expectations for student learning down to the course and assignment levels. An alternate approach for generating curriculum maps is proposed in section 8.2.2.

## **6.2 Critical incident survey**

### **6.2.1 Setting and population**

#### ***Phase 1***

Undergraduate history majors completing their end-of-course capstone projects constituted most of the study population at sites A and B; sophomores and juniors taking a research methods course at one site (site A) also participated in the study. History faculty and librarians at each study site (A and B) distributed ULI survey URLs to students in late April, 2011. Two reminder emails were sent to each cohort and the surveys were closed in mid-May, 2011. Respondents were entered in a drawing for \$25 gift certificates to the respective campus bookstores as an incentive for participating. Three students from each cohort received gift certificates. Informed consent was obtained according to procedures defined by the UNC-CH Human Subjects Institutional Review Board.

#### ***Phase 2***

The population for phase two included students enrolled in end-of-course capstone courses and in upper-level baccalaureate writing courses in undergraduate history at four sites (sites C through F). The site C cohort included students enrolled in capstone seminars during spring semester 2011 (6 courses), summer semester 2011 (one course), and fall semester 2011 (five courses). Both sections from site D were upper-level writing-intensive courses that fulfilled the university's Baccalaureate Writing requirement and are referred to as Baccalaureate Writing courses in the dissertation. All four sections at site E were senior seminars taught as capstone courses. Three of four courses at site F were Baccalaureate Writing courses and one section was a senior seminar taught as a capstone course.

Data collection at site C was conducted once in August 2011 and again during November and December 2011. Data collection at sites D, E, and F was conducted in November and in



December 2011. Survey URL distribution, IRB, and incentives procedures for sites C, D, E, and F were identical to those used in phase 1.

## 6.2.2 Response rates and demographics of respondents

### *Phase 1*

Forty-one critical incidents were reported in phase 1. Response rates for the spring Research Methods and Senior Seminars at site A were 53% and 46% respectively. Two responses from students enrolled in a fall 2010 senior seminar at site A were included in the dataset used for this analysis. The response rate at site B was 55%. Demographic characteristics of the samples are presented in Table 6.15.

Table 6.15 Phase 1: Demographic characteristics of respondents

	Site A - research methods (N=17)	Site A – Capstone Seminar (N=13)	Site B – Capstone Seminar (N=44)
Response rate	53% (9)	46% (6+2)	55% (24)
% female	78%	33%	100%
Academic class	89% sophomores / 11% juniors	50% juniors / 50% seniors	100% seniors
% non-white	11%	0%	16.67%
% traditional college-age	100%	100%	95.8%
% enrolled full-time	100%	100%	95.8%
% first generation college student	0%	0%	0%
% resides on campus	78%	12.5%	83.3%
% held job on campus	44%	62.5%	41.7%
% held job off campus	22%	12.5%	66.7%
% held jobs on and off campus	11%	0%	25%

### *Phase 2*

Eighty-six critical incidents were reported in phase 2. Response rates for sites C through F ranged from 24 to 38%. Demographic characteristics of the samples are provided in Table 6.16.

Table 6.16 Phase 2: Demographic characteristics of respondents

	Site C - part 1 (n=15)	Site C - part 2 (n=21)	Site D (n=11)	Site E (n=23)	Site F (n=15)
Response rate	24%	35%	26%	33%	38%
% female	47%	52%	64%	50%	67%
Academic class	100 % senior	95% senior	82% senior, 9% junior, 9% sophomore	87.5% senior, 12.5% junior	87% senior, 6.5% junior, 6.5% sophomore
% non-white	0%	9%	0%	4%	7%
% traditional college aged (17-22)	53%	95%	54%	88%	100%
% enrolled full-time	73%	95%	100%	96%	93%
% first generation college student	20%	19%	0%	8%	7%
% transferred to institution	40%	29%	46%	4%	7%
% resides on campus	13%	19%	18%	17%	73%
% held job on campus	33%	43%	27%	33%	60%
% held job off campus	73%	62%	54%	25%	47%
% held jobs on and off campus	27%	24%	9%	8%	20%
% held internship	20%	62%	27%	4%	20%

### 6.2.2.1 Nature of the samples

Demographic statistics from the samples are compared with statistics provided by each study site's common data set in Table 6.17. The common data set includes standard data elements commonly reported by higher education institutions in ten parts: A – general information, B – enrollment and persistence, C – First-time, first-year admissions data, D – transfer admissions data, E – academic offerings and policies, and F – student life, G – annual expenses, H – financial assistance, I – instructional faculty and class size, and J – degrees conferred (Common Data Set Initiative, 2011). One sample binomial tests were used to compute exact p values for comparing the characteristics of the samples at each site with respective student body populations. No statistically significant differences were found by ethnicity, campus residence, sex, or enrollment status.

Table 6.17 Comparing the sample with Common Data Set statistics

		% female	% non-white	Age	% enrolled full-time	% lives off-campus
Site A	Sample	53%	6%	0% > 25	100%	53%
	CDS	59%	21%	1% > 25	97%	41%
Site B	Sample	100%	21%	0% > 25	96%	17%
	CDS	100%	35%	0% > 25	97%	10%
Site C (phase 1)	Sample	47%	0%	47%>22	73%	87%
Site C (phase 2)	Sample	52%	9%	5%>22	95%	81%
	CDS	54%	13%	6.2%>25	95%	65%
Site D	Sample	64%	0%	46%>22	100%	82%
	CDS	51%	16%	12%>25	88%	74%
Site E	Sample	50%	4%	12%>22	96%	83%
	CDS	42%	15%	n/a	98%	63%
Site F	Sample	67%	7%	0%>22	93%	27%
	CDS	62%	14%	1%>25	96%	26%

CDS = Percentages from Common Data Set statistics for each site

#### 6.2.2.2 Deliverables

Students selected the deliverables associated with their course from a partially open checklist. Seventy percent of respondents reported on their experiences writing a research paper of 10 pages or more (see Table 6.18). Eighty-three (65%) reported they produced a bibliography for their course, and 66 (51.9%) reported preparing and delivering oral presentations. Fifty-one (52.5%) of the students enrolled in senior seminars reported producing a senior thesis. A handful of students reported they produced shorter pieces of written work. One student commented on creating a documentary.

Table 6.18 Student reports of course deliverables by site and type of course

Deliverable	Site A	Site B	Site C	Site D	Site E	Site F	RM	BW	SS	All sites
research or term paper	11	1	33	11	19	14	9	21	59	89
Bibliography	13	11	27	1	21	10	8	8	67	83
oral presentation	13	3	25	0	16	9	6	6	54	66
senior thesis	8	24	13	0	4	2	0	0	51	51
short essay (9 pages or less)	3	0	7	3	7	2	1	4	17	22
article review	7	1	5	0	6	1	5	1	14	20

*Continued*

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short research paper	1	0	2	2	3	4	1	4	7	12
other - 2 book reviews	0	0	1	0	0	0	0	0	1	1
other – outline	0	0	1	0	0	0	0	0	1	1
other - book reviews	0	0	1	0	0	0	0	0	1	1
other - documentary	0	0	0	0	1	0	0	0	1	1

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RM = Research Methods, BW = Baccalaureate Writing, SS = Senior Seminar

### **6.2.2.3 Student perceptions of learning objectives**

Respondents were asked to relate the learning objectives associated with their assignment near the beginning of the survey. One-hundred-twenty-five respondents answered this open-ended question. Thirty-nine respondents (31%) reported that learning about content was a purpose of the assignment. Forty-eight respondents (38%) identified learning outcomes associated with developing an argument. Twenty-three specifically used ‘build an argument’ or similar phrasing. Others mentioned answering an important historical question or creating a thesis. Still others said they were expected to practice analytical skills (12 respondents), think critically (2), and draw conclusions based on analysis of sources (5). There were 114 references to research-related activities such as ‘conducting research,’ finding sources, using secondary and primary sources to support an argument, and working with primary sources. Sixty-three students noted that becoming a better researcher or learning research skills were learning objectives for the assignment. There were eighty-six references to writing-related learning objectives such as ‘becoming a better writer’ or ‘gain experience writing a long-form paper.’ Eight of these students mentioned the importance of making an original contribution with their work; five mentioned writing on a topic that complemented existing literature. Five mentioned learning to write literature reviews, use style manuals, and cite properly. Thirteen students mentioned the importance of planning (6) and working independently on an extended project (7).

#### 6.2.2.4 Participant checks

Respondents had the option of leaving an email address to be eligible for a drawing for a gift certificate and checking a box expressing their availability for a post-survey interview.

Twenty-two students noted their availability for post-survey telephone interviews. Three rounds of emails to these students were sent, yet only three students responded favorably to the request.

Comments from these participants will be discussed as appropriate in the sections below.

#### 6.2.3 Scales

##### 6.2.3.1 Deep Learning Scale Scores

Students responded to the 12 questions used to derive the Deep Learning Scale and its three component scales. The component scales measure the degree to which students report engagement in integrative, challenging, and reflective learning activities during their time in college. Responses were scored on a 4-point Likert scale. Scale scores were computed using methods described in section 5.3.2. One-way ANOVA revealed no statistically significant differences between Deep Learning Scale scores or sub scale scores by site or course.

Descriptive statistics for the scales are provided in tables 6.19.

Table 6.19 Descriptive statistics for Deep Learning Scale scores

	Challenge Scale		Integrate Scale		Reflective Scale		Deep Scale	
	M	SD	M	SD	M	SD	M	SD
A	82.84	15.44	78.04	14.09	84.97	10.34	81.95	11.32
B	78.47	24.44	75.83	21.79	80.09	20.72	78.13	19.66
C	81.14	20.84	74.24	20.2	81.15	20.88	78.84	18.02
D	77.77	27.83	74.26	17.83	72.47	23.72	78.45	11.11
E	74.65	19.73	68.61	15.68	73.15	16.68	72.14	14.15
F	72.22	15.64	77.33	17.43	73.36	15.6	74.27	11.61
Research Methods	83.33	16.67	76.3	13.79	87.66	10.31	76.65	16.85
Baccalaureate Writing	77.25	22.61	77.31	16.28	72.88	20.79	77.69	11.34
Senior Seminar	77.95	20.84	73.51	19.21	78.49	18.71	82.43	11.51

### 6.2.3.2 CSEQ Scale Scores

Students responded to the 10 questions found in the College Student Experiences Questionnaire Library Experiences Effort Scale (Appendix C). Scale scores were generated using procedures outlined in section 5.3.2 and range from a minimum of 10 to a maximum of 40. Descriptive statistics for the CSEQ scale scores are presented in 6.20. One-way ANOVA revealed a statistically significant difference between CSEQ SCALE scores by site ( $F(5,119) = 2.87, p = 0.0175$ ) and by course ( $F(2,122) = 4.01, p = 0.0206$ ). Post-hoc comparisons using Tukey's HSD revealed the mean score for students at site D ( $M = 25.63, SD = 6.59$ ) was significantly lower than the mean score for students at site A ( $M = 31.35, SD = 2.67$ ) and mean scores for students in Baccalaureate Writing courses ( $M = 26.57, SD = 5.77$ ) were significantly lower than the mean scores for students in Senior Seminars ( $M = 29.68, SD = 5.1$ ).

Table 6.20 CSEQ Scale Scores

	CSEQ Scale	
	M	SD
A	31.35	2.67
B	30.83	5.76
C	29.85	4.85
D	25.63	6.59
E	27.67	5.26
F	28.4	4.37
Research Methods	31.33	2.92
Baccalaureate Writing	26.57	5.77
Senior Seminar	29.68	5.1

### 6.2.3.3 Nontraditional scale scores

Horn and Carroll defined guidelines for determining a student's nontraditional status: delayed enrollment into college, part-time attendance, financial independence, working full-time while enrolled, having dependents other than a spouse, being a single parent, and not having earned a traditional college diploma. Students exhibiting one nontraditional characteristic were considered 'minimally nontraditional,' those students exhibiting two or three characteristics were

considered ‘moderately nontraditional’, and ‘highly nontraditional’ students exhibited four or more characteristics (Horn and Carroll, 1996).

A subset of Horn and Carroll’s guidelines for determining nontraditional student status was applied to the dataset in this phase of the study: delayed enrollment, part-time attendance, and working full-time while enrolled. Only one student out of seventeen respondents at site A held one nontraditional attribute; three of twenty-four students at site B held one nontraditional attribute. By and large the students in both of these cohorts can be considered traditional college students.

Three additional variables were added during phase two data collection: having dependents other than a spouse, being a single parent, and not having earned a traditional college diploma. Statistics regarding nontraditional status are presented in Table 6.21. Seventeen of 86 or 19.7% of the respondents in phase two demonstrated the attributes of mild or moderate nontraditional students. The most prominent nontraditional characteristics were part-time enrollment, working a full-time job or the equivalent, and having a dependent other than a spouse.

Table 6.21 Nontraditional student status, Sites C through F

	Site C		Site D		Site E		Site F		All sites	
	n	%	n	%	n	%	n	%	n	%
Enrolled part-time	5	13.9%	0	0.0%	1	4.2%	1	6.7%	7	8.1%
Work full-time	1	2.8%	0	0.0%	1	4.2%	2	13.3%	4	4.7%
Earned GED	1	2.8%	2	18.2%	0	0.0%	0	0.0%	3	3.5%
Has dependents other than spouse	2	5.6%	2	18.2%	0	0.0%	1	6.7%	5	5.8%
Single parent	0	0.0%	1	9.1%	0	0.0%	1	6.7%	2	2.3%
Delayed enrollment	2	5.6%	2	18.2%	0	0.0%	0	0.0%	4	4.7%
Mildly nontraditional	6	16.7%	1	9.1%	2	8.3%	1	6.7%	10	11.6%
Moderately nontraditional	2	5.6%	3	27.3%	0	0.0%	2	13.3%	7	8.1%

### ***Employment and internships***

Employment characteristics of the sample demonstrate a majority of these students work while going to school (see Table 6.22). While a minority of students work more than 20 hours per week at sites A, B, and E (11.8%, 12.5%, and 12.5% respectively), between one third and one half of respondents from sites C, D, and F work 20 hours per week or more. Notably, a full 67% of respondents from sites B and C and almost half of the respondents at sites D and F worked at an off-campus job. Relatively few students reported working the equivalent of a full-time job, defined as working 40 or more hours per week in one or more jobs. However, when combining job responsibilities with internship commitments, between eight and thirteen percent of the students at sites C through F reported working the equivalent of a full-time job.

Table 6.22 Employment characteristics of respondents

	Site A	Site B	Site C	Site D	Site E	Site F
% working one or more jobs	70.6%	83.3%	80.6%	72.7%	50.0%	86.7%
% working off campus	17.6%	66.7%	66.7%	54.5%	25.0%	46.7%
% working more than 10 hours per week	35.3%	45.8%	63.9%	63.6%	33.3%	60.0%
% working more than 20 hours per week	11.8%	12.5%	36.1%	54.5%	12.5%	33.3%
% working more than 30 hours per week	5.9%	8.3%	16.7%	18.2%	8.3%	13.3%
% working equivalent of a full-time job	5.9%	4.2%	2.8%	0.0%	4.2%	13.3%
% participating in internships	*	*	44.4%	27.3%	4.2%	20.0%
% where work and internship combined exceed 30 hours per week			36.1%	5.6%	12.5%	13.3%
% where work and internship combined are equivalent to a full-time job	*	*	11.1%	9.1%	8.3%	13.3%

\* Internship data was not collected during phase 1

### **6.2.4 Library use**

#### **6.2.4.1 Resource, service, and facility use by site**

Lists of resources, services, and facilities were provided as response categories to respondents in ‘checklist’ form. Respondents could select one, several, or none of the categories or check ‘other’ and write in a new value. The 127 respondents in this study reported using 1,806 types of library and information resources, library services, and library facilities during their



projects. As shown in Figure 6.1, electronic resources make up almost one half of the uses reported by these students.

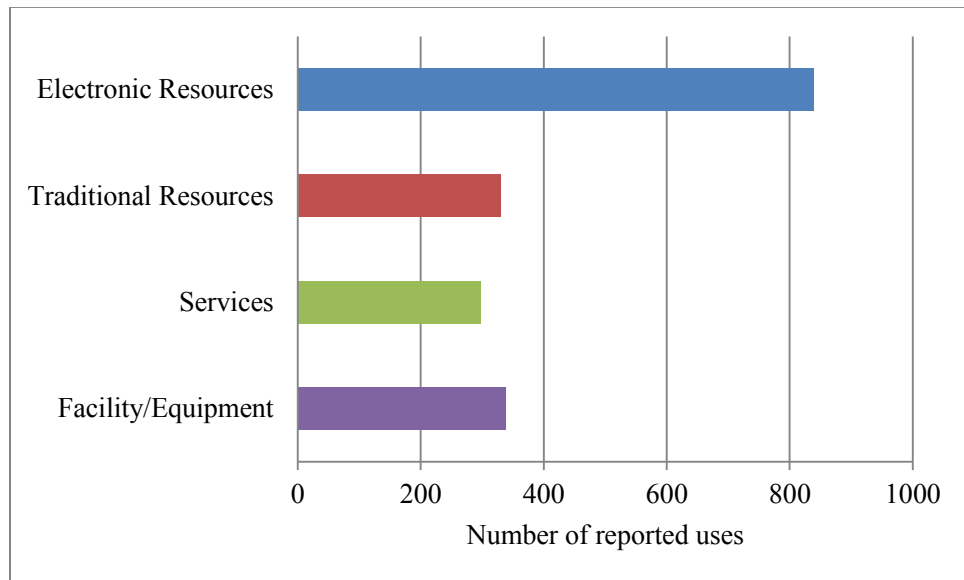


Figure 6.1 Library uses by type

Figure 6.2 presents the proportion of respondents in the study reporting uses by type. It is not a surprise that 100% of students in the study reported using electronic resources at some point during their projects. Ninety-seven percent reported using traditional resources, 94% reported using library facilities or equipment, and 85% reported using library services when completing coursework. Resource and facility usage is consistent across study sites. However, there is some variation of note regarding the use of services. Over 90% of respondents at the liberal arts institutions (sites A, B, and F) and 88% of respondents from site E, the very high research university, reported using library services. Yet only 78% of students at site C, the Master's L University, and 54% of students at site D, the high research university, reported using library services. These trends will be examined more closely in chapter 7. The number of uses reported by respondents ranged from 6 to 22. The mean number of uses per respondent was 13.03 with a standard deviation of 3.78. One-way ANOVA revealed no significant differences in the number of use types reported by site or by type of course.

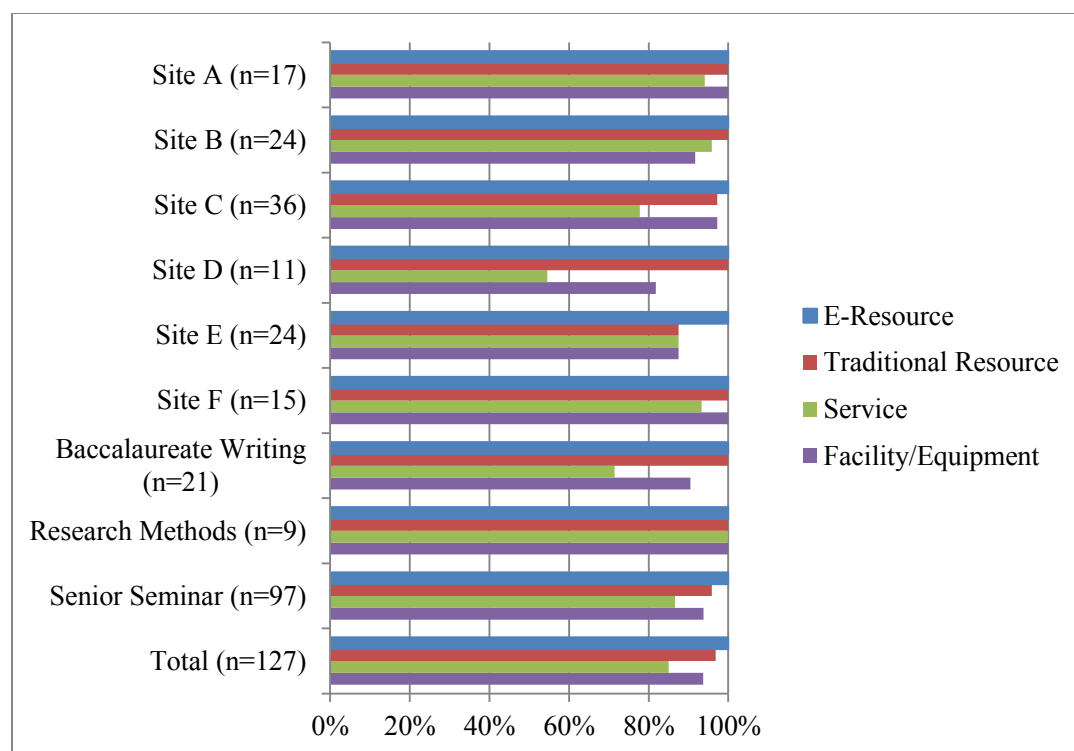


Figure 6.2 Proportion of respondents reporting types of use, by site and type of course

Figure 6.3 presents the 20 most common resources, services, and facilities used by study participants. The importance of the library catalog (used by 98% of participants), books (98%), and interlibrary loan (61%) reveals the monograph-centric nature of history as a discipline in these assignments. Digital resources including indexes and databases (87%), electronic journals (81%), electronic primary sources (70%), and electronic books (59%) are also in high demand for these projects. Interlibrary loan, including document delivery from consortium-based services, is the most important library service among these respondents while in-person services such as library instruction and reference services were used by 47% and 41% of respondents respectively. Study space (70%), printers (68%), and computers (66%) topped the list of facilities and equipment used by study respondents.

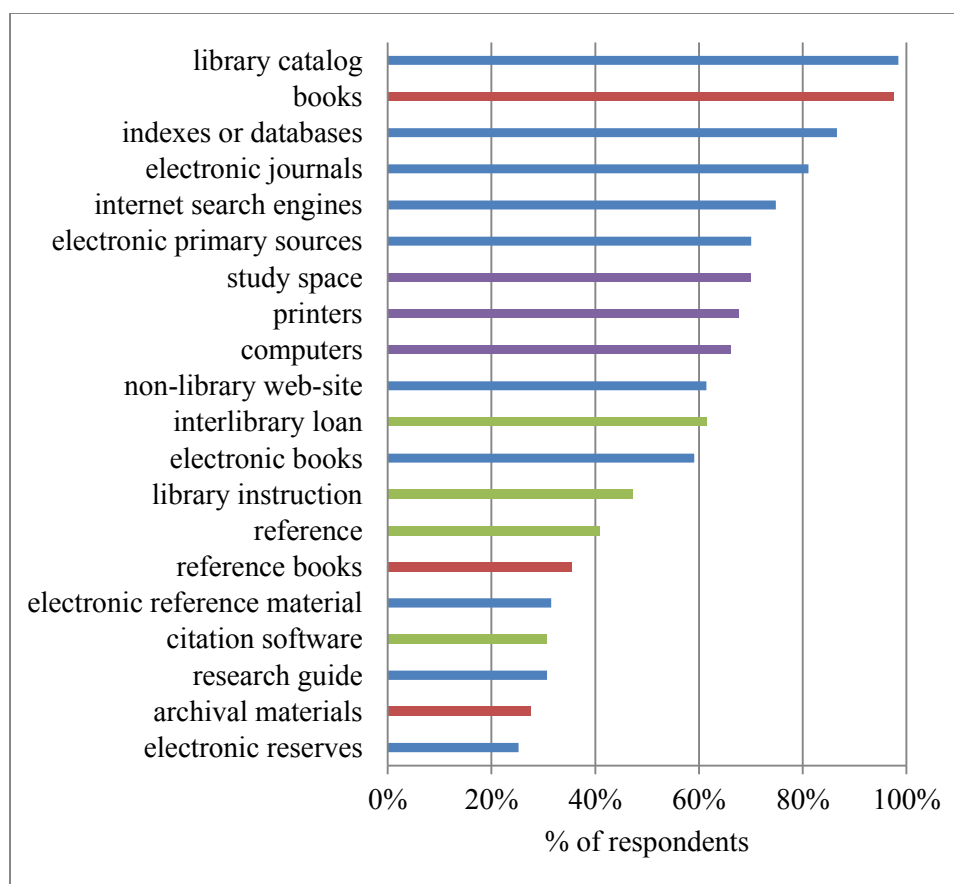


Figure 6.3 'Top 20' most commonly used resources, services, and facilities

\*Figures include interlibrary loan requests in addition to requests through consortium-based document delivery services

Details regarding use of resources, services, and facilities are provided in tables 6.23 and 6.24. Response categories varied among study sites to reflect local naming conventions for specific resources or services, such as the library catalog or 'Ask a librarian' services. These local conventions were normalized for reporting purposes. Several new categories were introduced in phase 2 including e-reference material, archival finding aids, microforms, and citation software.

Table 6.23 Proportion of respondents reporting library use during coursework

	Site A	Site B	Site C	Site D	Site E	Site F	All Sites
<i>Electronic Resources</i>							
library catalog	100.0%	100.0%	97.2%	100.0%	100.0%	100.0%	99.2%
indexes or databases	76.5%	70.8%	88.9%	90.9%	95.8%	100.0%	86.6%
electronic journals	100.0%	91.7%	72.2%	63.6%	83.3%	73.3%	81.1%

*Continued*

internet search engines	82.4%	75.0%	66.7%	54.6%	95.8%	66.7%	74.8%
electronic primary sources	58.8%	66.7%	69.4%	72.7%	70.8%	86.7%	70.1%
non-library web-site	64.7%	66.7%	52.8%	36.4%	79.2%	60.0%	61.4%
electronic books	58.8%	66.7%	50.0%	63.6%	58.3%	66.7%	59.1%
electronic reference material	*	*	55.6%	63.6%	25.0%	46.7%	31.5%
research guide	52.9%	29.2%	27.8%	27.3%	8.3%	53.3%	30.7%
electronic reserves	17.7%	20.8%	30.6%	54.6%	25.0%	6.7%	25.2%
Summon	*	*	0.0%	27.3%	66.7%	0.0%	15.0%
archival finding aids	*	*	30.6%	27.3%	8.3%	6.7%	13.4%
journal resolver	*	*	0.0%	0.0%	62.5%	0.0%	11.8%
streaming videos	*	*	0.0%	0.0%	8.3%	0.0%	1.6%
<i>Traditional Resources</i>							
books	100.0%	100.0%	97.2%	100.0%	91.7%	100.0%	98.4%
reference books	52.9%	33.3%	30.6%	36.4%	12.5%	66.7%	35.4%
archival materials	35.3%	50.0%	25.0%	27.3%	20.8%	6.7%	28.4%
print journals	29.4%	29.2%	16.7%	0.0%	12.5%	33.3%	20.5%
media	29.4%	16.7%	8.3%	9.1%	20.8%	40.0%	18.9%
print reserves	11.8%	20.8%	8.3%	0.0%	0.0%	13.3%	9.5%
microforms	0.0%	0.0%	11.1%	18.2%	16.7%	0.0%	7.9%
<i>Services</i>							
interlibrary loan	64.7%	62.5%	33.3%	36.4%	83.3%	53.3%	55.1%
library instruction	52.9%	70.8%	38.9%	0.0%	33.3%	80.0%	47.2%
reference	52.9%	70.8%	30.6%	27.3%	29.2%	33.3%	40.9%
citation software/guide	*	*	44.4%	18.2%	62.5%	40.0%	30.7%
interlibrary loan (consortium)	0.0%	58.3%	30.6%	0.0%	0.0%	73.3%	28.4%
research consultation	0.0%	29.2%	13.9%	0.0%	0.0%	6.7%	10.2%
chat reference	11.8%	20.8%	8.3%	0.0%	8.3%	0.0%	9.5%
visited the archives	5.9%	8.3%	13.9%	9.1%	4.2%	6.7%	8.7%
digital media services	*	*	2.8%	0.0%	4.2%	0.0%	1.6%
<i>Facility/Equipment</i>							
study space	76.5%	79.2%	69.4%	45.5%	83.3%	46.7%	70.1%
printers	100.0%	79.2%	66.7%	36.4%	29.2%	100.0%	67.7%
computers	94.1%	58.3%	75.0%	63.6%	33.3%	80.0%	66.1%
group study space	41.2%	4.2%	33.3%	9.1%	12.5%	40.0%	23.6%
photocopiers	29.4%	8.3%	11.1%	36.4%	8.3%	20.0%	15.8%
workspace in the archives	11.8%	12.5%	16.7%	18.2%	12.5%	0.0%	12.6%
microform reader/printers	*	*	11.1%	18.2%	12.5%	0.0%	7.1%
media desk	*	*	0.0%	0.0%	0.0%	13.3%	1.6%
video viewing room	0.0%	8.3%	0.0%	0.0%	0.0%	0.0%	1.6%
digital media lab	*	*	0.0%	0.0%	4.2%	0.0%	0.8%

\* response category was added in phase 2

Table 6.24 Resource, services, and facilities use by type of course

<i>Electronic Resources</i>	Research Methods (n=9)	Baccalaureate Writing (n=21)	Senior Seminar (n=97)	All courses
library catalog	100.0%	100.0%	97.9%	98.4%
indexes or databases	88.9%	95.2%	84.5%	86.6%
electronic journals	100.0%	66.7%	82.5%	81.1%
internet search engines	88.9%	57.1%	77.3%	74.8%
electronic primary sources	66.7%	76.2%	69.1%	70.1%
non-library web-site	66.7%	47.6%	63.9%	61.4%
electronic books	55.6%	66.7%	57.7%	59.1%
electronic reference material	*	52.4%	29.9%	31.5%
research guide	77.8%	38.1%	24.7%	30.7%
electronic reserves	22.2%	33.3%	23.7%	25.2%
Summon	*	14.3%	16.5%	15.0%
archival finding aids	*	14.3%	14.4%	13.4%
journal resolver	*	*	15.5%	11.8%
streaming videos	*	*	2.1%	1.6%
<i>Traditional Resources</i>				
books	100.0%	100.0%	95.9%	96.9%
reference books	44.4%	42.9%	33.0%	35.4%
archival materials	44.4%	19.0%	27.8%	27.6%
print journals	11.1%	23.8%	20.6%	20.5%
media	55.6%	23.8%	13.4%	18.1%
print reserves	11.1%	0.0%	11.3%	9.4%
microforms	*	9.5%	6.2%	6.3%
<i>Services</i>				
interlibrary loan	66.7%	33.3%	56.7%	53.5%
library instruction	77.8%	33.3%	47.4%	47.2%
reference	66.7%	28.6%	41.2%	40.9%
citation software	*	28.6%	34.0%	30.7%
interlibrary loan (consortium)	*	28.6%	30.9%	28.3%
research consultation	0.0%	4.8%	12.4%	10.2%
chat reference	22.2%	0.0%	10.3%	9.4%
visited the archives	0.0%	9.5%	9.3%	8.7%
digital media services	*	0.0%	2.1%	1.6%
<i>Facilities/Equipment</i>				
study space	88.9%	47.6%	73.2%	70.1%
printers	100.0%	66.7%	64.9%	67.7%
computers	100.0%	76.2%	60.8%	66.1%
group study space	22.2%	19.0%	24.7%	23.6%

*Continued*

photocopiers	33.3%	23.8%	12.4%	15.7%
workspace in the archives	22.2%	9.5%	12.4%	12.6%
microform reader/printers	0.0%	9.5%	7.2%	7.1%
media desk	0.0%	4.8%	1.0%	1.6%
video viewing room	*	0.0%	2.1%	1.6%
digital media lab	*	0.0%	1.0%	0.8%

\* response category was added in phase 2

### ***Other***

Ten respondents selected ‘other’ and entered a free-text response (see Table 6.25). In five cases students entered response categories that appeared in subsequent resource lists, such as an entry for interlibrary loan under the category of e-resources. In four cases students referenced using resources or services that were not from the home institution’s library, such as ‘microfilm material at other libraries/historical societies.’ Except for one entry, ‘monuments,’ each of the ten items fits into existing categories.

Table 6.25 Student submitted use types, after checking ‘other’

Response section	Student entered response	Category	Site
E-Resource	archives	archival materials	Site B
E-Resource	Interlibrary loan	interlibrary loan	Site E
E-Resource	microfilm	microforms	Site E
E-Resource	monuments		Site C
Facility/Equipment	other study rooms	study space	Site A
Service	Checked out a book from the Law School library	books	Site B
Service	library catalog	library catalog	Site C
Traditional Resource	books on loan from other libraries	books	Site A
Traditional Resource	Microfilm at other libraries/historical societies	microforms	Site C
Traditional Resource	other - cassette tapes not from the library	media	Site F
Traditional Resource	other – ILLIAD	interlibrary loan	Site E

### **6.2.4.2 Comparing use patterns across sites and course types**

The Kruskal-Wallis one-way analysis of variance test was used to explore variations in use of library resources, facilities, and services by site and course. The three most popular uses in

both resources categories and the facilities category were chosen for analysis (see Table 6.23). Electronic resources analyzed include the library catalog, indexes and databases, and electronic journals. There were no statistically significant differences in the likelihood of using these resources by site or course. Traditional resources analyzed include books, reference books, and archival materials. No statistically significant relationships with the use of books or archival materials were found by site or course. Statistically significant relationships between site and the use of reference books was observed ( $H(5) = 14.5$ ,  $p = 0.0127$ ). Further analysis revealed students at site A were more likely to use reference books than students at site E [9/17 vs. 3/24], Fisher's exact test,  $p = .0127$ ; students at site F were more likely to use reference books than students at site B [10/15 vs. 8/24], ( $\chi^2 = 4.12$ ,  $df = 1$ ,  $p = 0.0422$ ), site C [10/15 vs. 11/36], ( $\chi^2 = 5.70$ ,  $df = 1$ ,  $p = 0.0170$ ), and site E [10/15 vs. 3/21], Fisher's exact test,  $p = 0.0011$ . No statistically significant differences were found between use of the top 3 most commonly used traditional resources and type of course.

Statistically significant differences were observed in the use of study space by type of course ( $H(2) = 8.18$ ,  $p < 0.0167$ ). Students in Senior Seminars were more likely to use study space in the library than students enrolled in Baccalaureate Writing courses [71/97 vs. 10/21], ( $\chi^2 = 5.23$ ,  $df = 1$ ,  $p = 0.022$ ). Statistically significant differences were observed in the use of library computers by site ( $H(5) = 20.5$ ,  $p < 0.001$ ) and type of course ( $H(2) = 6.73$ ,  $p = 0.0346$ ). Students at site A were more likely to use library computers than students at site B [16/17 vs. 14/24], Fisher's exact test,  $p = 0.0136$  and site E [16/17 vs. 8/24], Fisher's exact test  $p < 0.0001$ ). Students at site C were more likely to use library computers than students at site E [27/36 vs. 8/24], ( $\chi^2 = 10.29$ ,  $df = 1$ ,  $p = 0.0013$ ). Students enrolled in Research Methods were more likely to use library provided computers than students enrolled in the Senior Seminars [9/9 vs. 59/97], Fisher's exact test,  $p = 0.0248$ .

Four services were analyzed including library instruction, reference, research consultations, and any form of interlibrary loan. Statistically significant relationships were

observed between site and exposure to library instruction ( $H(5) = 25.65$ ,  $p = 0.0002$ ). Further analysis revealed that respondents at Site A were more likely to claim library instruction helped with their coursework than respondents at site D [9/17 vs. 0/11], Fisher's exact test,  $p = 0.0039$ . Respondents at Site B were more likely to claim library instruction helped with their coursework than respondents at site C [17/24 vs. 14/36] ( $\chi^2 = 5.88$ ,  $df = 1$ ,  $p = 0.0153$ ), respondents at site D [17/24 vs. 0/11], Fisher's exact test  $p < 0.0001$ , and respondents at site E [17/24 vs. 8/24] ( $\chi^2 = 6.76$ ,  $df = 1$ ,  $p = 0.0093$ ). Respondents at site F were more likely to claim library instruction helped with their coursework than respondents at site C [12/15 vs. 14/36], Fisher's exact test,  $p = 0.0128$ , respondents at site D [12/15 vs. 0/11], Fisher's exact test,  $p < 0.0001$ , and respondents at site E [12/15 vs. 8/24], Fisher's exact test,  $p = 0.0079$ . To summarize, respondents at the liberal arts colleges (sites B and F) were more likely to claim library instruction helped with their coursework than respondents at sites C, D, and E. No statistically significant relationships were observed between type of course and exposure to library instruction.

Respondents at site B were far more likely to use reference and research consultation services than students at other sites. Statistically significant relationships were observed by site and the user of reference services ( $H(5) = 14.91$ ,  $p = 0.0107$ ). Respondents at site B were more likely to use reference services than respondents at site C [17/24 vs. 11/36] ( $\chi^2 = 9.39$ ,  $df = 1$ ,  $p = 0.0022$ ), site D [17/24 vs. 3/11], Fisher's exact test,  $p = 0.0271$ , site E [17/24 vs. 7/24] ( $\chi^2 = 8.33$ ,  $df = 1$ ,  $p = 0.0039$ ), and site F [17/24 vs. 4/15] Fisher's exact test,  $p = 0.0100$ . Statistically significant relationships were observed by site and the use of research consultations ( $H(5) = 15.89$ ,  $p = 0.0072$ ). Further analysis demonstrated that respondents at site B were more likely to use research consultations than students at site A [7/24 vs. 0/17], Fisher's exact test,  $p = 0.0295$  and respondents at site E [7/24 vs. 0/24], Fisher's exact test,  $p = 0.0094$ . Notably none of the students at site D [0/11] and one respondent at site F [1/15] used a research consultation, but statistically significant differences were not observed between these responses and those from site



B. No significant relationships were observed between type of course and use of reference or research consultation services.

Statistically significant relationships were observed between type of course and the use of any interlibrary loan services (ILL), including consortium-based ILL. Students enrolled in Senior Seminars were more likely to use ILL than students enrolled in Baccalaureate Writing courses [61/97 vs. 7/21] , ( $\chi^2 = 6.1766$ ,  $df = 3$   $p = 0.0130$ ). No statistically significant relationships were observed by site and the use of interlibrary loan services.

#### 6.2.4.3 Non-users

Respondents also had the option of choosing ‘none’ for each use type. As shown in Table 6.26, there were no non-users of electronic resources and just four non-users of traditional resources. Nineteen students were non-users of library services and eight students (6%) were non-users of facilities or equipment. Notably, 45% of students at site D and 29% of students enrolled in Baccalaureate Writing courses were non-users of library services. Levels of non-use were essentially non-existent at the liberal arts colleges, sites B and F, and the liberal arts university, site A.

Table 6.26 Frequency of non-use by resource type and site

Site	Electronic Resources		Traditional Resources		Services		Facility Equipment	
A	0	0%	0	0%	1	6%	0	0%
B	0	0%	0	0%	1	4%	2	8%
C	0	0%	1	3%	8	22%	1	3%
D	0	0%	0	0%	5	45%	2	18%
E	0	0%	3	13%	3	13%	3	13%
F	0	0%	0	0%	1	7%	0	0%
Baccalaureate Writing	0	0%	0	0%	6	29%	2	10%
Research Methods	0	0%	0	0%	0	0%	0	0%
Senior Seminar	0	0%	4	4%	13	13%	6	6%
Total	0	0%	4	3%	19	15%	8	6%

#### 6.2.4.4 Discussion

The preceding analysis demonstrated that there were few statistically significant relationships between site or course and the use of specific types of electronic and traditional resources. However, statistically significant differences were observed regarding the use of certain facilities and services. The most striking differences are observed regarding respondents at site B who claimed to benefit from instruction, reference, and research consultations at higher rates than respondents at other sites. Further analysis demonstrated that exposure to library instruction was positively associated with the use of reference services [30/60 vs. 21/67], ( $\chi^2 = 4.58$ ,  $df = 1$ ,  $p = 0.0323$ ). This association held when respondents from site B were removed from the analysis [19/43 vs. 15/60], ( $\chi^2 = 4.170$ ,  $df = 1$ ,  $p = 0.0412$ ). Further, students at site D were less likely to use library services of any kind. Five out of 11 respondents from site D (45%) were non-users of library services of any kind, three reported using reference services, and none of these students used a research consultation service.

The cause for these differences may be traced to the curriculum followed by students at sites B and D. A review of course syllabi revealed that students at site B participated in year-long senior seminars and were required to complete a senior thesis of 40 pages in length based on an original thesis and work with primary sources. Students at site D were enrolled in thematic Baccalaureate Writing courses that covered a single semester and were expected to write papers of 16-20 pages in length on a topic related to the theme of the seminar. Students at site B had library instruction designed for their class and students at site D did not. It is conceivable that exposure to library instruction increases a students' awareness of the availability of in-person services and likelihood of using those services. Without exposure to instruction, students at site D may have been unaware of the utility of in-person services to help with their work. Task complexity may have played a role as well, in that students in the courses at site D had to write relatively shorter papers than students at site B on thematic, instead of open-ended topics. All of the students from site B reported writing senior theses; none of the students at site B reported this

expectation. Eight of 11 students from site D were enrolled in a course on the topic of the Vietnam War. The range of primary sources available to an undergraduate for a 20<sup>th</sup> century topic like this would likely be fairly narrow when compared to other more open-ended topics.

#### **6.2.5 ‘Most important’ library uses**

The instrument includes four blocks of questions regarding use of electronic resources, traditional resources, library services, and facilities or equipment. After identifying all of the types of uses in each category, respondents are asked to identify their ‘most important’ resource, service, or facility in each of the four categories. The purpose of asking about ‘most important’ uses is to encourage respondents to think back to specific, memorable activities carried out during the project so they will recall the factors of library use that were most helpful or problematic during their academic work.

##### **6.2.5.1 ‘Most important’ uses, by site and type**

Table 6.27 presents the ‘most important’ library uses reported by respondents by type and by site. The monograph-centric nature of the discipline shows through for respondents at all sites and those enrolled in all three types of courses. Respondents reported books (78%), the library catalog (27.6%), and interlibrary loan including consortium-based document delivery services (42.5%) as their most important traditional resources, electronic resources, and services respectively. Primary sources in the form of electronic primary sources (19.7%) and archival materials were commonly selected as ‘most important’ resources (9.4%). However, none of the respondents at sites A and E selected archival materials as their most important traditional resource. The role of electronic indexes and secondary sources is clear as respondents named indexes or databases (21.3%), electronic journals (13.4%), and electronic books (3.1%) as most important electronic resources. Notably, only 3.9% of respondents across the entire study reported that internet search engines were their ‘most important’ electronic resource even though 74.8% of students reported using search engines for their project at some time.

Respondents had the option of noting the specific electronic or print resource chosen as the ‘most important’ use in an open-ended question. One-hundred-twenty-eight (51.6%) out of 248 students provided the name of specific books, archival collections, and e-resources in this prompt. Most important uses by type of course are presented in Table 6.28.

Table 6.27 Most important library uses, by site

	Site A	Site B	Site C	Site D	Site E	Site F	All sites
<i>Electronic Resources</i>							
library catalog	35.3%	25.0%	30.6%	36.4%	20.8%	20.0%	27.6%
indexes or databases	11.8%	20.8%	13.9%	9.1%	33.3%	40.0%	21.3%
electronic primary sources	17.6%	29.2%	13.9%	18.2%	20.8%	20.0%	19.7%
electronic journals	23.5%	20.8%	19.4%	9.1%	0.0%	0.0%	13.4%
internet search engines	0.0%	0.0%	5.6%	0.0%	12.5%	0.0%	3.9%
electronic books	0.0%	4.2%	2.8%	9.1%	0.0%	6.7%	3.1%
research guides	5.9%	0.0%	2.8%	0.0%	0.0%	6.7%	2.4%
Summon	*	*	0.0%	9.1%	8.3%	0.0%	2.4%
archival finding aids	*	*	5.6%	0.0%	0.0%	0.0%	1.6%
non-library web sites	5.9%	0.0%	2.8%	0.0%	0.0%	0.0%	1.6%
electronic reserves	0.0%	0.0%	0.0%	9.1%	0.0%	0.0%	0.8%
journal resolver	*	*	0.0%	0.0%	4.2%	0.0%	0.8%
<i>Traditional Resources</i>							
books	100.0%	70.8%	77.8%	63.6%	75.0%	80.0%	78.0%
archival materials	0.0%	25.0%	11.1%	9.1%	0.0%	6.7%	9.4%
media	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	2.4%
microforms	0.0%	0.0%	0.0%	18.2%	4.2%	0.0%	2.4%
reference books	0.0%	4.2%	0.0%	9.1%	0.0%	6.7%	2.4%
<i>Services</i>							
interlibrary loan	52.9%	29.2%	11.1%	27.3%	54.2%	20.0%	30.7%
library instruction	23.5%	8.3%	13.9%	0.0%	4.2%	26.7%	12.6%
interlibrary loan (consortium)	0.0%	20.8%	16.7%	0.0%	0.0%	26.7%	11.8%
reference	17.6%	16.7%	5.6%	18.2%	4.2%	13.3%	11.0%
citation software	*	*	11.1%	9.1%	20.8%	6.7%	8.7%
research consultation	0.0%	16.7%	8.3%	0.0%	0.0%	0.0%	5.5%
chat reference	0.0%	4.2%	5.6%	0.0%	0.0%	0.0%	2.4%
digital media services	*	*	0.0%	0.0%	4.2%	0.0%	0.8%
<i>Facility/Equipment</i>							
study space	11.8%	54.2%	22.2%	9.1%	54.2%	20.0%	31.5%
printers	52.9%	25.0%	11.1%	18.2%	0.0%	46.7%	22.0%

*Continued*

computers	23.5%	12.5%	25.0%	18.2%	8.3%	13.3%	17.3%
group study room	5.9%	0.0%	8.3%	0.0%	4.2%	6.7%	4.7%
microform readers	0.0%	0.0%	2.8%	18.2%	4.2%	0.0%	3.1%
photocopiers	0.0%	0.0%	0.0%	9.1%	8.3%	0.0%	2.4%
workspace in the archives	0.0%	0.0%	5.6%	0.0%	4.2%	0.0%	2.4%
digital media lab	*	*	0.0%	0.0%	4.2%	0.0%	0.8%
media desk	*	*	0.0%	0.0%	0.0%	6.7%	0.8%

\* category added in phase 2

Table 6.28 'Most important' library uses, by course type

	Research Methods	Baccalaureate Writing	Senior Seminar	All sites
<i>Electronic resources</i>				
library catalog	22.2%	28.6%	27.8%	27.6%
indexes and databases	11.1%	23.8%	21.6%	21.3%
electronic primary sources	22.2%	19.0%	19.6%	19.7%
electronic journals	22.2%	4.8%	14.4%	13.4%
internet search engines	0.0%	4.8%	5.2%	4.7%
electronic books	0.0%	9.5%	2.1%	3.1%
research guide(s)	11.1%	0.0%	2.1%	2.4%
Summon	*	4.8%	2.1%	2.4%
archival finding aids	*	0.0%	2.1%	1.6%
non-library web sites	11.1%	0.0%	1.0%	1.6%
electronic reserves	*	4.8%	0.0%	0.8%
journal resolver	*	0.0%	1.0%	0.8%
<i>Traditional resources</i>				
books	100.0%	66.7%	78.4%	78.0%
archival materials	0.0%	9.5%	10.3%	9.4%
media	0.0%	0.0%	3.1%	2.4%
microforms	0.0%	9.5%	1.0%	2.4%
reference books	0.0%	9.5%	1.0%	2.4%
<i>Services</i>				
interlibrary loan	44.4%	14.3%	33.0%	30.7%
library instruction	44.4%	14.3%	9.3%	12.6%
interlibrary loan (consortium)	0.0%	14.3%	12.4%	11.8%
reference	11.1%	19.0%	9.3%	11.0%
citation software	*	9.5%	9.3%	8.7%
research consultation	0.0%	0.0%	7.2%	5.5%

*Continued*

chat reference	0.0%	0.0%	3.1%	2.4%
digital media services	*	0.0%	1.0%	0.8%
<i>Facility/Equipment</i>				
study space	11.1%	19.0%	36.1%	31.5%
printers	66.7%	28.6%	16.5%	22.0%
computers	22.2%	14.3%	17.5%	17.3%
group study room	0.0%	0.0%	6.2%	4.7%
microform readers	0.0%	9.5%	2.1%	3.1%
photocopiers	0.0%	4.8%	2.1%	2.4%
workspace in the archives	0.0%	0.0%	3.1%	2.4%
digital media lab	*	0.0%	1.0%	0.8%
media desk	*	4.8%	0.0%	0.8%

\* response category added in phase 2

While 47.2% and 40.7% of students said library instruction and reference, respectively, helped during their projects (see Table 6.23), a minority named instruction (12.6%) or reference (11%) as their most important services. There was some variation on this point among respondents by type of course. Over 40% of students in the Research Methods and Senior Seminar courses claimed interlibrary loan, including consortium-based services, were their most important services. Only 28.6% of students in the Baccalaureate Writing courses held this opinion. Nineteen percent of respondents in the Baccalaureate Writing courses claimed reference service was their most important service. Nine percent of respondents in Senior Seminars and 11% of respondents from the Research Methods course at site A made this claim. Study space topped the list for most important facilities (31.5%) followed by equipment concerns in the form of printers (22%) and (17.3%) computers. There was wide variation, on this point however, among the sites. Over 50% of respondents at sites B and E claimed study space to be their most important facility, while approximately 20% of students at sites C and F and approximately 10% of respondents at sites A and D held this opinion. Notably 18.1% of students at site D claimed microform readers to be the most important library facility/equipment used during their projects.

### 6.2.5.2 ‘Most important’ uses by learning activity

After naming their most important resources, services, and facilities, students were asked to identify the learning activities during which each was used. Respondents could check none, one, or several activities. They could also check ‘other’ and write in new categories.

Participation rates were computed to determine the proportion of respondents who engaged in each learning activity when using library and information services. According to Butterfield (2005, p. 487) high participation rates suggest the validity of a category identified in a Critical Incident Technique study. The authors cite a participation rate of 25% as a threshold for considering a category valid. As depicted in Figure 6.4, participation rates for all seven of the activities used in phase 1 exceeded 50%. Rates exceeded 80% for five of these activities including ‘getting oriented’, ‘developing a thesis’, ‘gathering evidence’, ‘finding other or secondary sources’, and ‘writing’. The activity ‘preparing a presentation,’ introduced in phase 2, was ultimately selected by 40 of 86 (47%) of respondents in phase 2 or 32% of all respondents in the entire study.

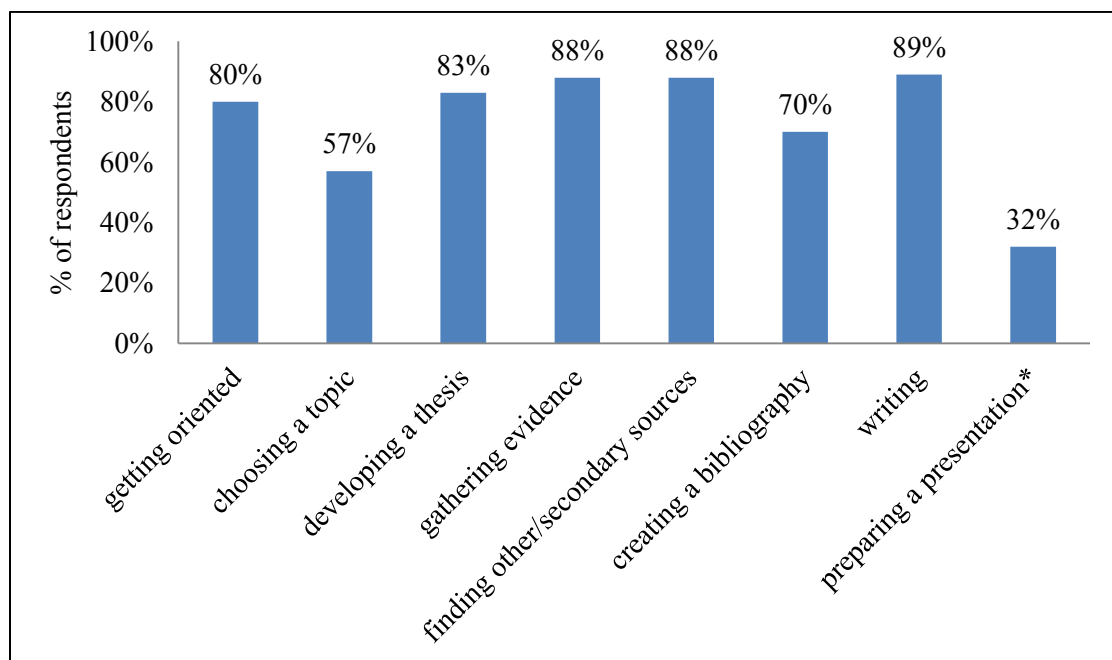


Figure 6.4 ‘Most important’ uses by learning activity

The proportion of respondents from each site reporting ‘most important’ uses of any type during each learning activity is reported in Table 6.29. Eighty percent or more respondents at all site reported library use during the ‘getting oriented,’ ‘developing a thesis,’ ‘gathering evidence,’ ‘finding other sources,’ and ‘writing’ activities. A majority of respondents used most important library resources, services, or facilities when choosing a topic (57%) and creating a bibliography (70%). The activity of ‘preparing a presentation’ was added to the instrument in phase 2. Thirty-two percent of all respondents and 47% percent of respondents from sites C – F reported using their ‘most important’ resources, services or facilities during this activity. Variations in these figures will be discussed in section 6.2.6.

Table 6.29 'Most important uses' by site and learning activity

	Site						Type of course			
	A	B	C	D	E	F	RM	BW	SS	All sites
getting oriented	88%	83%	75%	64%	83%	87%	89%	71%	81%	80%
choosing a topic	53%	71%	61%	36%	42%	67%	44%	52%	59%	57%
developing a thesis	88%	79%	83%	64%	88%	87%	89%	71%	85%	83%
gathering evidence	100%	92%	89%	91%	75%	87%	100%	86%	88%	88%
finding other/secondary sources	100%	79%	83%	82%	100%	87%	100%	81%	89%	88%
creating a bibliography	88%	58%	75%	45%	71%	73%	89%	57%	71%	70%
writing	88%	88%	89%	82%	96%	87%	89%	86%	90%	89%
preparing a presentation*	*	*	44%	9%	54%	73%	*	33%	35%	32%

RM = Research Methods, BW = Baccalaureate Writing, SS=Senior Seminar

\* activity added in phase 2

Drilling down into the data further, the proportion of respondents reporting use of their ‘most important’ resources, services, and facilities is presented in Figure 6.5. When reviewing these tables and figures, it is important to remember that they depict only the most important uses to students during each activity. That is, a student may have indicated she used her most important electronic resource, electronic journals, when gathering evidence to support her thesis. She may also have used other electronic resources such as e-books or archival finding aids during this activity.



‘Most important’ electronic resources were used by over 40% of respondents in six of eight activities. A majority of respondents used ‘most important’ e-resources when ‘getting oriented’ (55%), ‘developing a thesis’ (52%), ‘gathering evidence’ (80%), and ‘finding other/secondary sources’ (66%). Traditional resources were used by a majority of students in four activities including ‘developing a thesis’ (68%), ‘gathering evidence’ (63%), ‘finding other/secondary sources’ (58%), and writing (62%) and by 50% of respondents when creating a bibliography. A majority of respondents used services during two activities ‘gathering evidence’ (54%) and ‘finding other/secondary sources’ (51%). Approximately 25% of respondents used their ‘most important’ facilities or equipment when getting oriented, finding other/secondary sources, and creating a bibliography. ‘Forty-five percent of respondents used their ‘most important’ facility/equipment when ‘gathering evidence’ and fifty-three percent reported use during when writing.

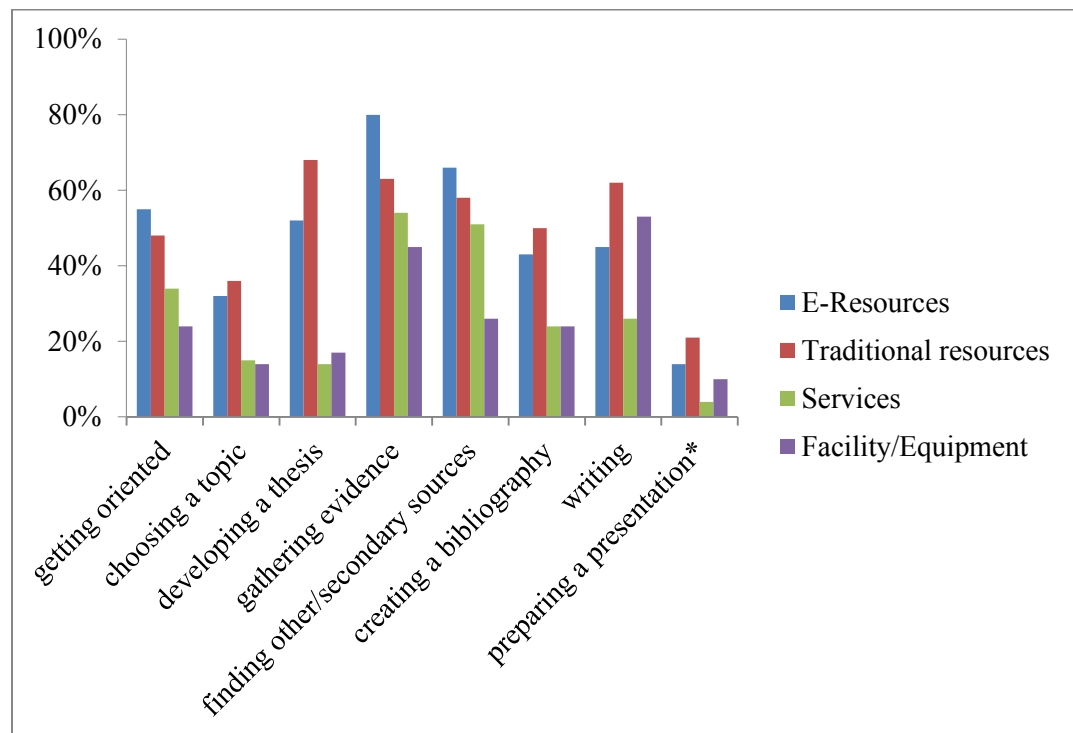


Figure 6.5 ‘Most important’ uses by type and learning activity

\* this activity was used in phase 2 only

In summary, there are fairly clear trends suggesting that most important electronic and traditional resources were used throughout the projects. ‘Most important’ services and facilities however, played key roles in the gathering evidence, finding other and secondary sources, and writing for a majority of the respondents.

#### **6.2.6 Mapping use to expectations for learning**

As reported in section 6.1 the learning activities crosswalk links learning activities derived in part from the stages of the Information Search Process (ISP) (Kuhlthau, 2004) to the common set of student learning outcomes for History. Further mapping links the activities to elements of the VALUE rubrics and Tuning outcomes for history. Student reported behaviors during these learning activities then provide a mechanism for connecting student information behaviors with associated expectations for learning. This section of the paper examines in detail the ‘most important’ information and library uses by type that occurred during learning activities along with relevant data from the learning activities crosswalk. At the close of this block of questions, students can add open-ended comments about resources, services, or facilities used during the project. Excerpts from these responses are used in this section to illustrate how library use supported students during each learning activity. Responses to these questions are covered in full in section 6.2.8.1.

##### **6.2.6.1 Getting oriented**

‘Getting oriented’ is similar to the ISP’s ‘initiating task’ in that the student may be coming to terms with the scope of the assignment and the range of information resources appropriate for completing the assignment. This activity was linked with two of the outcomes from the common set and mapped to elements of the VALUE rubrics and appropriate Tuning outcomes as illustrated in Table 6.30.

- SLO001, Ability to locate secondary sources
- SLO002, Ability to locate primary sources

Table 6.30 Expectations for student learning during the activity ‘getting oriented’

SLO code	SLO expectations and related VALUE rubric elements and Tuning outcomes
SLO001	Ability to locate secondary sources
<i>VALUE elements</i>	- <i>Information Literacy IL-1 Determine the Extent of Information Needed</i> - <i>Information Literacy IL-2 Access the Needed Information</i>
<i>Tuning outcomes</i>	<i>T011 Search for secondary sources</i>
SLO002	Ability to locate primary sources
<i>VALUE elements</i>	- <i>Information Literacy IL-1 Determine the Extent of Information Needed</i> - <i>Inquiry and Analysis IL-2 Access the Needed Information</i>
<i>Tuning outcomes</i>	<i>T012 Search for primary sources</i>

Eighty percent of respondents reported library and information use during the stage of ‘getting oriented’ (see Table 6.31). Respondents reported using the types of library uses which are consistent with this activity and associated learning outcomes noted in Table 6.30. A majority of respondents at sites A, D, E, and F and approximately 40% of respondents at sites B and C reported using their ‘most important’ electronic resources during this activity. Similar patterns are observed by type of course. Notably, almost 78% of respondents in the research methods class made use of ‘most important’ e-resources during this activity.

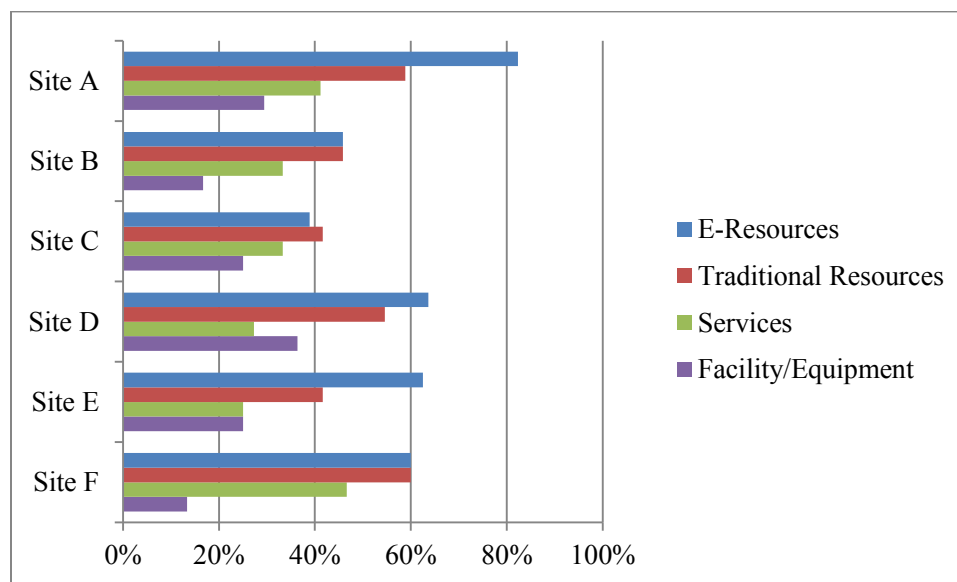


Figure 6.6 ‘Most important’ uses while 'getting oriented,' by site

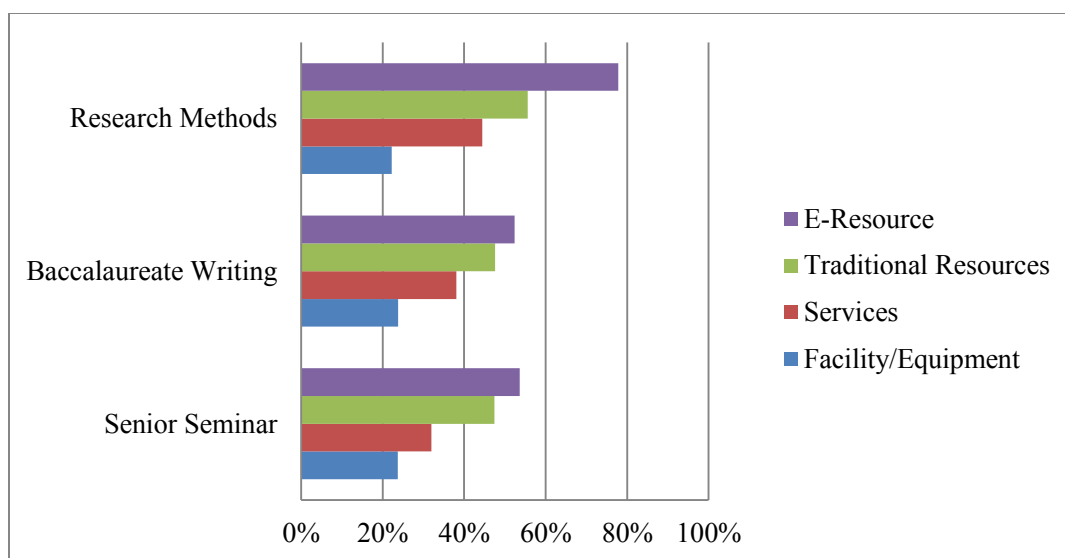


Figure 6.7 'Most important' uses while 'getting oriented' by type of course

Detailed statistics on 'most important' uses during this activity are reported in Table 6.31.

The importance of discovery tools during this stage is apparent, as over 30% of respondents used their most important electronic resources, the library catalog and indexes or databases, during this activity. Use of secondary sources was more prevalent as 42.5% of students reported using books as their most important traditional resource during this activity. Whereas only 9.4% and 2.4% respondents reported they used electronic primary sources or archival sources respectively as their most important resources during this activity. Even though interlibrary loan is far and away the most important library service to all of these cohorts, library instruction (11.0%) and reference (7.9%) were the most common 'top' services used during this activity. Use of 'most important' facilities, chiefly computers and study space, during this activity was reported by no more than 25% of respondents at four of six sites.

'Most important' uses made by specific students can help illustrate how library use supports this learning activity. As noted many students used their 'most important' electronic resource during this activity. Student A-13 used electronic databases during this activity and wrote: "I used the JSTOR database the most to find articles in several journals". In all 18 students named JSTOR as the e-journal database they used when 'Getting started.' Twelve

students used electronic primary sources during this activity. Student B-13 wrote: “access to digitized historical newspapers helped me discover my project!” ‘Most important’ library services also come into play. Fifteen students said they used library instruction, their ‘most important’ library service during this learning activity. Student C-01 was one of these students and he wrote:

“I learned more about the library in 10 minutes via class-wide information sessions than I did in my entire four years at [my institution]. The staff is great, and there's a lot of information that would simply go unnoticed if I hadn't been shown in a session. Should be a requirement for all research-based degrees, and potentially everyone on campus.”

Table 6.31 Most important resources, services, and facilities while 'getting oriented'

	Site A	Site B	Site C	Site D	Site E	Site F	RM	BW	SS	All sites
<i>Electronic Resources</i>										
library catalog	29.4%	16.7%	16.7%	9.1%	8.3%	13.3%	22.2%	9.5%	16.5%	15.7%
indexes or databases	5.9%	20.8%	5.6%	9.1%	25.0%	26.7%	0.0%	14.3%	16.5%	15.0%
electronic primary sources	11.8%	8.3%	5.6%	18.2%	8.3%	13.3%	11.1%	14.3%	8.3%	9.4%
electronic journals	23.5%	0.0%	5.6%	0.0%	0.0%	0.0%	22.2%	0.0%	4.1%	4.7%
internet search engines	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	3.1%	2.4%
Summon	0.0%	0.0%	0.0%	9.1%	8.3%	0.0%	0.0%	4.8%	2.1%	2.4%
non-library web site	5.9%	0.0%	2.8%	0.0%	0.0%	0.0%	11.1%	0.0%	1.0%	1.6%
research guide	5.9%	0.0%	0.0%	0.0%	0.0%	6.7%	11.1%	0.0%	1.0%	1.6%
electronic books	0.0%	0.0%	2.8%	9.1%	0.0%	0.0%	0.0%	4.8%	1.0%	1.6%
electronic reserves	0.0%	0.0%	0.0%	9.1%	0.0%	0.0%	0.0%	4.8%	0.0%	0.8%
<i>Traditional Resources</i>										
books	58.8%	41.7%	36.1%	36.4%	37.5%	53.3%	55.6%	33.3%	43.3%	42.5%
archival materials	0.0%	4.2%	2.8%	9.1%	0.0%	0.0%	0.0%	4.8%	2.1%	2.4%
media	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	1.0%	0.8%
microforms	0.0%	0.0%	0.0%	9.1%	0.0%	0.0%	0.0%	4.8%	0.0%	0.8%
reference books	0.0%	0.0%	0.0%	0.0%	0.0%	6.7%	0.0%	4.8%	0.0%	0.8%

*Continued*

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<i>Services</i>										
library	17.7%	8.3%	13.9%	0.0%	4.2%	20.0%	33.3%	9.5%	9.3%	11.0%
instruction										
reference	11.8%	8.3%	2.8%	18.2%	4.2%	13.3%	0.0%	19.1%	6.2%	7.9%
interlibrary	11.8%	4.2%	5.6%	9.1%	8.3%	6.7%	11.1%	4.8%	7.2%	7.1%
loan										
research	0.0%	12.5%	2.8%	0.0%	0.0%	0.0%	0.0%	0.0%	4.1%	3.1%
consultation										
citation	0.0%	0.0%	2.8%	0.0%	8.3%	0.0%	0.0%	0.0%	3.1%	2.4%
software										
interlibrary	0.0%	0.0%	2.8%	0.0%	0.0%	6.7%	0.0%	4.8%	1.0%	1.6%
loan										
(consortium)										
chat	0.0%	0.0%	2.8%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.8%
reference										
<i>Facility/Equipment</i>										
computers	17.7%	8.3%	11.1%	18.2%	4.2%	6.7%	11.1%	9.5%	10.3%	10.2%
study space	5.9%	4.2%	8.3%	9.1%	20.8%	6.7%	11.1%	9.5%	9.3%	9.4%
printers	0.0%	4.2%	2.8%	0.0%	0.0%	0.0%	0.0%	0.0%	2.1%	1.6%
microform	0.0%	0.0%	0.0%	9.1%	0.0%	0.0%	0.0%	4.8%	0.0%	0.8%
readers										
group study	5.9%	0.0%	0.00%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.8%
room										
workspace in	0.0%	0.0%	2.8%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.8%
the archives										

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RM = Research Methods, BW = Baccalaureate Writing, SS=Senior Seminar

### **6.2.6.2 Choosing a topic**

Choosing a topic is similar to the ISP's selection and exploring stages. The student is actively looking for a topic now and she may be reviewing primary and secondary sources in part to look for a topic and also to be assured that there are adequate resources available to support the project. The learning activities crosswalk links this activity with two of the discipline-specific skills and one thesis and argument outcome from the common set:

- SLO001, Ability to locate secondary sources and
- SLO002, Ability to locate primary sources
- SLO007, Ability to select a topic and ask an ambitious yet answerable question

Relevant sections of the crosswalk are provided in Table 6.32.

Table 6.32 Expectations for student learning while ‘choosing a topic’

SLO code	SLO expectations and related VALUE rubric elements and Tuning outcomes
SLO001	Ability to locate secondary sources
<i>VALUE elements</i>	- <i>Information Literacy IL-1 Determine the Extent of Information Needed</i> - <i>Information Literacy IL-2 Access the Needed Information</i>
<i>Tuning outcomes</i>	<i>T011 Search for secondary sources</i>
SLO002	Ability to locate primary sources
<i>VALUE elements</i>	- <i>Information Literacy IL-1 Determine the Extent of Information Needed</i> - <i>Inquiry and Analysis IL-2 Access the Needed Information</i>
<i>Tuning outcomes</i>	<i>T012 Search for primary sources</i>
SLO008	Ability to select a topic and ask an ambitious yet answerable question
<i>VALUE</i>	- <i>Inquiry and Analysis IA2 Topic selection</i>

Fifty-seven percent of respondents reported library use during this activity (see Table 6.29). As depicted in Figures 6.8 and 6.9 the proportion of respondents reporting use of most important resources of all types declined during this activity. Over 40% of respondents at sites B and F claimed using their ‘most important’ traditional sources during this activity. Forty-six percent of respondents at site B reported using their ‘most important’ electronic resource during this activity. Yet fewer than 40% of respondents at each site and in each course type reported using ‘most important’ services and facilities during this activity.

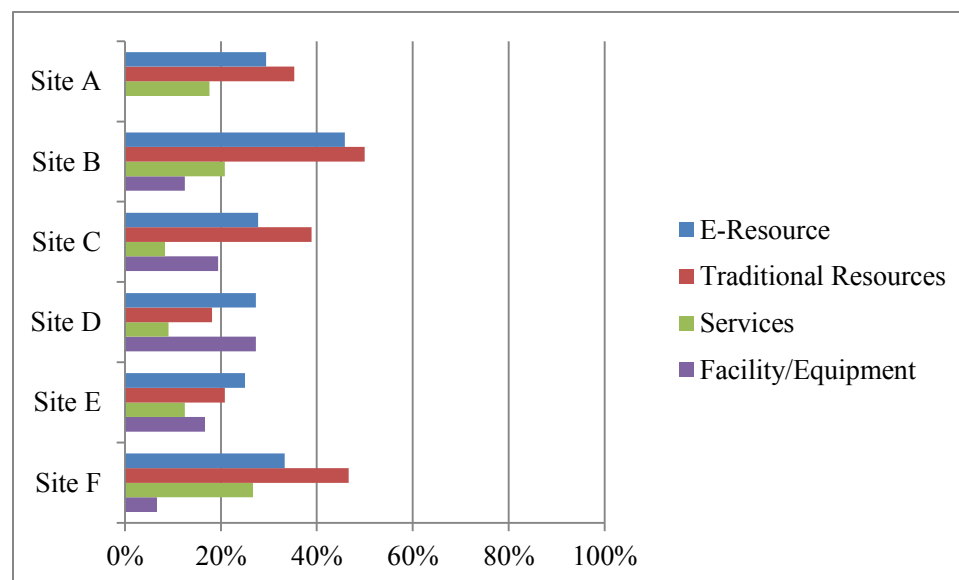


Figure 6.8 'Most important' uses while 'choosing a topic' by site

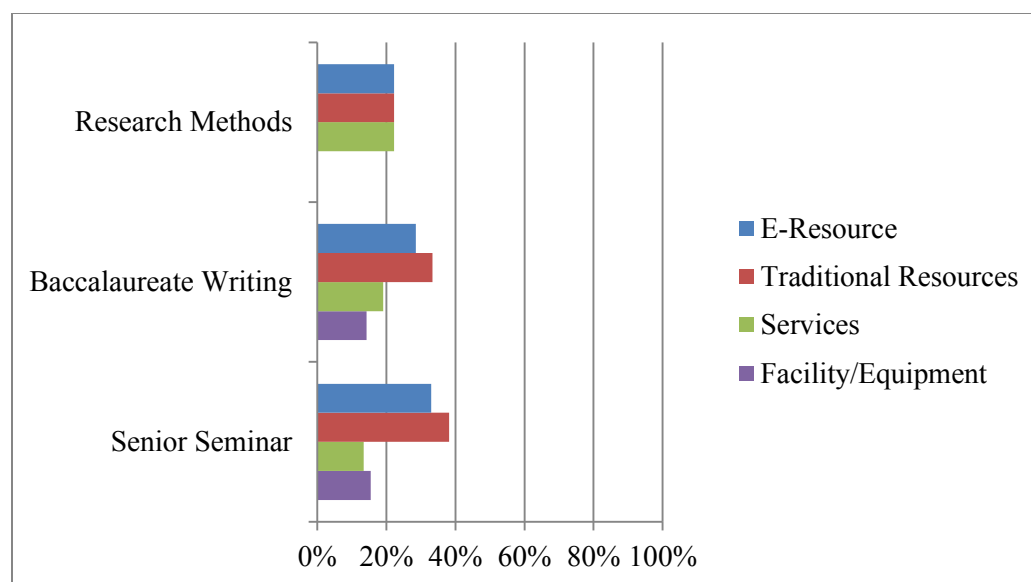


Figure 6.9 'Most important' uses while 'choosing a topic' by type of course

Details regarding use during this activity are provided in Table 6.33. Books remain the most frequently used 'top' traditional resource among 29.9% of respondents. This pattern holds across all six sites, except for students at site D. Even though 63.6% of students at site D reported books were their most important traditional resource, none of these students reported using them during this stage. One student used microforms and another used archival sources. Students enrolled in senior seminars seem more likely to claim use of their most important electronic and traditional resources during this activity than students enrolled in the research methods and baccalaureate writing courses. 'Most important' services seem relatively unimportant at this stage except for students at site F, where we see 26% of respondents report using their 'top' services of interlibrary loan, reference, and library instruction collectively. 'Top' facilities and equipment remained relatively unimportant across all groups during this activity.

Statements from individual students help illustrate how library use supports this learning activity. Several students mentioned this activity specifically when answering the opening question about learning objectives associated with the project:

"How to formulate a research question ..." (A-02)



“To learn to find an original thesis topic ...” (B-07)

“...How to develop a question” (E-10)

“He wanted us to become experts on the topic that we chose for our papers ...” (F-12)

Respondents seemed to value resources more than discovery tools during this activity. Several students mentioned visiting specific archives during this project (B-01, B-11, C-14, and D-08). And others mentioned electronic primary sources available on the web such as the “Vatican Archives “ (E-07) as well as vendor-provided sources like Early English Books Online (B-07) and Proquest Historical Newspapers (A-06). Almost 30% of the respondents mentioned using books during this stage and named specific titles that had been helpful or referred to a genre like “just biographies in general” as noted by student A-14.

Table 6.33 Most important library uses while 'choosing a topic'

	Site A	Site B	Site C	Site D	Site E	Site F	RM	BW	SS	All Sites
<i>Electronic Resources</i>										
library catalog	11.8%	16.7%	13.9%	0.0%	8.3%	6.7%	0.0%	0.0%	14.4%	11.0%
indexes or databases	0.0%	16.7%	0.0%	9.1%	12.5%	20.0%	0.0%	14.3%	8.3%	8.7%
electronic primary sources	5.9%	8.3%	8.3%	0.0%	4.2%	6.7%	11.1%	4.8%	6.2%	6.3%
electronic journals	5.9%	4.2%	2.8%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	2.4%
non-library web site	5.9%	0.0%	0.0%	0.0%	0.0%	0.0%	11.1%	0.0%	0.0%	0.8%
electronic reserves	0.0%	0.0%	0.0%	9.1%	0.0%	0.0%	0.0%	4.8%	0.0%	0.8%
electronic books	0.0%	0.0%	2.8%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.8%
Summon	0.0%	0.0%	0.0%	9.1%	0.0%	0.0%	0.0%	4.8%	0.0%	0.8%
<i>Traditional Resources</i>										
books	35.3%	37.5%	36.1%	0.0%	16.7%	40.0%	22.2%	19.1%	33.0%	29.9%
archival materials	0.0%	8.3%	2.8%	9.1%	0.0%	0.0%	0.0%	4.8%	3.1%	3.2%
reference books	0.0%	4.2%	0.0%	0.0%	0.0%	6.7%	0.0%	4.8%	1.0%	1.6%
microforms	0.0%	0.0%	0.0%	9.1%	0.0%	0.0%	0.0%	4.8%	0.0%	0.8%
media	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	1.0%	0.8%

Continued

<i>Services</i>										
interlibrary loan	5.9%	8.3%	0.0%	9.1%	8.3%	6.7%	11.1%	4.8%	5.2%	5.5%
reference	5.9%	8.3%	2.8%	0.0%	0.0%	6.7%	0.0%	4.8%	4.1%	3.9%
library instruction	5.9%	0.0%	2.8%	0.0%	0.0%	6.7%	11.1%	4.8%	1.0%	2.4%
interlibrary loan (consortium)	0.0%	0.0%	2.8%	0.0%	0.0%	6.7%	0.0%	4.8%	1.0%	1.6%
research consultation	0.0%	4.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.8%
citation software	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	1.0%	0.8%
<i>Facility/Equipment</i>										
study space	0.0%	8.3%	5.6%	0.0%	12.5%	0.0%	0.0%	0.0%	7.2%	5.5%
computers	0.0%	0.0%	8.3%	18.2%	4.2%	6.7%	0.0%	9.5%	5.2%	5.5%
printers	0.0%	4.2%	5.6%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	2.4%
microform readers	0.0%	0.0%	0.0%	9.1%	0.0%	0.0%	0.0%	4.8%	0.0%	0.8%

RM = Research Methods, BW = Baccalaureate Writing, SS=Senior Seminar

### 6.2.6.3 Developing a thesis statement

This activity is intended to align with Kuhlthau's 'Formulation' stage in which the student is creating his or her argument and will likely be preparing a research proposal for his or her professor's review and approval. The learning activities crosswalk links this activity with two of the discipline-specific skills from the common set, SLO008, "Ability to develop an original thesis statement" and SLO009, "Ability to advance an argument in support of thesis using evidence from primary sources." Relevant sections of the crosswalk are provided in Table 6.34.

Table 6.34 Expectations for student learning when 'developing a thesis statement'

SLO code	SLO expectations and related VALUE rubric elements and Tuning outcomes
SLO008	Ability to develop an original thesis statement
VALUE elements	- Critical Thinking C-4 Student position
Tuning outcomes	T020 Formulate and test hypotheses
SLO009	Ability to advance an argument in support of thesis using evidence from primary
VALUE elements	- Critical Thinking C-4 Student position
Tuning outcomes	T020 Formulate and test hypotheses

As reported in Table 6.29, 83% of respondents reported ‘most important’ library uses during this activity. As depicted in Figures 6.10 and 6.11, respondents at five of six sites and those enrolled in all three course types were more likely to use their ‘most important’ traditional resource than their ‘most important’ e-resources during this activity. Eighty-eight percent of respondents at site A made this claim as did 70% at site E and 73% at site F. Eighty-nine percent of students enrolled in the research methods class and 68% of students enrolled in senior seminars made this claim.

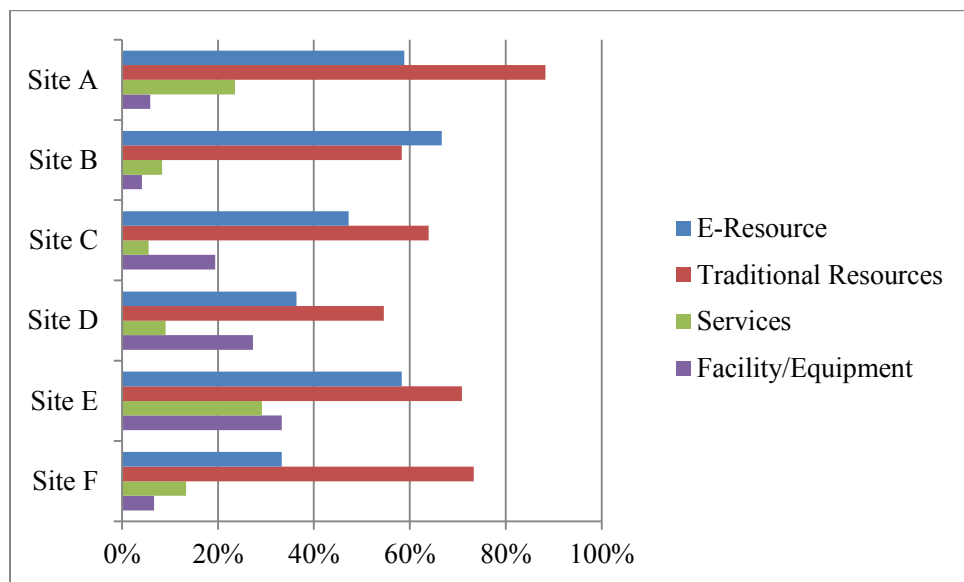


Figure 6.10 ‘Most important’ uses while ‘developing a thesis’ by site

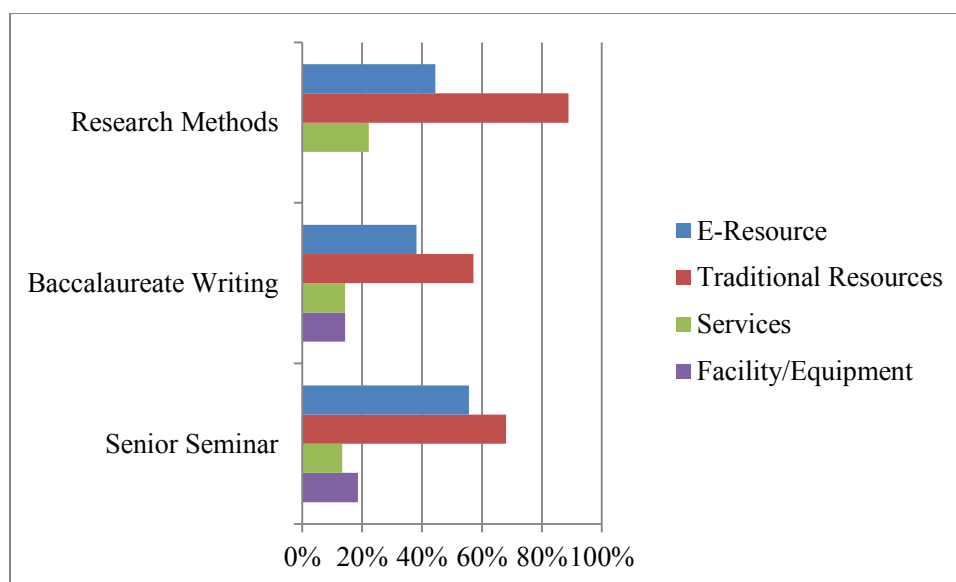


Figure 6.11 ‘Most important’ uses while ‘developing a thesis’ by type of course

A detailed look at ‘most important’ uses suggests students remain reliant on books at this stage. As seen in Table 6.35, over 60% of respondents reported using their most important traditional resource, books, during this activity. This figure ranges from 45% at sites B and D to 88% at sites A and among the students enrolled in the Research Methods class. Consistent with this theme the library catalog remained the most common ‘top’ e-resource and interlibrary loan was the most commonly used service. In-person services and facilities use was less prevalent during this activity as well.

Statements from individual students demonstrate that they had internalized the learning objectives for the project. Comments by students B-15 and E-19 echo the learning outcome SLO007, student demonstrates the “ability to develop an original thesis statement” when reporting their perceptions of the learning objectives associated with their projects:

“... We were to create a thesis question and write a paper based on our research that we did for over two semesters ...” (B-15)

“The ability to research, form a clear and defined thesis, and present all of this in a coherent essay.” (E-19)

The crosswalk links these activities to tuning learning outcome T020: Student is able to “formulate and test plausible historical hypotheses and marshal an argument, to be assessed through specifically designed individual assignments.”

Comments like this one, “I believe she wanted us to learn how to think like historians by analyzing sources and using them to answer our thesis” (C-28) reinforce the point that using evidence to support a thesis is an important learning outcome for the discipline. For this reason, it makes sense that primary and secondary sources seemed more important to respondents than discovery tools during this stage as respondents mentioned using specific archives, newspapers on microfilm, and books they had used. Student B-07, for instance, wrote: “Early English Books Online was essential for my thesis as it gave me access to early editions of texts not easily accessed outside of the UK.”

Table 6.35 Most important library uses while 'developing a thesis'

	Site A	Site B	Site C	Site D	Site E	Site F	RM	BW	SS	All sites
<i>Electronic Resources</i>										
library catalog	17.7%	25.0%	22.2%	9.1%	12.5%	0.0%	0.0%	4.8%	20.6%	16.5%
electronic primary sources	11.8%	16.7%	5.6%	9.1%	12.5%	13.3%	11.1%	14.3%	10.3%	11.0%
indexes or databases	5.9%	16.7%	2.8%	9.1%	16.7%	20.0%	11.1%	14.3%	10.3%	11.0%
electronic journals	17.7%	8.3%	8.3%	0.0%	0.0%	0.0%	11.1%	0.0%	7.2%	6.3%
internet search engines	0.0%	0.0%	2.8%	0.0%	8.3%	0.0%	0.0%	0.0%	3.1%	2.4%
journal resolver	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	1.0%	0.8%
electronic books	0.0%	0.0%	0.0%	9.1%	0.0%	0.0%	0.0%	4.8%	0.0%	0.8%
Summon	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	1.0%	0.8%
research guide	0.0%	0.0%	2.8%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.8%
non-library web site	5.9%	0.0%	0.0%	0.0%	0.0%	0.0%	11.1%	0.0%	0.0%	0.8%
archival finding aids	0.0%	0.0%	2.8%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.8%

*Continued*

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<i>Traditional Resources</i>										
books	88.2%	45.8%	58.3%	45.5%	62.5%	73.3%	88.9%	52.4%	60.8%	61.4%
archival materials	0.0%	8.3%	5.6%	9.1%	0.0%	0.0%	0.0%	4.8%	4.1%	3.9%
microforms	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	1.0%	0.8%
reference books	0.0%	4.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.8%
media	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	1.0%	0.8%
<i>Services</i>										
interlibrary loan	17.7%	4.2%	2.8%	9.1%	25.0%	0.0%	22.2%	4.8%	9.3%	9.5%
reference	5.9%	0.0%	0.0%	0.0%	0.0%	6.7%	0.0%	4.8%	1.0%	1.6%
interlibrary loan (consortium)	0.0%	0.0%	2.8%	0.0%	0.0%	6.7%	0.0%	4.8%	1.0%	1.6%
research consultation	0.0%	4.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.8%
citation software	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	1.0%	0.8%
<i>Facility/Equipment</i>										
study space	0.0%	4.2%	2.8%	9.1%	25.0%	0.0%	0.0%	4.8%	8.3%	7.1%
computers	0.0%	0.0%	8.3%	9.1%	4.2%	6.7%	0.0%	4.8%	5.2%	4.7%
group study room	5.9%	0.0%	2.8%	0.0%	0.0%	0.0%	0.0%	0.0%	2.1%	1.6%
microform readers	0.0%	0.0%	0.0%	9.1%	4.2%	0.0%	0.0%	4.8%	1.0%	1.6%
printers	0.0%	0.0%	5.6%	0.0%	0.0%	0.0%	0.0%	0.0%	2.1%	1.6%

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RM = Research Methods, BW = Baccalaureate Writing, SS=Senior Seminar

#### **6.2.6.4 Gathering evidence to support my thesis**

This stage has similarities to the ISP ‘collection’ stage. The student’s thesis is likely already decided upon and the student is pulling together resources to support his or her argument. This stage likely includes acts of finding, evaluating, analyzing, and using primary materials to back up their argument. In phase 2 the activity was modified to account specifically for gathering evidence from primary sources. The learning activities crosswalk links this activity with a range of discipline specific outcomes from the common set:

- SLO002 Ability to locate primary sources
- SLO003 Ability to distinguish among sources Primary vs. secondary
- SLO006 Ability to evaluate and interpret primary sources
- SLO009 Ability to advance an argument in support of thesis using evidence from primary sources
- SLO010 Ability to meet minimum standards for evidence (e.g. minimum number and quality of sources)

Further these outcomes are mapped to numerous elements of the VALUE rubrics and Tuning Learning Outcomes as depicted in Table 6.36.

Table 6.36 Expectations for student learning when ‘gathering evidence’

SLO code	SLO expectations and related VALUE rubric elements and Tuning outcomes
SLO002	Ability to locate primary sources
<i>VALUE elements</i>	- <i>Information Literacy IL-1 Determine the Extent of Information Needed</i> - <i>Information Literacy IL-2 Access the Needed Information</i>
<i>Tuning outcomes</i>	<i>T012 Search for primary sources</i>
SLO003	Ability to distinguish among sources Primary vs. secondary
<i>VALUE elements</i>	<i>None</i>
<i>Tuning outcomes</i>	<i>T011 Search for secondary sources (implied)</i> <i>T012 Search for primary sources (implied)</i>
SLO006	Ability to evaluate and interpret primary sources
<i>VALUE elements</i>	- <i>Information Literacy IL-3 Evaluate Information and its Sources Critically</i>
<i>Tuning outcomes</i>	<i>T010 Find and handle information</i> <i>T013 Evaluate texts and primary sources</i> <i>T018 Use basic interpretation and evaluation methods</i>
SLO009	Ability to advance an argument in support of thesis using evidence from primary sources
<i>VALUE elements</i>	- <i>Critical Thinking C-5 Evidence</i> - <i>Inquiry and Analysis IA-3 Analysis</i> - <i>Written Communication W-3 Sources and Evidence</i>
<i>Tuning outcomes</i>	<i>T020 Formulate and test hypotheses</i>
SLO010	Ability to meet minimum standards for evidence (e.g. minimum number and quality of sources)
<i>VALUE elements</i>	<i>None</i>
<i>Tuning outcomes</i>	<i>None</i>

Respondents from all sites and cohorts reported very high rates of library use during this activity. Overall 88% of respondents reported using ‘most important’ library resources, services, or facilities when gathering evidence (see Table 6.29). These rates ranged from 75% at site E to 100% at site A and among students enrolled in the Research Methods course.

‘Most important’ electronic resources and discovery tools play a strong role in supporting this activity. At least 66% of respondents at each site and in each course type reported using their ‘most important’ e-resource during this activity. A vast majority of respondents at sites A (94%), B (92%), and C (83%) as well as 100% of student enrolled in the research methods reported doing so (Figures 6.12 and 6.13). An overwhelming majority of the students at sites A (88%) and B (92%) reported using their most important traditional sources during this activity as well. This is significantly higher than seen among the students at sites C (47%), D (64%), E (38%), and F (66%). This difference is likely explained by the change in phase two, narrowing the focus from gathering evidence in any form to gathering evidence specifically from primary sources.

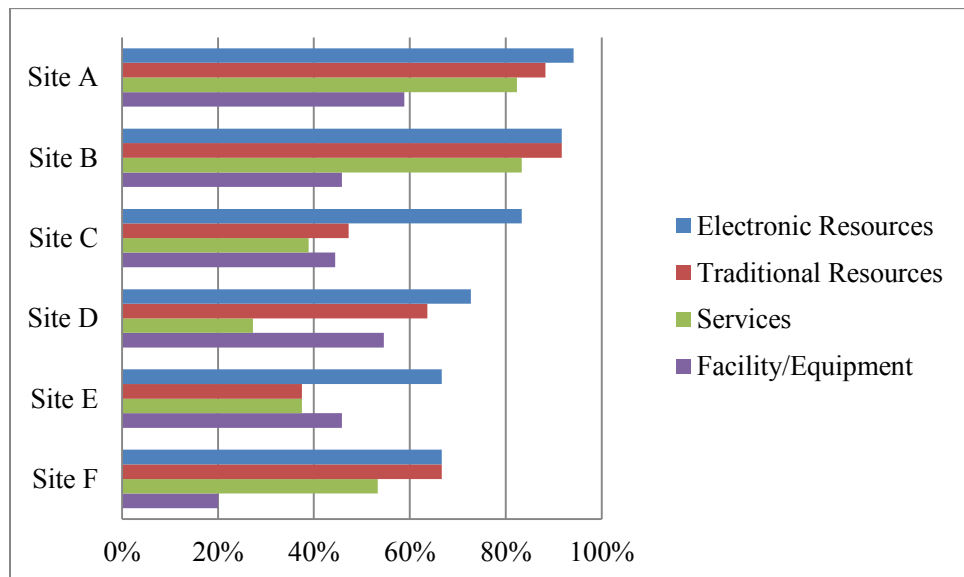


Figure 6.12 ‘Most important’ uses while ‘gathering evidence’ by site



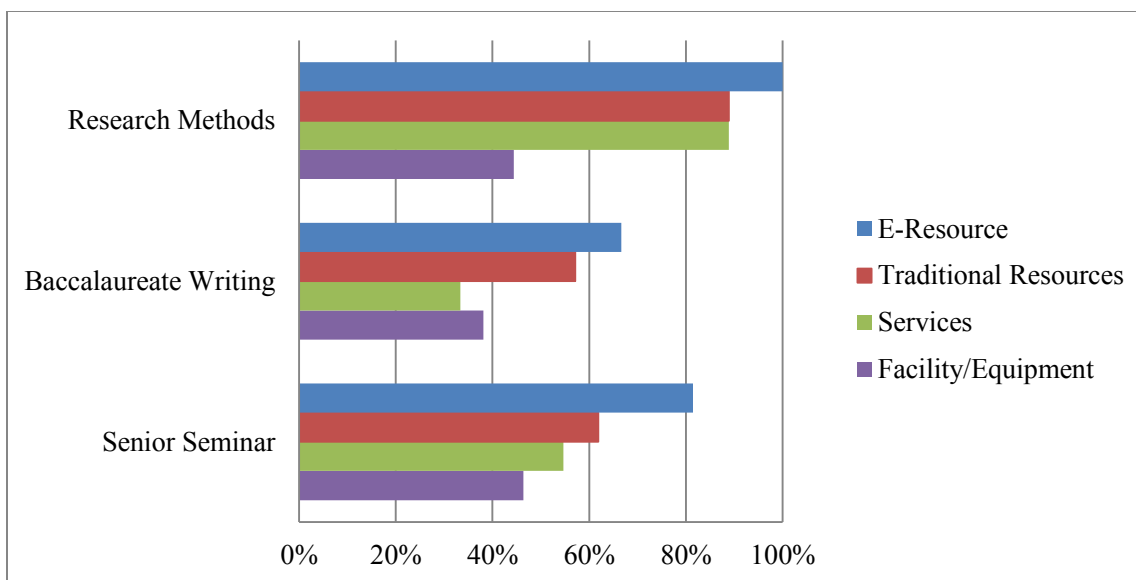


Figure 6.13 'Most important' uses while 'gathering evidence' by type of course

These monograph-centric projects still require books from campus libraries for 82.4% of students at site A, 66.7% of students at site B, and 60% at site F. Over 30% of respondents noted they used their 'most important' service, interlibrary loan, as well. Twenty-five percent of students at site B said they used 'archival materials,' their most important traditional resource during this activity. At site D books, archives and microforms were prevalent 'most important' traditional resources used when gathering evidence. Borrowing books from other libraries (site A, 1 student) and the use of interlibrary loan also increased during this time as 52.9% of respondents claimed ILL use during this stage at site A and 50% at site B. Primary sources made up a greater percentage of 'most important' uses during this stage than in any other. Almost 20% of respondents claimed 'electronic primary sources' were their 'most important' electronic resources used during this stage.

Also at site B, in-person services take on new importance during this stage. One third of students (8 out of 24) at site B, named research consultations (12.5%), reference (8.3%), instruction (8.3%), and chat reference (4.1%) as 'most important' services used during this stage. Facilities and equipment also emerge as important during this stage. Approximately 20% of students claimed they used 'study space,' their most important facility or equipment during this

stage. Almost 30% of the respondents reported using their most important equipment during this stage. Notably, two respondents at site D reported using their most important equipment, microfilm readers, during this activity.

Several statements regarding student perceptions of learning objectives associated with the project spoke directly to the theme of this activity:

“How to do research beyond the usual books and articles. How to find primary sources. How to present an argument and support it throughout the thesis.” (B-22)

“I think the professor wanted us to learn how to conduct research like a cultural historian using primary and secondary sources. She also wanted us to work within the writing process to develop a quality piece of scholarly work.” (F-13)

“She wanted us to learn how to use diverse primary and secondary sources to form a cohesive argument and think about them critically.” (E-08)

In each of these statements the common student learning outcome SLO009 can be heard: Student demonstrates the “Ability to advance an argument in support of thesis using evidence from primary sources.” The crosswalk links this SLO to elements of the critical thinking, inquiry and analysis, and writing VALUE rubrics which could be used to assess students’ ability to use of evidence in their work.

However, students needed help when it came to meeting the objectives for this activity and when working toward these learning outcomes. Student F-14 noted his library’s collections did not support his research project: “The Library has too few primary sources ...” Librarians did help students through this activity though as reported by student A-07 who said library instruction helped during this stage of the project: “the librarians were able to help me find a lot of reference books with primary sources I had been missing”. Interlibrary loan also fills gaps for students who are ‘gathering evidence’ as mentioned by student A-09: “Again, Inter Library Loan saved my paper.” Other students could use help selecting the appropriate tools for specific tasks. Student E-05 was using a federated search tool when ‘gathering evidence to support his thesis’ and wrote: “Summon is hard to work with, there needs to be more direction for what it should be used for ...” Student D-07 thought his professor expected him to learn “ ... How to analyze

primary sources and synthesize the information into a clear and well-argued paper.” This suggests that he was ready to move beyond gathering evidence to evaluating and analyzing information, skills that the crosswalk links to Tuning outcome T013: “Evaluate texts and primary sources” and elements of several VALUE rubrics.

Table 6.37 Most important library uses while 'gathering evidence'

	Site A	Site B	Site C	Site D	Site E	Site F	RM	BW	SS	All sites
<i>Electronic Resources</i>										
library catalog	29.4%	20.8%	27.8%	27.3%	12.5%	13.3%	22.2%	19.1%	22.7%	22.1%
electronic primary sources	17.7%	29.2%	13.9%	18.2%	20.8%	20.0%	22.2%	19.1%	19.6%	19.7%
indexes or databases	11.8%	20.8%	13.9%	0.0%	16.7%	20.0%	11.1%	9.5%	16.5%	15.0%
e-journals	23.5%	16.7%	11.1%	9.1%	0.0%	0.0%	22.2%	4.8%	10.3%	10.2%
internet search engines	0.0%	0.0%	5.6%	0.0%	4.2%	6.7%	0.0%	4.8%	3.1%	3.2%
research guide	5.9%	0.0%	2.8%	0.0%	0.0%	6.7%	11.1%	0.0%	2.1%	2.4%
Summon	0.0%	0.0%	0.0%	9.1%	8.3%	0.0%	0.0%	4.8%	2.1%	2.4%
archival finding aids	0.0%	0.0%	5.6%	0.0%	0.0%	0.0%	0.0%	0.0%	2.1%	1.6%
electronic books	0.0%	4.2%	2.8%	0.0%	0.0%	0.0%	0.0%	0.0%	2.1%	1.6%
non-library web site	5.9%	0.0%	0.0%	0.0%	0.0%	0.0%	11.1%	0.0%	0.0%	0.8%
journal resolver	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	1.0%	0.8%
electronic reserves	0.0%	0.0%	0.0%	9.1%	0.0%	0.0%	0.0%	4.8%	0.0%	0.8%
<i>Traditional Resources</i>										
books	88.2%	66.7%	38.9%	27.3%	33.3%	60.0%	88.9%	33.3%	51.6%	51.2%
archival materials	0.0%	25.0%	8.3%	9.1%	0.0%	6.7%	0.0%	9.5%	9.3%	8.7%
microforms	0.0%	0.0%	0.0%	18.2%	4.2%	0.0%	0.0%	9.5%	1.0%	2.4%
reference books	0.0%	0.0%	0.0%	9.1%	0.0%	0.0%	0.0%	4.8%	0.0%	0.8%
<i>Services</i>										
interlibrary loan	52.9%	29.2%	8.3%	18.2%	20.8%	13.3%	44.4%	9.5%	22.7%	22.1%

*Continued*

library instruction	17.7%	8.3%	8.3%	0.0%	4.2%	20.0%	33.3%	9.5%	7.2%	9.5%
interlibrary loan (consortium)	0.0%	20.8%	11.1%	0.0%	0.0%	13.3%	0.0%	4.8%	10.3%	8.7%
Reference	11.8%	8.3%	0.0%	9.1%	4.2%	6.7%	11.1%	9.5%	4.1%	5.5%
research consultation	0.0%	12.5%	8.3%	0.0%	0.0%	0.0%	0.0%	0.0%	6.2%	4.7%
citation software	0.0%	0.0%	0.0%	0.0%	8.3%	0.0%	0.0%	0.0%	2.1%	1.6%
chat reference	0.0%	4.2%	2.8%	0.0%	0.0%	0.0%	0.0%	0.0%	2.1%	1.6%
<i>Facility/Equipment</i>										
computers	17.7%	12.5%	19.4%	18.2%	8.3%	6.7%	11.1%	9.5%	15.5%	14.2%
study space	5.9%	20.8%	11.1%	9.1%	25.0%	6.7%	0.0%	9.5%	16.5%	14.2%
printers	29.4%	12.5%	5.6%	0.0%	0.0%	6.7%	33.3%	4.8%	7.2%	8.7%
microform readers	0.0%	0.0%	2.8%	18.2%	4.2%	0.0%	0.0%	9.5%	2.1%	3.2%
workspace in the archives	0.0%	0.0%	5.6%	0.0%	4.2%	0.0%	0.0%	0.0%	3.1%	2.4%
photocopiers	0.0%	0.0%	0.0%	9.1%	4.2%	0.0%	0.0%	4.8%	1.0%	1.6%
group study room	5.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.8%

RM = Research Methods, BW = Baccalaureate Writing, SS=Senior Seminar

### **6.2.6.5 Finding other relevant sources/secondary sources**

This stage is similar to the ISP's collection stage. In phase 1, respondents were presented with the activity of 'finding other relevant sources' and did not discriminate between primary or secondary sources. In phase 2, this activity was narrowed to 'finding secondary sources.' The learning activities crosswalk links this activity with a range of discipline specific outcomes from the common set:

- SLO001 Ability to locate secondary sources
- SLO003 Ability to distinguish among sources Primary vs. secondary
- SLO004 Ability to distinguish among sources Scholarly vs. non-scholarly

Further these outcomes are mapped to numerous elements of the VALUE rubrics and Tuning Learning Outcomes in Table 6.38.

Table 6.38 Expectations for student learning when ‘finding sources’

SLO code	SLO expectations and related VALUE rubric elements and Tuning outcomes
SLO001	Ability to locate secondary sources
<i>VALUE elements</i>	- <i>Information Literacy IL-1 Determine the Extent of Information Needed</i> - <i>Inquiry and Analysis IL-2 Access the Needed Information</i>
<i>Tuning outcomes</i>	<i>T011 Search for secondary sources</i>
SLO003	Ability to distinguish among sources Primary vs. secondary
<i>VALUE elements</i>	<i>None</i>
<i>Tuning outcomes</i>	<i>T011 Search for secondary sources (implied)</i> <i>T012 Search for primary sources (implied)</i>
SLO004	Ability to distinguish among sources Scholarly vs. non-scholarly
<i>VALUE elements</i>	<i>None</i>
<i>Tuning outcomes</i>	<i>T011 Search for secondary sources (implied)</i>

Eighty-nine percent of respondents reported library use during this activity ranging from 79% at Site B to 100% at Sites A and E and among students enrolled in the Research Methods course (see Table 6.29 and Figures 6.14 and 6.15). The use of digitized primary sources and archives declined during this stage among those who declared these materials to be ‘most important’ resources. Secondary sources remain important though in the form of books (51.2%), e-journals (8.7%), and electronic indexes and databases (17.3%). Several students at sites A and F claimed they used ‘most important’ in-person services during this stage of the project. Students claimed use of library instruction, (23.5% and 26.7% respectively), and reference, (11.8% and 6.7%), during this stage. And three out of 24 students at site B used research consultations during this stage. Unfortunately a coding error prevented collection of data about facilities and equipment used during this stage for sites A and B. Study space emerges as a ‘top use’ of importance during this stage, especially at site E (37%).

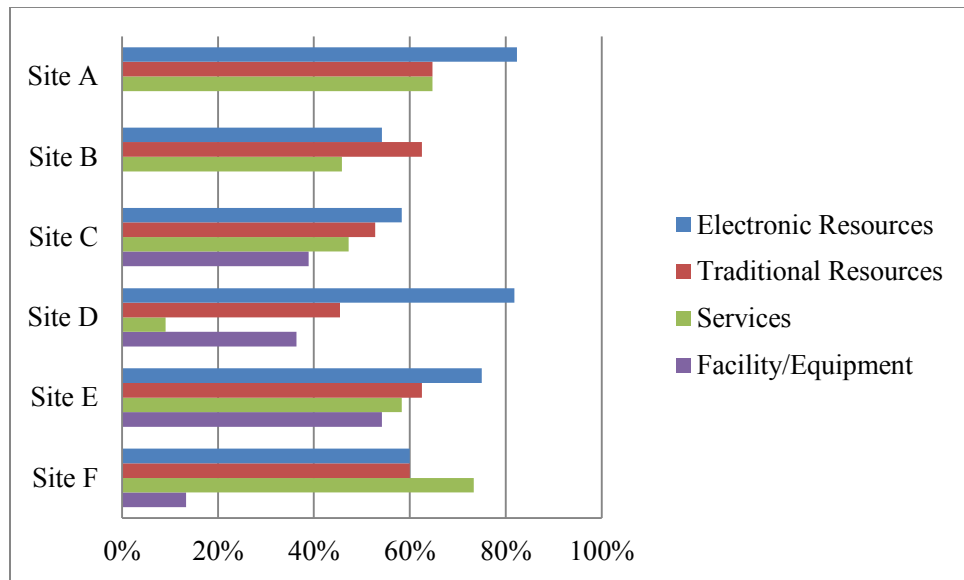


Figure 6.14 'Most important' uses while 'Finding secondary resources' by site

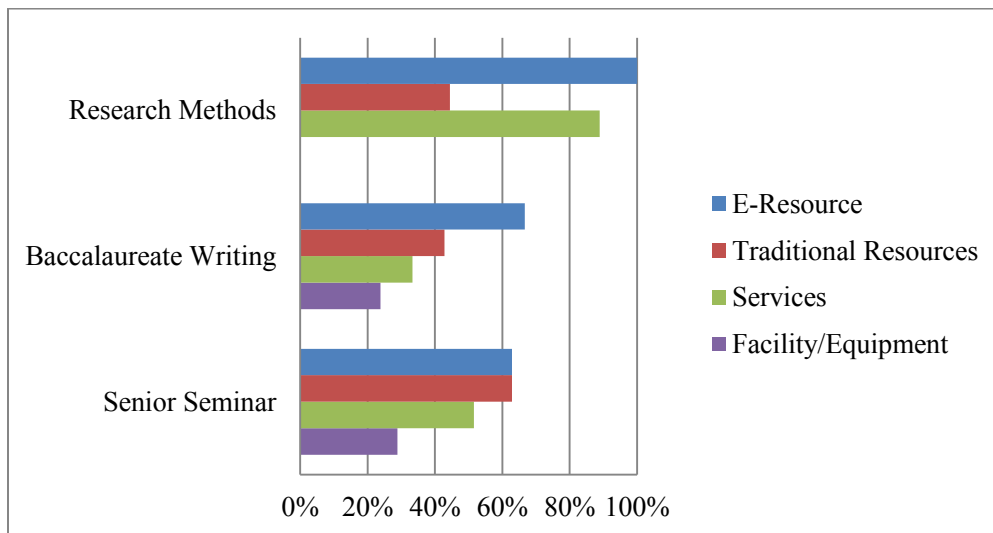


Figure 6.15 'Most important' uses while 'Finding secondary resources' by type of course

Comments from specific students reinforce these themes. Student A-08 noted that one of the learning objectives for his project was: "...how to look for good primary and secondary sources ..." echoing the point of SLO001: student demonstrates the "ability to locate secondary sources." To meet these objectives he used the library catalog and JSTOR. Student C-10 took advantage of all four of his 'most important' uses when 'finding secondary sources' including the library catalog, books, interlibrary loan, and library-provided computers. His comment "Google

led me to find the books I needed to prove my argument, and then I found them in the catalog, which led me to even more books that I didn't even know about" shows that students use library-provided and the open web in concert to achieve these ends. Here he is demonstrating several of the abilities described in the Information Literacy VALUE rubric.

Table 6.39 'Most important' library uses while 'finding sources'

	Site A	Site B	Site C	Site D	Site E	Site F	RM	BW	SS	All sites
<i>Electronic Resources</i>										
library catalog	29.4%	16.7%	22.2%	36.4%	20.8%	20.0%	22.2%	28.6%	21.7%	22.8%
indexes or databases	11.8%	16.7%	13.9%	9.1%	25.0%	26.7%	11.1%	14.3%	18.6%	17.3%
electronic journals	17.7%	8.3%	13.9%	9.1%	0.0%	0.0%	22.2%	4.8%	8.3%	8.7%
electronic primary sources	11.8%	12.5%	8.3%	9.1%	8.3%	0.0%	22.2%	4.8%	8.3%	8.7%
internet search engines	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	3.1%	2.4%
Summon	0.0%	0.0%	0.0%	9.1%	8.3%	0.0%	0.0%	4.8%	2.1%	2.4%
research guide	5.9%	0.0%	0.0%	0.0%	0.0%	6.7%	11.1%	0.0%	1.0%	1.6%
electronic books	0.0%	0.0%	0.0%	9.1%	0.0%	6.7%	0.0%	9.5%	0.0%	1.6%
non-library web site	5.9%	0.0%	0.0%	0.0%	0.0%	0.0%	11.1%	0.0%	0.0%	0.8%
<i>Traditional Resources</i>										
Books	64.7%	45.8%	47.2%	27.3%	62.5%	53.3%	44.4%	28.6%	56.7%	51.2%
archival materials	0.0%	16.7%	5.6%	9.1%	0.0%	0.0%	0.0%	4.8%	6.2%	5.5%
reference books	0.0%	0.0%	0.0%	9.1%	0.0%	6.7%	0.0%	9.5%	0.0%	1.6%
<i>Services</i>										
interlibrary loan	29.4%	8.3%	11.1%	9.1%	37.5%	20.0%	33.3%	4.8%	20.6%	18.9%
library instruction	23.5%	4.2%	5.6%	0.0%	4.2%	26.7%	44.4%	14.3%	5.2%	9.5%
interlibrary loan (consortium)	0.0%	8.3%	13.9%	0.0%	0.0%	20.0%	0.0%	9.5%	8.3%	7.9%
reference	11.8%	8.3%	2.8%	0.0%	4.2%	6.7%	11.1%	4.8%	5.2%	5.5%

Continued

research consultation	0.0%	12.5%	5.6%	0.0%	0.0%	0.0%	0.0%	0.0%	5.2%	3.9%
chat reference	0.0%	4.2%	5.6%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	2.4%
citation software	0.0%	0.0%	2.8%	0.0%	8.3%	0.0%	0.0%	0.0%	3.1%	2.4%
digital media services	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	1.0%	0.8%
<i>Facility/Equipment*</i>										
study space			11.1%	9.1%	37.5%	6.7%	0.0%	9.5%	13.4%	11.8%
computers			19.4%	9.1%	8.3%	6.7%	0.0%	4.8%	10.3%	8.7%
printers			5.6%	9.1%	0.0%	0.0%	0.0%	4.8%	2.1%	2.4%
photocopiers			0.0%	9.1%	8.3%	0.0%	0.0%	4.8%	2.1%	2.4%
workspace in the archives			2.8%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.8%

RM = Research Methods, BW = Baccalaureate Writing, SS=Senior Seminar

\*Data were not collected for sites A and B for this activity

#### 6.2.6.6 Creating a bibliography or documenting my work

This activity is intended to align in part to the ISP's presentation stage, but information use activities in support of this citation task can occur throughout the research and writing process. The learning activities crosswalk links this activity with 3 outcomes from the common set:

- SLO001 Ability to locate secondary sources
- SLO002 Ability to locate primary sources
- SLO014 Ability to follow discipline specific citation standards

Further these outcomes are mapped to numerous elements of the VALUE rubrics and Tuning Learning Outcomes in Table 6.40.

Table 6.40 Expectations for student learning while 'creating a bibliography'

SLO code	SLO expectations and related VALUE rubric elements and Tuning outcomes
SLO001	Ability to locate secondary sources
<i>VALUE elements</i>	- <i>Information Literacy IL-1 Determine the Extent of Information Needed</i> - <i>Information Literacy IL-2 Access the Needed Information</i>
<i>Tuning outcomes</i>	<i>T011 Search for secondary sources</i>
SLO002	Ability to locate primary sources
<i>VALUE elements</i>	- <i>Information Literacy IL-1 Determine the Extent of Information Needed</i> - <i>Inquiry and Analysis IL-2 Access the Needed Information</i>



Continued

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<i>Tuning outcomes</i>	<i>T012</i>	<i>Search for primary sources</i>
		<i>Demonstrate ability to conduct searches for primary sources to be assessed through specifically designed project assignments [written projects]</i>
<i>SLO013</i>		Ability to follow discipline specific citation standards
<i>VALUE elements</i>	<i>- Information Literacy IL-4</i>	<i>Access and Use Information Ethically and Legally</i>
<i>Tuning outcomes</i>	<i>T019</i>	<i>Use genre specific techniques for document preparation</i>

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As depicted in Table 6.29, 70% of respondents in the entire study reported ‘most important’ library uses during this activity. The proportion of respondents claiming most important uses by type are reported in Figures 6.16 and 6.17. Participation rates exceeded 70% at four sites, while rates at sites B and D were 58% and 45% respectively. And only 57% of students enrolled in the Baccalaureate Writing classes reported information and library use during this activity.

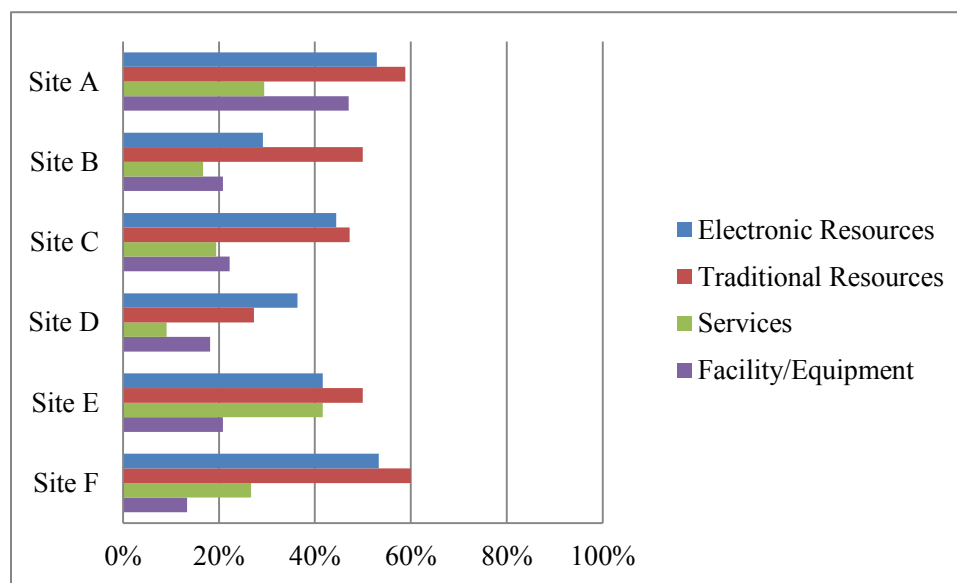


Figure 6.16 ‘Most important’ uses while 'Creating a bibliography' by site

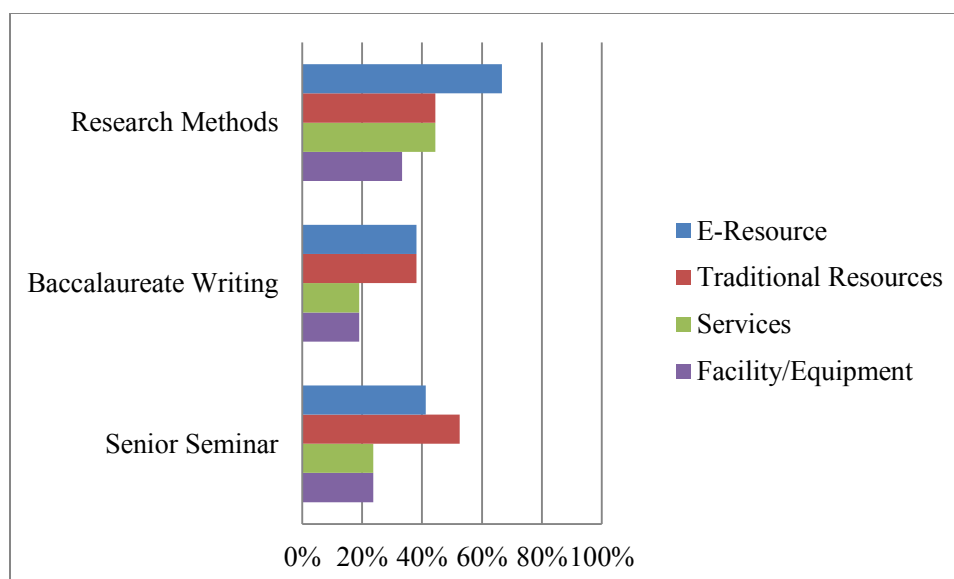


Figure 6.17 'Most important' uses while 'Creating a bibliography' by type of course

Detailed use statistics for this learning activity are provided in Table 6.41. Books remained popular during this activity as 'most important' traditional resources, used by 44.8% of respondents at all sites and course types. 'Top' electronic resources were important to relatively few students during this stage. Citation software emerges as a 'top' service used by a handful of students at sites C, D, and E. The 'citation software' response category was not offered in phase 1, so there are no responses for sites A and B for this type of tool. Few of the students who indicated computers and printers were their top equipment, reported using them during this activity.

Table 6.41 'Most important' library uses when 'creating a bibliography'

	Site A	Site B	Site C	Site D	Site E	Site F	RM	BW	SS	All sites
<i>Electronic Resources</i>										
library catalog	11.8%	4.2%	22.2%	9.1%	8.3%	13.3%	0.0%	9.5%	14.4%	12.6%
indexes or databases	5.9%	12.5%	5.6%	9.1%	20.8%	13.3%	11.1%	9.5%	11.3%	11.0%
electronic primary sources	5.9%	4.2%	11.1%	9.1%	4.2%	13.3%	11.1%	9.5%	7.2%	7.9%
electronic journals	17.7%	8.3%	5.6%	9.1%	0.0%	0.0%	22.2%	4.8%	5.2%	6.3%
research guide	5.9%	0.0%	0.0%	0.0%	0.0%	6.7%	11.1%	0.0%	1.0%	1.6%

*Continued*

internet search engines	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	1.0%	0.8%
non-library web site	5.9%	0.0%	0.0%	0.0%	0.0%	0.0%	11.1%	0.0%	0.0%	0.8%
electronic books	0.0%	0.0%	0.0%	0.0%	0.0%	6.7%	0.0%	4.8%	0.0%	0.8%
journal resolver	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	1.0%	0.8%
<i>Traditional Resources</i>										
books	58.8%	37.5%	41.7%	27.3%	45.8%	60.0%	44.4%	38.1%	46.4%	44.9%
archival materials	0.0%	12.5%	5.6%	0.0%	0.0%	0.0%	0.0%	0.0%	5.2%	3.9%
media	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	1.0%	0.8%
<i>Services</i>										
interlibrary loan	17.7%	4.2%	2.8%	0.0%	16.7%	0.0%	22.2%	0.0%	7.2%	7.1%
citation software	0.0%	0.0%	5.6%	9.1%	20.8%	0.0%	0.0%	4.8%	7.2%	6.3%
library instruction	11.8%	0.0%	5.6%	0.0%	0.0%	13.3%	22.2%	9.5%	2.1%	4.7%
interlibrary loan (consortium)	0.0%	8.3%	5.6%	0.0%	0.0%	13.3%	0.0%	4.8%	5.2%	4.7%
research consultation	0.0%	4.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.8%
reference	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	1.0%	0.8%
<i>Facilities</i>										
study space	5.9%	12.5%	8.3%	0.0%	12.5%	6.7%	0.0%	4.8%	10.3%	8.7%
computers	11.8%	0.0%	13.9%	0.0%	8.3%	0.0%	11.1%	0.0%	8.3%	7.1%
printers	23.5%	8.3%	0.0%	9.1%	0.0%	6.7%	22.2%	9.5%	4.1%	6.3%
photocopiers	0.0%	0.0%	0.0%	9.1%	0.0%	0.0%	0.0%	4.8%	0.0%	0.8%
group study room	5.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.8%

RM = Research Methods, BW = Baccalaureate Writing, SS=Senior Seminar

#### **6.2.6.7 Writing or creating the final product for the assignment**

This activity is intended to align with the ISP's presentation stage. While this stage is presented near the end of the project the activity likely occurs throughout the project during

preparation of proposals, drafts, and then the creation of the final product. The learning activities crosswalk links this activity with 3 outcomes from the common set:

- SLO005 Ability to use secondary sources to place argument in the context of previous scholarship
- SLO009 Ability to advance an argument in support of thesis using evidence from primary sources
- SLO011 Ability to communicate argument in a coherent, well organized paper
- SLO012 Ability to follow discipline specific style standards

Further these outcomes are mapped to numerous elements of the VALUE rubrics and Tuning Learning Outcomes in Table 6.42.

Table 6.42 Expectations for student learning when ‘writing’

SLO code	SLO expectations and related VALUE rubric elements and Tuning outcomes
SLO005	Ability to use secondary sources to place argument in the context of previous
<i>VALUE elements</i>	<i>None</i>
<i>Tuning outcomes</i>	<i>T006 Demonstrate basic historiography</i> <i>T009 Knowledge of historical research methods</i>
SLO009	Ability to advance an argument in support of thesis using evidence from primary sources
<i>VALUE elements</i>	<i>- Critical Thinking C-5 Evidence</i> <i>- Inquiry and Analysis IA-3 Analysis</i> <i>- Written Communication W-3 Sources and Evidence</i>
<i>Tuning outcomes</i>	<i>T010 Find and handle information</i> <i>T013 Evaluate texts and primary sources</i> <i>T018 Use basic interpretation and evaluation methods</i>
SLO011	Ability to communicate argument in a coherent, well organized paper
<i>VALUE elements</i>	<i>- Critical Thinking C-1 Explanation of issues</i> <i>- Inquiry and Analysis IA-4 Conclusion</i> <i>- Written Communication W-4 Control of Syntax and Mechanics</i> <i>- Written Communication W-5 Content Development</i>
<i>Tuning outcomes</i>	<i>T021 Communicate complex historical topic coherently</i>
SLO012	Ability to follow discipline specific style standards
<i>VALUE elements</i>	<i>- Written Communication W-2 Genre and Disciplinary Conventions</i>
<i>Tuning outcomes</i>	<i>T019 Use genre specific techniques for document preparation</i>

As shown in Table 6.29, 89% of respondents reported making use of ‘most important’ resources, services, and facilities during this activity. Participation rates by type of use, site, and type of course are presented in Figures 6.18 and 6.19. A majority of respondents claimed use of

most important traditional resources at sites A (70.6%), B (70.8%), D (63.6%), E (75%), and F (67%) as did students enrolled in all three types of courses. Fifty percent or more respondents at sites A (52.99%), B (58.3%), C (50%), E (54.2%), and F (73.3%) used their ‘most important’ facilities and equipment during this activity as did a majority of students enrolled in Baccalaureate Writing courses (52.4%) and Senior Seminars (53.6%).

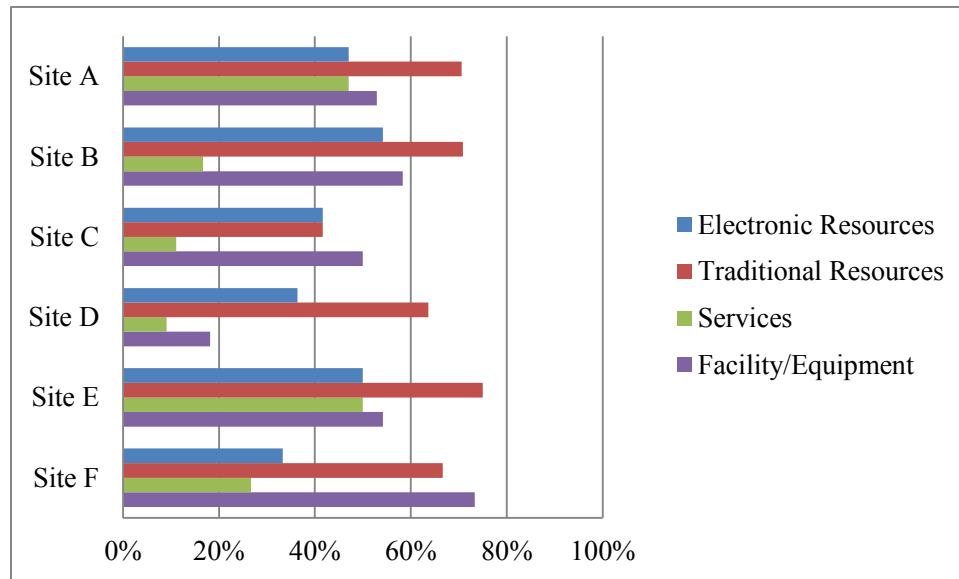


Figure 6.18 ‘Most important’ uses while 'Writing' by site

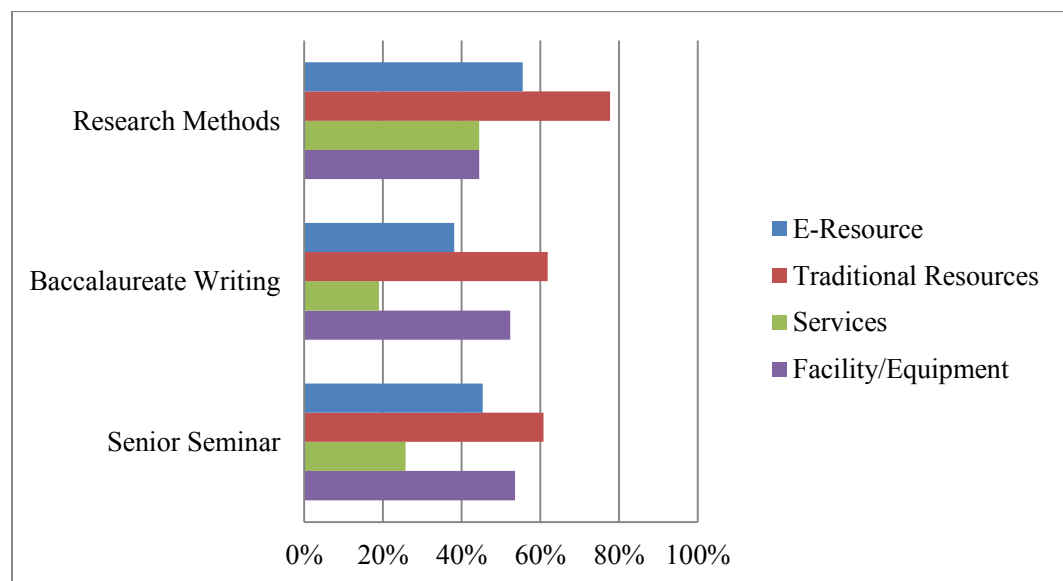


Figure 6.19 ‘Most important’ uses while 'Writing' by type of course

Detailed usage statistics for this activity are reported in Table 6.43. Books again were the most commonly used ‘top’ resources during this activity at all sites and in all course types. Electronic primary sources moved to the top of a crowded list of ‘most important’ e-resources used during this activity. Notably, almost 17% of students at site B used manuscripts or archival resources and almost 21% used digitized primary sources during this stage. Facilities and equipment were heavily used during this activity. Study space was the ‘top’ facility used by 24% of respondents, ranging from 0% at site D to 45% at site B. The small sample size and the make-up of the sample at site D may explain these patterns. Forty-six percent of the respondents at site D were of nontraditional college age and 36% possessed attributes of mildly and moderately nontraditional students. Perhaps their other responsibilities required them to complete their writing elsewhere. At sites A and F, a relatively high proportion of students who claimed printers were their most important equipment, reported using library-provided printers during this activity, while the rate was zero at sites C and E.

Comments from specific students help illustrate how library use supports this activity and related learning objectives. One student wrote that her professor expected her to “How to craft an argument and make a somewhat original claim in the field” (B-09). This sentiment is captured in SLO005: “Ability to use secondary sources to place argument in the context of previous research” which could be assessed using the Tuning outcome T006 “Demonstrate basic Historiography.” Another student from site B noted how writing in the library in close proximity to sources supports achieving this learning outcome: “... I found it helpful to write parts of my thesis in an area of the stacks in [the library] where a number of relevant sources were located ...” (B-16). And clearly students noted the importance of mastering SLO011: “Ability to communicate argument in a coherent, well organized paper,” as noted in these student perceptions of learning expectations for their project:

“... He wanted to take all that we had learned in our college years to write a coherent, well researched paper...” (C-32)

“How to craft an analytic paper based on what primary and secondary sources that we could find based on a topic during the Cold War.” (E-24)

“My professor wanted us to be able to study primary sources in-depth, while using multiple, effective, secondary sources in order to produce a substantial piece of professional historical writing.” (F-05)

While these comments allude to the importance of using primary and secondary sources during the writing process, sometimes students just need quiet space to do their work. Student C-01 used library space when writing and complained about too much noise. Student C-02 expressly did not use any library facilities when ‘writing’ and noted that “The library as whole is becoming over-crowded and even the "quiet" levels are no longer a good place to study.”

Table 6.43 Most important library uses while 'writing'

	Site A	Site B	Site C	Site D	Site E	Site F	RM	BW	SS	All sites
<i>Electronic Resources</i>										
electronic primary sources	5.9%	20.8%	5.6%	18.2%	16.7%	6.7%	0.0%	14.3%	12.4%	11.8%
indexes or databases	5.9%	8.3%	5.6%	9.1%	16.7%	13.3%	11.1%	14.3%	8.3%	9.5%
library catalog	5.9%	8.3%	16.7%	9.1%	4.2%	0.0%	11.1%	4.8%	9.3%	8.7%
electronic journals	17.7%	16.7%	2.8%	0.0%	0.0%	0.0%	11.1%	0.0%	7.2%	6.3%
internet search engines	0.0%	0.0%	2.8%	0.0%	8.3%	0.0%	0.0%	0.0%	3.1%	2.4%
research guide	5.9%	0.0%	0.0%	0.0%	0.0%	6.7%	11.1%	0.0%	1.0%	1.6%
archival finding aids	0.0%	0.0%	5.6%	0.0%	0.0%	0.0%	0.0%	0.0%	2.1%	1.6%
electronic books	0.0%	0.0%	2.8%	0.0%	0.0%	6.7%	0.0%	4.8%	1.0%	1.6%
journal resolver	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	1.0%	0.8%
non-library web site	5.9%	0.0%	0.0%	0.0%	0.0%	0.0%	11.1%	0.0%	0.0%	0.8%
<i>Traditional Resources</i>										
books	70.6%	54.2%	41.7%	45.5%	66.7%	60.0%	77.8%	47.6%	54.6%	55.1%
archival materials	0.0%	16.7%	0.0%	9.1%	0.0%	0.0%	0.0%	4.8%	4.1%	3.9%

*Continued*

media	0.0%	0.0%	0.0%	0.0%	8.3%	0.0%	0.0%	0.0%	2.1%	1.6%
reference books	0.0%	0.0%	0.0%	0.0%	0.0%	6.7%	0.0%	4.8%	0.0%	0.8%
microforms	0.0%	0.0%	0.0%	9.1%	0.0%	0.0%	0.0%	4.8%	0.0%	0.8%
<i>Services</i>										
interlibrary loan	41.2%	4.2%	5.6%	9.1%	37.5%	0.0%	33.3%	4.8%	16.5%	15.8%
interlibrary loan (consortium)	0.0%	8.3%	5.6%	0.0%	0.0%	26.7%	0.0%	14.3%	5.2%	6.3%
citation software	0.0%	0.0%	0.0%	0.0%	8.3%	0.0%	0.0%	0.0%	2.1%	1.6%
research consultation	0.0%	4.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.8%
digital media services	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	1.0%	0.8%
library instruction	5.9%	0.0%	0.0%	0.0%	0.0%	0.0%	11.1%	0.0%	0.0%	0.8%
<i>Facility/Equipment</i>										
study space	11.8%	45.8%	16.7%	0.0%	37.5%	20.0%	11.1%	14.3%	27.8%	24.4%
printers	29.4%	12.5%	0.0%	18.2%	0.0%	33.3%	22.2%	28.6%	7.2%	11.8%
computers	5.9%	0.0%	19.4%	0.0%	4.2%	6.7%	11.1%	4.8%	8.3%	7.9%
group study room	5.9%	0.0%	8.3%	0.0%	4.2%	6.7%	0.0%	0.0%	6.2%	4.7%
workspace in the archives	0.0%	0.0%	2.8%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.8%
media desk	0.0%	0.0%	0.0%	0.0%	0.0%	6.7%	0.0%	4.8%	0.0%	0.8%
digital media lab	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	1.0%	0.8%
photocopiers	0.0%	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%	1.0%	0.8%

RM = Research Methods, BW = Baccalaureate Writing, SS=Senior Seminar

### 6.2.6.8 Preparing for an oral presentation

This activity aligns with Kuhlthau's presentation stage. The learning activities crosswalk links this activity with one outcome from the common set, SLO015, the ability to communicate argument in a coherent oral presentation. The crosswalk maps this ability to the Tuning outcome T021, 'Communicate complex historical topic coherently [oral presentation].'



This activity was added to the protocol in phase 2. Consequently library use participation rates for this activity are only available for sites C through F and students enrolled in the Baccalaureate Writing and Senior Seminar courses (see Figures 6.20 and 6.21). Participation rates for this activity across all sites ranged from 44% at site C to 73% at site F. Participation rates for this activity also seem to be affected by site and pedagogical method as only one respondent from site D reported library use during this stage. This is explained by the fact that neither of the syllabi from the Baccalaureate Writing courses at site D required oral presentations. ‘Top’ resource, service, and facility uses were distributed across a wide range of categories. Details for this activity are presented in Table 6.44. Notably, books remained the ‘most’ commonly selected ‘top’ use during this activity among students at sites C, E, and F.

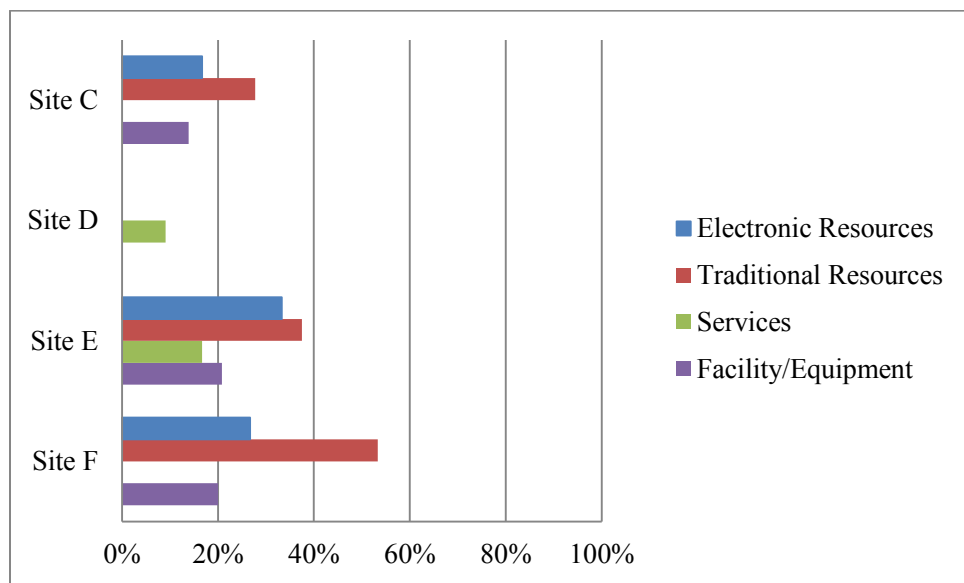


Figure 6.20 ‘Most important’ uses while 'preparing a presentation' by site

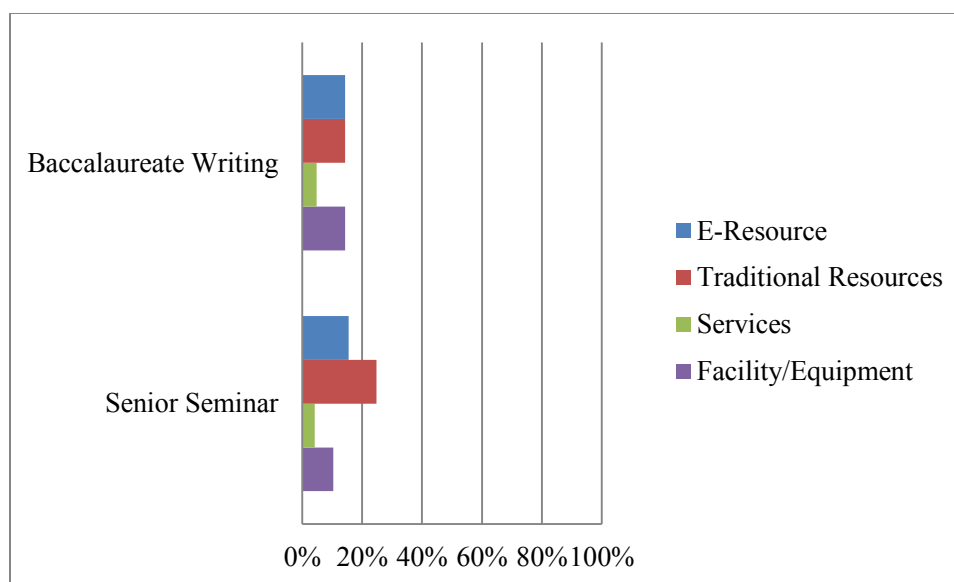


Figure 6.21 'Most important' uses while 'preparing a presentation' by type of course

Student F-03 appreciated the importance of this learning activity and understood the associated learning objectives:

“Although writing a research paper was part of the project, he also had us create presentations and posters based on the same research. Rather than limiting ourselves to a single mode of communication, he wanted to show us how using multiple media can help expand and complement other methods of communicating personal research to a larger audience.” (F-03)

This student must have put a lot of effort into this part of the project, noting that she took advantage of three of her 'most important' library uses during this activity: JSTOR, books, consortium-based interlibrary loan, and the services of the media desk where she used the library-provided poster printer.

Table 6.44 'Most important' library uses while 'preparing for an oral presentation'

	Site C	Site D	Site E	Site F	BW	SS	Sites C-F
<i>Electronic Resources</i>							
indexes or databases	2.8%	0.0%	12.5%	6.7%	4.8%	6.2%	5.8%
electronic primary sources	2.8%	0.0%	4.2%	6.7%	4.8%	3.1%	3.5%
internet search engines	2.8%	0.0%	8.3%	6.7%	4.8%	4.6%	4.6%
online library catalog	5.6%	0.0%	4.2%	0.0%	0.0%	4.6%	3.5%
manuscript collection finding aids	2.8%	0.0%	0.0%	0.0%	0.0%	1.5%	1.2%
research guide	0.0%	0.0%	0.0%	6.7%	0.0%	1.5%	1.2%
journal resolver	0.0%	0.0%	4.2%	0.0%	0.0%	1.5%	1.2%

*Traditional Resources*

books	27.8%	0.0%	33.3%	53.3%	14.3%	35.4%	30.2%
media	0.0%	0.0%	4.2%	0.0%	0.0%	1.5%	1.2%

*Services*

interlibrary loan	0.0%	0.0%	16.7%	0.0%	0.0%	6.2%	4.7%
citation software	0.0%	9.1%	0.0%	0.0%	4.8%	0.0%	1.2%

*Facility/Equipment*

computers in the library	8.3%	0.0%	4.2%	6.7%	4.8%	6.2%	5.8%
study space	2.8%	0.0%	8.3%	0.0%	0.0%	4.6%	3.5%
group study space	2.8%	0.0%	4.2%	0.0%	0.0%	3.1%	2.3%
scanners/photocopiers	0.0%	0.0%	4.2%	0.0%	0.0%	1.5%	1.2%
media desk	0.0%	0.0%	0.0%	6.7%	4.8%	0.0%	1.2%
printers in the library	0.0%	0.0%	0.0%	6.7%	4.8%	0.0%	1.2%

BW = Baccalaureate Writing, SS=Senior Seminar

**6.2.6.9 Discussion**

In sections 6.2.5 and 6.2.6, I linked data from the critical incidents to the framework established in the learning activities crosswalk. I made assertions about the learning outcomes associated with specific learning activities, observe resource, services, and facilities use trends during these activities, and focus on the experiences of specific students to illustrate the crosswalk in action. These results lead to two key findings: 1) support for the validity of the learning activities crosswalk and its components and 2) evidence that the ULI's focus on library use during learning activities can demonstrate credible links between library use and expectations for student learning.

***Support for the learning activities crosswalk***

The proportion of respondents reporting activities during learning activities, provide evidence of their stability. Respondents made use of a diverse range of library-provided services, resources, and facilities during the learning activities associated with their academic work. While the 'most important' uses only accounted for 25% of all library use reported in these critical incidents, participation rates in each learning activity far exceeded the 25% threshold Butterfield et al. (2005) recommend for validity of a category in a CIT study (see Figure 6.4 on page 211).

There is also evidence that the common set of student learning outcomes (SLOs) represent learning expectations associated with respondents' projects. Student perceptions of the learning objectives associated with their projects closely matched the sense and even the terminology used in the common set of learning outcomes, the VALUE rubrics, and the Tuning outcomes.

Logical patterns in student use of the library during specific learning activities support the framework as well. Students were more likely to use their 'most important' resources during the early stages of the project when they are formulating their research questions and theses. Use of 'most important' services, such as interlibrary loan and in-person services, increased as students moved to the stages of gathering evidence to build and defend an argument and writing. Finally use of most important facilities also increased in the later stages of the projects culminating in the writing stage.

### ***Demonstrating credible links to student learning***

The CIT survey asked students to focus on their 'most important' library uses during their projects, with the intent of revealing details about the most memorable aspects of their projects. As noted in the previous paragraphs, analysis of quantitative and qualitative results suggests this has been successful. Furthermore, variations in use of 'most important' resources, services, and facilities throughout the projects provide support the authenticity of the responses. The ULI framework and instruments provide a vehicle, then, for examining library use in relationship to learning activities associated with academic work and learning outcomes defined and assessed by teaching faculty.

There are two important implications of these findings. First, the ULI framework provides a foundation for examining library impact on *student performance* as assessed by faculty. This point is explored further in the discussion of future work in section 8.4. Second, the ULI instruments generate authentic data to support advocacy and improvement efforts. Isolating library use to specific learning activities such as 'choosing a topic' or 'gathering evidence' allows

faculty and librarians to design curricular or service interventions to help students when they most need it. I illustrate these capabilities with a few examples here and elaborate on this point in section 6.2.7, 6.2.8, and 8.4

At site B, eighty three percent of respondents reported using their ‘most important’ library services when ‘gathering evidence’ and over 40% used their most important facilities during this activity. At site F, over 60% of respondents used their ‘most important’ electronic resources and over 60% used their ‘most important’ traditional resources during this activity. This is a time when these students practiced a number of abilities related to locating information sources and using evidence to support their argument. These are abilities that teaching faculty expect students to demonstrate in their papers and project. The crosswalk demonstrates that faculty can use several elements of the VALUE rubrics to assess this work. Student competencies in these areas can also be communicated using several Tuning outcomes. In other words, the ULI framework provides a clear method of expressing the impact of these ‘most important’ library services and electronic resources on student learning outcomes defined and assessed by teaching faculty. Qualitative data presented in sections 6.2.6.1 through 6.2.6.8 provide other evidence which explain how these services were used and hint at areas where students have problems. Sites could use these findings to make decisions and allocate resources. Site E, recognizing students need help selecting tools for gathering evidence may alter their library instruction program. Collection managers at site F, recognizing students need more primary sources, may collaborate with faculty to coordinate acquisitions to match curriculum needs and acquire more electronic primary resources which are increasingly popular with these students.

At site A, seventy percent of respondents reported using their most important traditional library resource, books, and during the activity of ‘writing.’ At sites B and C, 46% and 30% of students used their most important library facility, study space, when writing. During this activity these students practiced several abilities related to seven Tuning outcomes for history and 3

VALUE rubrics. Student comments about these resources and facilities provide suggestions for making decisions. Site C, whose students complained about noise, have evidence to take action. For instance, managers at site B, whose students valued space near print resources, may think twice about removing study space in the stacks.

The next two sections of the dissertation evaluate other portions of the instrument and demonstrate how data collected in the critical incidents can be used for advocacy and improvement purposes.

### **6.2.7 Factors of use associated with ‘most important’ uses**

Students next reported on helpful or problematic aspects (factors of use) associated with their most important electronic resources, traditional sources, services, and facilities/equipment. The response categories to these partially open questions were developed and refined in qualitative studies (Rodriguez, 2006, 2007) and augmented with items from other studies (Kuhlthau, 2004; Saracevic & Kantor, 1997a,b). The fifty-four factors of use were then categorized by theme by the researcher and one additional coder. Nominal k-alpha was 0.4489 with a 95% confidence interval of 0.09 to 0.8913 over 103 coding units and 90.4% agreement between coders.

For instance, five factors were classified using the theme ‘help finding information’:

- I learned about information sources for my project (help)
- I learned new skills (help)
- helped me when I got stuck (help)
- the assistance I received wasn't helpful (problem)
- it was difficult to find someone to help me (problem)

Eight themes were created:

- Access to information
- Access to tools
- Affect of staff
- Anxiety
- Availability of space
- Convenience

- Ease of use
- Help finding information

One new theme ‘Issue with assignment’ was created after analysis of user-entered factors. A complete listing of response categories mapped to themes is reported in appendix H.

#### 6.2.7.1 Participation rates and strength of theme

A simple count of the frequency with which students contributed feedback to this portion of the survey can be compared across the cohorts. One-hundred-twenty six out of the 127 respondents provided factors of use. One student at site C did not provide any factors. As seen in Table 6.45, the average number of helps per respondent ranged from 11.27 (site D) to 16.12 (site A) and the average number of problems reported by respondent ranged from 3.83 (site E) to 4.82 (site D). One-way ANOVA revealed no statistically significant differences in the number of helps and problems reported by respondents across sites.

Table 6.45 Helps and problems reported by respondents

Site	N		M	SD	Minimum	Maximum
A	17	Help	16.12	4.08	9	23
	17	Problem	4.24	2.05	1	8
B	24	Help	12.25	5.10	5	20
	24	Problem	4.63	1.84	2	10
C	35	Help	11.60	5.73	2	26
	35	Problem	4.34	2.40	0	11
D	11	Help	11.27	5.27	6	23
	11	Problem	4.82	1.54	2	7
E	24	Help	13.33	5.95	4	28
	24	Problem	3.83	1.37	1	6
F	15	Help	12.07	4.35	3	19
	15	Problem	3.93	1.58	1	7

One-hundred-twenty-six respondents identified 2,138 factors related to ‘most important’ library uses, 75% of which were ‘helpful’. The most prominent theme was ‘access to information,’ which included responses such as ‘provided the best information for my project’

and ‘it was difficult to find’ mentioned by 126 respondents. Participation rates by theme are presented in Figure 6.22. Virtually all respondents (99.2%) reported helps in this theme, while 61.4% of respondents reported problems in this area. Convenience and ease of use were themes associated with factors selected by over 85% of the respondents. Almost 75% of students mentioned helpful factors related to the availability of space in their responses and 35% reported problems in this area. Over 58% mentioned factors related to help finding information while 40% selected helpful factors related to the theme affect of staff.

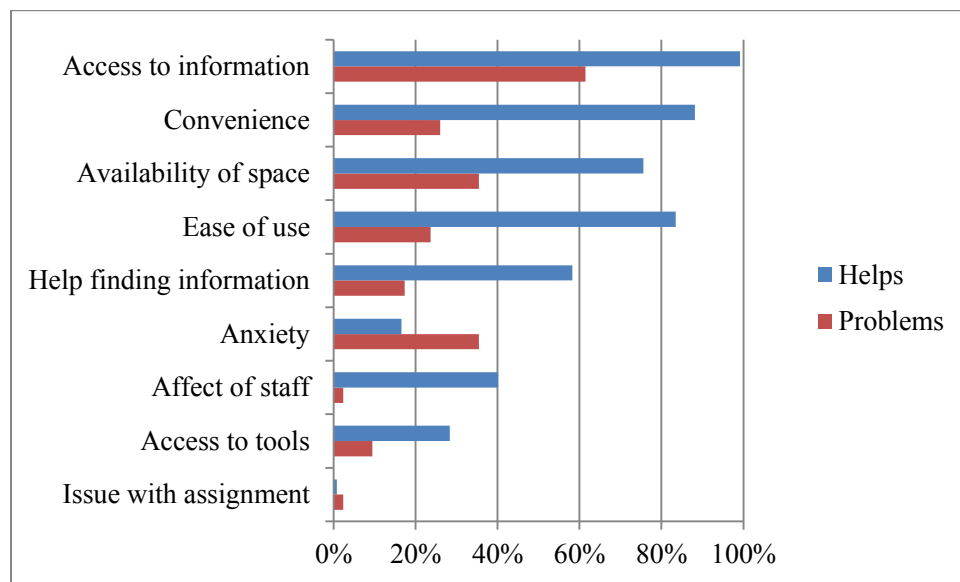


Figure 6.22 Participation rates in factors of use by theme

Participation rates can also be viewed by site as depicted in Table 6.46 and 6.47. Helps and problems for six of nine themes were expressed by respondents at all six sites (access to information, access to tools, anxiety, availability of space, convenience, and help finding information). Helps related to affect of staff were reported by respondents at all six sites, but respondents at four out of six sites reported no problems related to affect of staff in regard to their most important service. Helps related to ease of use were expressed by all six sites and problems related to this theme were reported by respondents at 5 out of 6 sites. ‘Issues with assignments’ were expressed by 3.2% of respondents by checking other and writing in new content.



Table 6.46 Themes expressed by respondents by site

Theme	Site A		Site B		Site C		Site D		Site E		Site F	
	H	P	H	P	H	P	H	P	H	P	H	P
Access to information	x	x	x	x	x	x	x	x	x	x	x	x
Access to tools	x	x	x	x	x	x	x	x	x	x	x	x
Affect of staff	x		x		x		x		x	x	x	x
Anxiety	x	x	x	x	x	x	x	x	x	x	x	x
Availability of space	x	x	x	x	x	x	x	x	x	x	x	x
Convenience	x	x	x	x	x	x	x	x	x	x	x	x
Ease of use	x	x	x	x	x	x	x		x	x	x	x
Help finding information	x	x	x	x	x	x	x	x	x	x	x	x
Issues with assignment			x	x						x		x

H = Helps, P = Problems

Participation rates for each theme were computed by determining the proportion of participants who cited factors classified in specific themes (see tables 6.47, 6.48, and 6.49). A rate of 25% has been proposed as a threshold for determining the validity of categories in Critical Incident Technique studies (Butterfield, et al. 2005). Those themes with participation rates in excess of 25% are set in bold type face in table 6.49. Detailed participation rates for each factor are provided in appendix I.

Table 6.47 Participation rates for factors of use, by theme, sites A, B, and C

	Site A		Site B		Site C	
	H	P	H	P	H	P
Access to information	100.0%	52.9%	100.0%	66.7%	97.2%	61.1%
Access to tools	47.1%	5.9%	8.3%	4.2%	30.6%	2.8%
Affect of staff	76.5%	0.0%	41.7%	4.2%	36.1%	5.6%
Anxiety	17.7%	35.3%	16.7%	33.3%	16.7%	41.7%
Availability of space	88.2%	35.3%	79.2%	37.5%	66.7%	52.8%
Convenience	100.0%	29.4%	79.2%	50.0%	88.9%	19.4%
Ease of use	94.1%	29.4%	70.8%	41.7%	77.8%	16.7%
Help finding information	70.6%	35.3%	66.7%	25.0%	61.1%	8.3%
Issue with assignment	0.0%	0.0%	0.0%	4.2%	0.0%	2.8%

Table 6.48 Participation rates for factors of use, by theme, sites D, E, and F

	Site D		Site E		Site F	
	H	P	H	P	H	P
Access to information	100.0%	72.7%	100.0%	50.0%	100.0%	73.3%
Access to tools	18.2%	45.5%	33.3%	4.2%	33.3%	20.0%
Affect of staff	18.2%	0.0%	20.8%	0.0%	53.3%	0.0%
Anxiety	18.2%	54.6%	16.7%	25.0%	13.3%	26.7%
Availability of space	81.8%	9.1%	79.2%	25.0%	66.7%	26.7%
Convenience	81.8%	18.2%	87.5%	12.5%	93.3%	26.7%
Ease of use	72.7%	45.5%	95.8%	16.7%	93.3%	0.0%
Help finding information	36.4%	18.2%	45.8%	12.5%	60.0%	13.3%
Issue with assignment	9.1%	9.1%	0.0%	0.0%	0.0%	0.0%

Table 6.49 Participation rate for factors of use, by type of course and all respondents

	Research Methods		Baccalaureate Writing		Senior Seminar		All respondents	
	H	P	H	P	H	P	H	P
Access to information	100.0%	55.6%	100.0%	71.4%	99.0%	59.8%	<b>99.2%</b>	<b>61.4%</b>
Access to tools	55.6%	11.1%	33.3%	33.3%	24.7%	4.1%	<b>28.4%</b>	9.5%
Affect of staff	100.0%	0.0%	33.3%	0.0%	36.1%	3.1%	<b>40.2%</b>	2.4%
Anxiety	33.3%	33.3%	14.3%	42.9%	15.5%	34.0%	16.5%	<b>35.4%</b>
Availability of space	77.8%	33.3%	76.2%	19.1%	75.3%	39.2%	<b>75.6%</b>	<b>35.4%</b>
Convenience	100.0%	33.3%	85.7%	19.1%	87.6%	26.8%	<b>88.2%</b>	<b>26.0%</b>
Ease of use	100.0%	33.3%	81.0%	23.8%	82.5%	22.7%	<b>83.5%</b>	<b>23.6%</b>
Help finding information	77.8%	33.3%	52.4%	14.3%	57.7%	16.5%	<b>58.3%</b>	17.3%
Issue with assignment	0.0%	0.0%	4.8%	4.8%	0.0%	2.1%	0.8%	2.4%

\*Themes in boldface type exceed the 25% threshold for validity suggested by Butterfield, et al., 2005

#### 6.2.7.2 Theme saturation

An exhaustiveness check was conducted to determine the point at which new content categories “stop emerging” from the data (Andersson & Nilsson, 1964; Butterfield, et al. 2005, p. 487). Matrices with categories on the y axis and respondent ids on the x-axis were created for each cohort to assess exhaustiveness as demonstrated in Table 6.50 for site A. Response ids were

assigned chronologically in the order in which completed responses were received. Each column indicates the frequency with which each respondent mentioned factors which were classified by themes in the y-axis. Respondent #1 for instance, referenced 5 factors of use classified as ‘access to information.’ A zero in a cell indicates the respondent did not mention any factors related to that theme. Saturation statistics are computed by determining how quickly the themes were expressed as a proportion of responses analyzed. For instance, in Table 6.50, five of eight themes expressed by respondents at site A were expressed by the first respondent. An additional 25% of themes were expressed in responses from the next respondent.

Table 6.50 Saturation table for Site A, 'help' factors, by theme

Theme	Response ids																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Access to information	5	5	4	4	3	7	7	5	7	6	8	6	7	6	6	6	8
Access to tools	1	0	0	0	0	1	1	1	1	0	1	0	0	1	1	0	0
Affect of staff	0	1	1	1	1	1	1	1	1	0	1	0	1	1	0	1	1
Anxiety	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0
Availability of space	1	1	1	2	2	1	1	0	2	2	1	1	2	0	2	1	3
Convenience	1	5	4	2	3	7	4	6	5	4	4	4	1	4	3	3	7
Ease of use	1	2	2	3	2	3	3	2	2	2	3	1	0	3	1	2	2
Help finding information	0	2	0	3	3	3	2	3	2	0	0	1	1	3	1	0	2
Issues with assignment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

#### Saturation statistics

Proportion of themes expressed by respondents at this site (89%)

50% of 8 themes were expressed by the first 1 respondent

75% of 8 themes were expressed by the first 2 respondents

95% of 8 themes were expressed by the first 6 respondents

Saturation statistics from all six sites are summarized in Table 6.51. Seventy five percent of helpful factors were expressed by the first 20% or fewer respondents at all six sites and 75% of problematic factors were expressed by the first 35% or fewer respondents at 5 of the 6 sites. This

steep increase in the number of themes noted among the responses across all six sites followed by a leveling off indicates the themes are expressed thoroughly both within and between sites.

Table 6.51 Proportion of responses required to reach theme saturation

		Proportion of factors expressed		
		50%	75%	95%
Site A	Helps	5.9%	11.8%	35.3%
	Problems	17.7%	35.3%	70.6%
Site B	Helps	4.2%	4.2%	20.8%
	Problems	8.3%	66.7%	79.2%
Site C	Helps	2.9%	2.9%	2.9%
	Problems	2.9%	29.4%	67.7%
Site D	Helps	9.1%	18.2%	90.9%
	Problems	27.3%	27.3%	63.6%
Site E	Helps	4.2%	12.5%	16.7%
	Problems	20.8%	29.2%	50.0%
Site F	Helps	13.3%	13.3%	46.7%
	Problems	33.3%	33.3%	73.3%

### 6.2.7.3 Themes and their factors

This section of the paper discusses the factors and library use types associated with each theme. As depicted in Table 6.52, the most prominent themes by proportion of all factors were ‘Access to information’ (35.03%), ‘Convenience’ (19.83%), ‘Ease of use’ (11.23%), ‘Availability of space’ (10.34%), and ‘Help finding information’ (6.83%). Factors related to ‘Anxiety’, ‘Affect of staff’, and ‘Access to tools’ were least prominent. Participants contributed 42 new factors of use (1.92%) by checking ‘other’ and writing in their own factors. Thirty three of the user-contributed factors were ‘problems’ such as ‘I got yelled at for ILL requesting items the library owned and stored offsite’ or ‘the printer was slow.’ Each of the themes and their factors are discussed here.

Table 6.52 Factors of use, by theme and type

Theme	Help	Problem	Total	% of all factors
Access to information	622	127	749	35.03%
Convenience	384	40	424	19.83%
Ease of use	205	35	240	11.23%
Availability of space	156	65	221	10.34%
No Factor	0	168	168	7.86%
Help finding information	123	23	146	6.83%
Anxiety	21	60	81	3.79%
Affect of staff	51	3	54	2.53%
Access to tools	36	14	50	2.34%
Issue with assignment	1	3	4	0.19%
Total	1599	538	2137	

***Access to information***

Seven ‘help’ factors and three ‘problem’ factors constitute this theme which predominantly related to resource use of some kind as depicted in Table 6.53. Several factors spoke directly to the benefit of providing ‘needed,’ ‘best,’ and ‘most current’ information as well as information that could be found ‘nowhere else.’ Another factor spoke to the notion that a resource could lead to other relevant sources. Problematic factors included finding too little or too much information or difficulties finding the resource to begin with.

Table 6.53 Factors associated with theme 'Access to information'

Factors	E	T	S	F
it led me to other relevant resources (Help)	X	X		
it provided information I couldn't find elsewhere (Help)	X	X		
it provided information I needed for my topic (Help)			X	
it provided information that was more current than information I found in other resources (Help)	X	X		
it provided the best information for my project (Help)	X	X		
the computers allowed me to access needed information (Help)				X
I found too little information on my topic (Problem)	X	X		
I found too much information on my topic (Problem)	X	X		
it was difficult to find (buried on the website/not on shelf, etc.) (Problem)	X	X		

E=Electronic Resources, T=Traditional Resources, S=Services, F=Facility/Equipment

Factors associated with this theme were most often referenced in relation to ‘most important’ traditional or electronic resources as noted in Table 6.53. Ninety-nine students

reported books, an example of a traditional resource, were their most important resources. Of these students 61% said books led them to relevant sources, 76.8 % said books provided the best information for their project, and 56% said books provided information not found elsewhere. On the other hand 22.2% reported finding too much information in books and 18.2% reported difficulties finding books, one of the problems associated with this theme. Twelve out of 127 respondents in the entire study (9.4%) claimed archival materials were their most important traditional resources. Ten of these 12 students claimed archives provided information not found elsewhere, eight claimed archives provided the 'best information for my project,' and five claimed archives led them to relevant sources. Four reported that archival materials were difficult to find and three reported finding too much information, two of the problems associated with this theme.

This theme was observed among respondents who chose the library catalog (35 respondents), indexes and databases (27), electronic primary sources (25), and electronic journals (17) as their most important electronic resources (see Table 6.54). The top factor, 'it led me to other relevant resources', was chosen by 63% (for the library catalog), 74% (for electronic indexes), 36% (for electronic primary sources), and 70.6% (for electronic journals) of these respondents. Over 70% of respondents who chose electronic indexes and electronic primary sources as their 'most important' e-resources reported these tools provided information not found elsewhere, one of the helps associated with this theme. Twenty-eight percent of users claiming electronic primary resources as their top choice (7 out of 25) reported finding too much information in this resource, one of the problems in this theme.

Table 6.54 Most prevalent 'Access to information' factors for electronic resources

Factor	Electronic resource			
	Electronic journals (n=17)	Electronic Primary sources (n=25)	Indexes or databases (n=25)	Library catalog (n=35)
it led me to other relevant resources	70.6%	36.0%	74.1%	62.9%
it provided information I couldn't find anywhere else	47.1%	72.0%	70.4%	40.0%
it provided information that was more current than information I found in other resources	17.6%	32.0%	33.3%	34.3%
it provided the best information for my project	35.3%	44.0%	55.6%	42.9%
I found too much information on my topic in this resource	5.9%	28.0%	11.0%	25.7%

This theme was also observed among users who selected interlibrary loan (39), consortium-based interlibrary loan (15), reference (14) and instruction (16) as their most important services. Over 90% of both 'ILL cohorts' claimed that this service 'provided information needed for my project.' Fifty percent and 27% of the reference and instruction groups, respectively, claimed the same benefit. The theme 'the computers allowed me to access needed information' was noted by 55 (43%) of 127 of the respondents regarding their use of study space, computers, and printers.

A subset of students checked 'other' and contributed ten factors that were classified using this theme. One was a help related to a most important use of archival resources, 'provided primary source material,' and another was a help related to indexes and databases, 'provided access to peer-reviewed articles.' Each problematic 'other' factor is listed below. The 'most important' use associated with each factor is noted in parentheses.

- not enough up to date articles on my topic (library catalog)
- occasional server problems (library catalog)
- Sometimes the pages loaded very slowly and the computers booted up very slowly. (computers)
- When it directed me to online resources such as a PDF of a scholarly article, the links were dead ends and I could not gain access to the journal article which was very frustrating (Summon)
- the books I used could not be taken out of the library (study space)
- I needed the books for longer than I could have them (interlibrary loan)

- the collections of the fourth floor of the library closes relatively early (archival materials)
- It was a translated document (books)

### **Recommended modifications**

Participant checks revealed that the response category ‘provided information I needed for my project’ may have been too general. For instance, interviewees specifically mentioned valuing electronic resources because they provided access to full-text of a document online or information needed in a specific language. As depicted above, students entered statements regarding library policies restricting access to space which then limited their access to materials or information. New categories tapping this subtheme may be warranted in future versions of the protocol. Finally, problems with broken links were frequently reported problems that limited access to information.

### ***Access to tools***

This theme included three factors related to ‘most important’ facilities and equipment as listed in Table 6.55. One-hundred-one students selected the helpful factor, ‘computers provided access to productivity software,’ five students reported ‘problems with computers,’ and 3 students reported problems with A/V equipment.

Table 6.55 Factors associated with theme 'Access to tools'

Factors	E	T	S	F
the computers provided access to productivity software (Help)				X
I had computer problems (Problem)				X
I had problems with the equipment (audio-visual, photocopier, etc.)				X
E=Electronic Resources, T=Traditional Resources, S=Services, F=Facility/Equipment				

Eleven respondents checked ‘other’ and entered new factors. Four of these responses were helps:

- I was able to print a 2'x3' poster there (media desk)
- It did them for me I didn't have to research them. (citation software)
- It organized my resources making it easier to write. (citation software)
- I don't have a printer (printers)

And six were problems:



- stapler on the first floor never worked (printers)
- The computer lab computers are incredibly slow (printers)
- the keywords were a little tricky (printers)
- The printer was slow (printers)
- it does not function with some of the places I got sources, i.e. Factiva (citation software)

### **Recommended modifications**

Students had no difficulties elaborating on problems encountered with computers using the ‘other’ category. Adding the option to enter more details after selecting the ‘I had computer problems’ category may help students elaborate on this issue. In some cases, as found in the open responses and in the participant checks, institutions may want to include possible benefits associated with copy centers or digital production facilities such as ‘allowed me to print out a poster’ or ‘helped me prepare a video.’ Benefits and problems with citation software were mentioned by a handful of respondents. Additional categories specific to benefits or problems associated with these applications may be considered.

### ***Affect of staff***

This theme includes factors related to the approachability of library staff as depicted in Table 6.56 and were presented to respondents after selecting their ‘most important’ services.

Table 6.56 Factors associated with the theme ‘Affect of Staff’

<i>Factors</i>	<i>E</i>	<i>T</i>	<i>S</i>	<i>F</i>
Library staff were approachable (Help)			X	
Library staff members were not approachable (Problem)			X	

E=Electronic Resources, T=Traditional Resources, S=Services, F=Facility/Equipment

Forty percent of all respondents at the six sites noted factors in this theme. Participation at the sites varied significantly from 18.2% at site D to 76% at site A, correlating with levels of use of in-person services at each site. Fourteen of seventeen respondents who claimed reference or chat reference was their most important service selected the factor ‘staff were approachable.’ Five out of seven students who named research consultations as their most important service

selected this factor as well. Fifty-four respondents (42.5%) named interlibrary loan or consortium based document delivery services as their top service. Fifteen of these respondents selected the factor 'staff were approachable.' No respondents chose the option 'staff were not approachable.' However, two students checked other and added responses. One student added a factor of her own noting about interlibrary loan: 'I got yelled at for requesting ILL material that the library owned and stored offsite, which wasn't apparent from the online catalog.' Another student noted that 'an employee was being overly loud and I had to move.'

### **Recommended modifications**

While the 'library staff were approachable' category was somewhat successful in gathering useful data, its opposite seems under-utilized by respondents. More specific choices regarding librarian's affect and effort librarians exerted in reference interactions may increase participation in this category. Examples include:

- The librarian did/did not go out of his/her way to help me
- Library staff were polite/rude
- Library staff referred me to someone who could help me

### ***Anxiety***

Participation rates for this theme ranged between 46.7% at site F to 100% at site D. Two factors made up this theme: 'I was overwhelmed' and 'it helped me overcome my fear of doing research'. The factor 'I was overwhelmed' when working with resources was selected as a problem by 60 respondents related to the use of traditional and electronic resources (see Table 6.57). Notably 10 of 25 respondents selected this factor in regard to 'electronic primary resources' and 23 of 99 respondents noted being overwhelmed when using 'books'. Twenty one respondents noted that services such as reference, interlibrary loan, and research consultations helped them 'overcome their fear of research.' Almost half of these responses were related to the use of interlibrary loan.

Table 6.57 Factors associated with the theme ‘Anxiety’

Factors	E	T	S	F
it helped me overcome my fear of doing research (Help)			X	
I was overwhelmed (Problem)	X	X		

E=Electronic Resources, T=Traditional Resources, S=Services, F=Facility/Equipment

### Recommended modifications

The lack of specificity in these statements may have limited response rates for these factors. A new question asking about increases in confidence, as opposed to overcoming fear may be a useful addition. An additional response category relating the notion of familiarity with the research process and a relative increase in confidence may collect data about this point. Finally, a third factor may be added to inquire about how a service, resource, or facility helped a student become more independent.

### *Availability of space*

As shown in Table 6.58, this theme included several factors related to the use of library space and equipment for studying or getting project work done.

Table 6.58 Factors associated with the theme ‘Availability of space’

Factors	E	T	S	F
it provided a quiet place to study/research (Help)				X
it provided space and equipment to watch videos or listen to audio for this project (Help)				X
it provided space for collaborating with project partners (Help)				X
the facility or equipment was available at times that were convenient for me (Help)				X
I had a hard time finding an available study room (Problem)				X
I had trouble finding space to work (Problem)				X
the facility wasn't available at a time that was convenient for me (Problem)				X
there was too much noise (Problem)				X

E=Electronic Resources, T=Traditional Resources, S=Services, F=Facility/Equipment

The participation rates for this theme were particularly strong at all six sites. The most common factor was ‘provided a quiet place to study/research.’ Forty students selected ‘study space’ as their most important facility/equipment and 34 (85%) of them chose this factor. All six

students who chose a group study room as their most important facility selected this factor as well. Fourteen of 22 and 9 of 28 students who chose computers and printers, respectively, as their top facility also selected this category. These responses suggest that students were reflecting on a range of experiences in the library when answering the help and problem questions regarding facilities/equipment. That is, the printer may have been the most important equipment for a student, but using the printer was not the sole reason for a visit or series of visits. This suggests that we should not interpret these findings too literally. If we ignore specific use types and examine the proportion of students selecting factors we find that 51% of respondents appreciated a quiet place to study while 21% had problems finding space to work and 11% reported problems with noise. Thirteen percent used space for collaborating with partners and 7% had a hard time finding space to accomplish this task.

### **Recommended modifications**

Several modifications should be made in this category. First, the notion of studying or working alone and studying or working with a group should be clearly differentiated. Libraries may also want to add categories for auxiliary space such as ‘offered me a place to store my belongings while I worked.’ Aspects of workspace such as lighting, network connections, and electrical outlets are also important to students as mentioned in participant interviews. Finally, library space is used for multiple purposes. Future iterations of the protocol could offer response categories such as:

- My workspace was close to information resources I needed for my project
- My workspace was close to computers I needed for my project
- My workspace was close to in-person services that helped me with my project

### ***Convenience***

The convenience theme encompasses factors related to savings or costs in time and money due to the use of resources, services, and facilities as noted in Table 6.59.

Table 6.59 Factors associated with the theme 'Convenience'

Factors	E	T	S	F
it saved me money (Help)	X	X		
it saved me time (Help)	X	X	X	
it was convenient (Help)	X	X		X
it was inconvenient for me to use this resource (Problem)	X	X		
the service took too long (Problem)			X	

E=Electronic Resources, T=Traditional Resources, S=Services, F=Facility/Equipment

Convenience was the second most prominent theme mentioned by students in this study, making up almost 20% of the factors contributed by students. Participation rates by site ranged from 12.5% for problems at site E to 100% for helps at site A. Sixty five per cent of students noted electronic resources were convenient, 64% noted they saved time, and 33% said that they saved money. Among the 25 students who selected electronic primary sources as their top e-resource, 18 said the source was convenient, 10 noted financial savings, and 15 noted time savings. Comparable ratings were provided by the 27 students who chose electronic indexes and databases as their top electronic resource. Among the 99 students who named books as their most important traditional resource, 23% cited monetary savings, 28% saved time, and 52.5% said the resource was convenient. Nine however, said it was inconvenient to use books.

Time savings were also important for library services. Sixteen students chose library instruction as their top service and 12 (75%) of these students noted time savings. Similarly, of the 24 students who named reference (including chat) or research consultations as their most important services, 14 named time savings as a result of using the service, while 1 student said a research consultation took too long. Fifty four students named interlibrary loan services, including consortium-based ILL, as their most important services. Twenty three (42.5%) of these respondents named time savings and 10 (18%) said the service took too long.

Ten respondents checked other and entered new factors. Respondents contributed two helpful factors categorized using this theme:

- I was able to take sources home that I wouldn't have without copying (photocopiers)

- it was the only place I could use those resources (workspace in the archives)

Respondents contributed 8 problematic factors that were categorized using this theme:

- waiting for sources that our library didn't have (journal resolver)
- I wish the library opened earlier and stayed open later on the weekends (group study room)
- until I found a friend with a locker, I had to carry over 50 lbs of books with me when I was going to work (study space)
- I needed the book for a long time and it was difficult to renew after it was overdue. Well it was impossible. (interlibrary loan)
- The loaning period was too short at some periods (interlibrary loan)
- I couldn't renew my books more than once (interlibrary loan (consortium))
- cost factors for trip to Yale University (archival materials)
- It was in Boston (archival materials)

### Recommended modifications

Challenges with library policies that cause frustration constitute a sub-theme running through the open responses and may merit an additional category. The comment 'it was the only place I could use those resources (workspace in the archives)' could get at the point that students value space in close proximity to materials needed. The student may also have been stating a problem, in that the materials were only available for use in this space. This reinforces the need to add new categories specific to the use of library space to tease out these differences.

### *Ease of use*

Four factors related to electronic and traditional resource use make up this category: 'it was easy / difficult to use' and 'its search functions were/were not easy to use' as depicted in Table 6.60.

Table 6.60 Factors associated with the theme 'Ease of use'

Factors	E	T	S	F
the resource was easy to use (Help)	X	X		
it was difficult to use (Problem)	X	X		
its search functions were easy to use (Help)	X			
its search functions were difficult to use (Problem)	X			
E=Electronic Resources, T=Traditional Resources, S=Services, F=Facility/Equipment				

Over 11% of the factors selected by respondents were classified using this category. Fifty four percent and 56% of respondents selected the ‘easy to use’ category with regard to electronic and traditional resources respectively. Sixty four of the 99 (64.7%) respondents who declared books their most important traditional resources selected this factor. High percentages of respondents choosing indexes and databases (70.4%), electronic primary sources (44%), and the library catalog (54%) also selected this factor. Fourteen percent of the 125 respondents who identified ‘most important’ electronic resources cited difficulties with search interfaces. Twenty percent of those who claimed the library catalog and electronic primary sources as most important e-resources had problems with these search interfaces.

Respondents who checked ‘other’ contributed five problems:

- It was frustrating to use the online search engines as not all journal articles are accessible, but they still come up in the search fields (electronic journals)
- hard to navigate (electronic primary sources)
- reading sources on a computer screen can be tiring on the eyes (electronic primary sources)
- It often took a little bit of searching through to find relevant information, but other than that, it was fine. (indexes or databases)
- hard to read articles (research guide)

### **Recommended modifications**

These response categories could be supplemented in several ways. Site and resource navigation was problematic for some students as seen in the ‘other’ responses above and mentioned in participant check interviews. Links to full-text materials are not only appreciated but expected by students, and hyperlinks that are broken or are ‘false advertisements’ for full-text materials disappoint students. Each of these aspects can be construed as sub-categories of the ‘easy/difficult to use’ categories.

### ***Help finding information***

Factors in this category were related to respondent interactions with library services including in-person services such as reference, library instruction, research consultations, and chat as well as interlibrary loan.

Table 6.61 Factors associated with the theme 'Help finding information'

Factors	E	T	S	F
helped me when I got stuck (Help)			X	
I learned about information sources for my project (Help)			X	
I learned new skills (Help)			X	
it was difficult to find someone to help me (Problem)			X	
the assistance I received wasn't helpful (Problem)			X	

E=Electronic Resources, T=Traditional Resources, S=Services, F=Facility/Equipment

Three sub-themes merit discussion: generic helping activities including problems with unhelpful assistance and difficulties in finding someone to help, learning about new information sources, and learning new skills. Thirty three respondents reported a service ‘helped me when I got stuck,’ referring to reference services, library instruction, interlibrary loan, and research consultations. Notably 56% of the 16 students claiming library instruction as their most important service selected this factor, as did 43% of those selecting reference as their most important service.

Forty six percent of all respondents reported ‘learning about information sources for my project’ from library services including 93.4% of these students who claimed library instruction was their top ranked service, 71.4% (10 of 14) who named reference as their most important service, and six out of seven respondents who named research consultations as their most important service. Forty-one percent of those (16 of 39) who named ILL their most important service said it helped them learn new skills. It is unclear if these students truly felt they learned new skills from ILL or if this was in response to other in-person services used. Sixty nine percent and 57% of respondents reported that library instruction and research consultations, respectively, helped them ‘learn new skills’. Problems were not common in this category as 2 students reported difficulties finding someone to help and 3 reported the assistance they received was not helpful. One respondent offered a factor classified using this theme: “The librarian I chatted with didn't specialize in the subject I needed, but she provided me with a helpful database nonetheless (site B).”



### ***Recommended modifications***

A new factor recorded in the resource usage blocks was added to this theme. “I had to ask for help” appears in the problem block for traditional and electronic resources. While it may be a problem that a student had to ask for help, it demonstrates evidence that library services were helpful in resolving this issue. In nine cases respondents selected this factor related to traditional and electronic resources.

### ***Issue with assignment and personal***

Four write-in responses were classified as ‘issue with assignment.’

- it was tempting to rely too heavily on journal articles to develop my argument without looking first and foremost at the primary source evidence (electronic journals)
- just have to keep searching using all kinds of different keywords until you figure it out (library catalog)
- allowed me to complete the project (printers)
- It was sometimes hard to synthesize the information into one argument or definitive statement when authors' opinions differed on a particular subject. (books)

### ***No problems***

One-hundred-sixty-eight times, respondents reported no problems with their ‘most important’ library resource, service, or facility (see Table 6.62). Given respondents reported 462 ‘most important’ uses we can say that in 37% of these ‘most important’ uses, students reported no problems with library resources, services, or facilities.

Table 6.62 Percentage of respondents reporting 'no' problems with ‘most important’ uses

	Electronic Resources		Traditional Resources		Services		Facility/Equipment	
	N	%	N	%	n	%	n	%
Site A	5	29.4%	3	17.6%	7	41.2%	5	29.4%
Site B	7	29.2%	6	25.0%	11	45.8%	5	20.8%
Site C	9	25.0%	9	25.0%	15	41.7%	8	22.2%
Site D	1	9.1%	2	18.2%	4	36.4%	4	36.4%
Site E	9	37.5%	12	50.0%	14	58.3%	10	41.7%
Site F	6	40.0%	3	20.0%	6	40.0%	7	46.7%

#### **6.2.7.4 Discussion**

This section of the paper reported on the factors of use expressed by these cohorts. As noted above, participation rates for 8 themes suggest their validity for this sample of respondents. Forty two new categories were entered by students, complementing the response categories in the list. These responses, coupled with comments from the participant checks, suggest new dimensions to explore in future versions of the protocol. As discussed above, several of these categories may have been too general to describe students' experiences. Future testing of more specific categories is warranted.

In several cases, students selected a specific 'most important' choice but answered questions about helps and problems from a more general perspective. For example some students noted that printers were their top ranked equipment but then went on to comment about how the space provided a quiet place to study. Modern web-based surveys offer question piping capabilities which could narrow the helps and problems offered to students after they select a most important resource, service, or facility. For instance, a respondent who selected printers as her most important facility or equipment would be presented with factors that only pertained to printers. While this may increase the specificity of feedback, it may reduce the amount of data gathered about these critical incidents. Factors were classified by theme and subjected to inter-coder agreement testing returning a Krippendorff's alpha value of .4489 and 90.4% agreement. While levels of agreement are high, the reliability coefficient is relatively low, further suggesting that the categories need refinement.

#### **6.2.8 Open ended questions**

Three sets of open ended questions elicited student feedback regarding their experiences. Open ended questions followed each 'library use type' block allowing students to leave further comments about their library use. A related prompt allowed students to leave further recommendations for the library. A series of questions asked respondents to reflect on a challenging time during the project and how they sought to overcome the challenge. A third set

of questions asked students to identify their top-ranked library use for the entire project and then answer the hypothetical question: “what would you do if it hadn’t been available to you?”

### 6.2.8.1 Open ended questions regarding library use and recommendations for change

An open ended question closes each ‘library use’ type block, such as:

“Do you have other comments about the electronic information resources you used for your project? Your comments will be shared with the library and can help improve services to students.”

At the conclusion of the survey, respondents were asked if they had further recommendations for the library:

“Are there ways the libraries' services, collections, or facilities could be changed to provide better support for your work on this project?”

#### *Participation rates*

Responding to these questions, like all questions in the survey, is optional. Participation rates for each site are presented in Table 6.63. Overall 20% or fewer respondents responded to the open-ended questions at the end of each library use block ranging from 4.2% of respondents at site E who commented on library services to 41.2% of respondents at site A who commented on traditional resources. Participation rates for the question about ‘suggestions for the library’ were somewhat higher. Almost 63% of respondents left suggestions for their library, ranging from 54.6% at site D to 75% at site E.

Table 6.63 Participation rates for open-ended questions

	Site A	Site B	Site C	Site D	Site E	Site F	RM	BW	SS	All sites
Electronic resources	29.4%	37.5%	11.1%	18.2%	20.8%	13.3%	33.3%	14.3%	21.7%	21.3%
Traditional resources	41.2%	33.3%	13.9%	18.2%	12.5%	6.7%	55.6%	9.5%	19.6%	20.5%
Services	35.3%	37.5%	8.3%	9.1%	4.2%	6.7%	44.4%	4.8%	16.5%	16.5%
Facilities or equipment	17.7%	33.3%	13.9%	9.1%	8.3%	13.3%	33.3%	14.3%	15.5%	16.5%
Suggestions for the library	64.7%	58.3%	61.1%	54.6%	75.0%	60.0%	77.8%	57.1%	62.9%	62.9%

RM=Research Methods, BW=Baccalaureate Writing, SS=Senior Seminar

### ***Comments regarding electronic resources***

Twenty seven comments were left regarding electronic resources. Fourteen of these comments were positive, as in these examples:

“None, they were fantastic.” (A-07 – in regard to electronic primary sources)

“It enhanced my arguments in my papers.” (E-01 - online library catalog (Addison))

“The online databases were essential to my project!” (E-03 - electronic databases on the library web site)

Some students noted benefits of electronic resources when compared to traditional equivalents:

“E-books are phenomenal, especially in terms of primary sources. I read a lot of fourteenth century chronicles that, in print form, span ten or more volumes. I could easily find the volume I wanted online and then search within the text for the exact section.” (B-04 - electronic books)

“Early English Books Online was essential for my thesis as it gave me access to early editions of texts not easily accessed outside of the UK.” (B-07 - digitized primary source material)

Yet 5 students mentioned frustrations associated with searching the library catalog or other resources:

“The articles I found in JSTOR were much less helpful than the books I used for my research. The vast majority of my research came from printed material. It was difficult to find what I was looking for using JSTOR's search engine.” (A-12 - electronic journals)

“While the library online catalog is indispensable in finding and corroborating sources, it is a bit clunky. This may very well be unavoidable as a result of the sheer amount of information the catalog contains, but especially at the beginning of research (when topical searches are necessarily broad), it may be quite difficult to narrow searches to pertinent material without having to wade through the entirety of the document.” (C-01 - library catalog)

Students also mentioned the benefits of help from librarians or need for help in using electronic resources:

“No comments. The set-up on the website is great and the extra session at the beginning of the thesis-writing process was very helpful!” (B-06 - electronic indexes or databases on the library web site)

“Summon is hard to work with, there needs to be more direction for what it should be used for or the best way to use summon.” (E-05 - electronic databases on the library web site)

“These resources were very easy to use, but without meeting with library staff, I would have never known they were there (this applies specifically to LexisNexis. Also, often when I searched for key words for my topic, I got many irrelevant sources.” (E-17 - electronic databases on the library web site)

Students also reported frustrations. One student at site A complained that the library subscribed to fewer resources than a neighboring library and one student at site B complained that the library “dismantled the web page it created for our seminar mid-way through the semester.”

### ***Comments regarding traditional resources***

Twenty six students left responses regarding traditional resources. Twenty comments were related to books checked out from the library or borrowed from other libraries. A student at site A said "books are great...I guess I encourage students to REALLY spend some time walking through the library" (A-14). The benefits of browsing the stacks to find relevant resources were mentioned by 5 students. A student at site B could barely conceal her enthusiasm for browsing the shelves and using references in books to lead to other useful resources:

“Books are the easiest to use. They are in their correct place at the library and I can always find more books like it because they are all catalogued in the same section. I love sitting in the stacks or in the Library finding more and more books that are perfect for my paper that all stemmed from one book that I located. Books are the best ---the best!” (B-15 - books)

Needed materials are not always available in the campus library. Five students noted the importance of interlibrary loan for providing access to needed materials as noted by this student at site A: "Inter library loan materials seriously helped me in this project. Much gratitude to the inter library loan staff" (A-17 – books). Yet interlibrary loan is not instantaneous as recognized by this student at site C: "It's fantastic that you can get any book through inter-library loan, but it would be even better if the books were digitized so you don't have to wait as long" (C-10 - books). The six students who left comments about manuscript collections used for their projects would like to have seen their materials digitized as well. Student C-06 stated, "The above-mentioned journal [a diary] was not housed within the [state] library system...I had to travel to utilize it" (C-06 - manuscripts) and student B-10 noted that archives are "[m]uch more difficult to access" (B-10 - manuscripts).

### ***Comments regarding library services***

Twenty-one comments regarding library services were received. Eight were related to the benefits of interlibrary loan for accessing needed materials at sites A and B as in these comments:

"fantastic resource." (A-17)

"[consortium document delivery] and interlibrary loan were incredibly useful to me in that many materials relevant to my project that were not shelved in the libraries were available this way and the materials always arrived very promptly (usually in about 2 days)" (B-16)

On the other hand some students mentioned loan periods for this service can be a hindrance, as suggested by a student at site B:

"It would be more helpful to have longer days of use for interlibrary loan and [consortium document delivery] because I found myself ordering the same book again and again, wasting days, rather than having the ability to keep it for a little longer" (B-03).

Ten students noted that instruction and reference were helpful, but one student still needed help: "I am glad I took the class but I am still uneasy about using the online databases for anything but books." Others were effusive in their comments, such as this student from site C:

"I learned more about the library in 10 minutes via class-wide information sessions than I did in my entire four years at college. The staff is great, and there's a lot of information that would simply go unnoticed if I hadn't been shown in a session..." (C-01)

### ***Comments regarding facilities and equipment***

Twenty-one comments about facilities and equipment were received. Eight of 21 had to do with the availability of space. Four were positive such as this comment from a student at site B: "Having a quiet space (2nd floor of the Library) away from my dorm helped me stay on track researching and writing" (B-01). Student B-16 found it helpful to work "in an area of the stacks where a number of relevant resources were located so that I did not have to check out literally hundreds of books and trudge back and forth with them" (B-16). There were also complaints with the availability of space, the hours, and noise, as a student at site B wrote "It is very frustrating to work at [the library] given the lack of available space and the hours" and a student

at site A wrote “I wish the library did not close so early on Friday and Saturday nights.” A student at site C was quite upset:

“The main problems I have using the library for long periods of time is that it is rarely conducive to actual work, albeit necessary at times. The majority of the study rooms are occupied by students socializing and the open areas (Namely the bottom floor and the third floor lobbies) aren't much better. There are periods where it seems less like a library and more like a club, with people milling about and talking as if they were outdoors. Seriously, these people just need to be kicked out” (C-01)

Other comments had to do with printers and the need for lockers so students did not have to carry books to and from the library. One student used a loaner laptop when his computer broke, but was puzzled by the 3 hour loan period (F-08). A student at site E noted that the library computers were quite fast, but “... the wifi in the library is abysmal and made working on a personal laptop impossible at times” (E-18 - computers in the library).

### ***Recommendations for the library***

Eighty students left recommendations for their institution’s library. However, 30 of these responses provided no substantive recommendations as noted by student A-07 who said, “No, everything was great,” and E-21: “No, I think the library was an invaluable tool in this research project.” Fifteen of the remaining responses had to do with library facilities and equipment, including space to work, alleviating noise, extending hours, and additional equipment, as noted by student E-05, who wrote, “[I]t would be nice if they had more TV's to use for the VHS players ...”. Nine responses were related to library services, including making it easier to schedule research consultations (2 respondents), increasing awareness of services among students and faculty (2), and more instruction (2). One student at site C recommended changes in the writing center, which is housed in the library at this particular campus.

Twelve students recommended improvements with search tools including the library catalog (3 respondents), more databases (3), a newspaper index (1), and improvements correcting broken links to full-text resources (1). Fifteen responses were related to improving collections. Seven focused on expanding the scope of book collections, as in this point made by a student at

site A: “We just need more books and archived information... not enough resources, but inter-library loan helps!” (A-8). Students at site E recommended that “The collections could be expanded because there aren't enough sources at the library” (E-13) and “Having a better history section and more translated sources” (E-24). Three students recommended their library expand the range of primary resources available.

### ***Discussion***

The responses to the open ended questions reinforced findings from earlier portions of the survey. For example, forty percent of students selected ‘study space’ as their most important facility/equipment and ‘it provided a quiet place to study/research’ was the most common factor of use related to this use. Open-ended comments like this one from student B-01 reinforce the value of quiet space to students: “Having a quiet space (2nd floor of the Library) away from my dorm helped me stay on track researching and writing.” The frequent comments about library hours speak to the importance of availability of space as well. In some cases, students’ open-ended responses added nuance.

The response rates for the use comments were relatively low (~20%) across all sites and 50 of the 127 respondents (39.7%) left meaningful recommendations for the library. These response rates are not exceptionally high. Nonetheless, the open-ended responses reinforce other study findings and provide student stories that can support advocacy. Answering these optional questions also did not seem to consume a great deal of student effort. These factors warrant retaining them in the survey.

#### **6.2.8.2 Open ended questions related to challenges**

Each respondent was asked to identify a ‘challenge’ faced during the project. Subsequent questions inquired about the learning activities in which it was encountered, what types of library uses were at the source of this challenge, and how the challenge was overcome. This block of questions was inspired by Brenda Dervin’s Sense-making methodology (1992) and was intended



to identify gap-defining and gap-facing behaviors as well as ways in which library services supported overcoming the gaps.

Respondents were first provided with a cue:

“Please think back to a particularly challenging time during this project. This may have been a time when you had trouble finding information for the project, a time when you had problems, or a time when you felt particularly frustrated.”

The first open-ended prompt asks the student to “briefly describe the challenges faced during this time in your project.” A series of probes identify the learning activities in which the student was engaged when the problem challenge occurred and whether or not the challenges were related to library resources, services, or facilities. The block closes with a prompt to elaborate on the source of the challenge and then to describe how the challenge was overcome.

### ***Participation rates***

One hundred seven or 84.3% of respondents responded to these questions. Rates ranged from 72% at sites C and D to 100% at site A and among students enrolled in the research methods course (see Table 6.64).

Table 6.64 Challenges participation rates by site

	Site A	Site B	Site C	Site D	Site E	Site F	RM	BW	SS	All sites
N	17	22	26	8	20	14	9	17	81	107
%	100.0%	91.7%	72.2%	72.7%	83.3%	93.3%	100.0%	81.0%	94.2%	84.30%

RM=Research Methods, BW=Baccalaureate Writing, SS=Senior Seminar

### ***Content analysis***

The text of each response was subjected to content analysis to detect the task associated with the challenge, the source of the challenge, whether or not the challenge was overcome, and if so, how. Four sets of codes were generated through an initial review of the data: task type codes, source codes, overcome codes, and success codes. The codebook was shared with a second coder who conducted content analysis over the entire set of challenges reported by participants (n=107). Krippendorff's alpha (k-alpha) was computed to determine agreement between coders for all four tasks.

### ***Challenges with academic work tasks and information seeking***

Challenge task types fell into one of two domains, ‘academic work tasks’ such as ‘developing a thesis’ or ‘information seeking’ such as ‘finding primary sources.’ The codes and the frequency with which they were applied are presented in Table 6.65. One student’s challenge was coded using three different tasks and sources and eight students’ challenges were coded using two task codes. The remaining challenges were coded using a single category. Eighty seven student’s challenges were coded by task using 93 codes. Thirty one student’s challenges could not be coded by task type. Overall 53 students’ challenges were coded as pertaining to ‘information seeking tasks’ and 34 students’ challenges were coded as ‘academic work tasks.’ Nominal k-alpha for agreement between coders regarding type of task was 0.6297 with a 95% confidence interval of .4417 to .8058 over 118 units. Percent agreement between coders was 84.7%.

Table 6.65 Frequency with which task codes were assigned to challenges

Code	Label	Domain	Codes applied
GS	Getting started	Work tasks	3
OT	Organizing thoughts	Work tasks	3
CT	Choosing topic	Work tasks	7
NT	Narrowing topic	Work tasks	7
DT	Developing thesis	Work tasks	7
BA	Building argument	Work tasks	5
PS	Placing scholarship in context	Work tasks	3
W	Writing	Work tasks	4
ST	Selecting resource or tool	Information seeking	5
F	Finding information	Information seeking	17
FS	Finding secondary sources	Information seeking	6
FP	Finding primary sources	Information seeking	22
II	Interpreting information	Information seeking	4
Total			93

Several challenges emphasized academic work tasks related to getting started or organizing thoughts as expressed by student B-12: “Uncertainty about where to start.” Student C-

11 noted that organizing thoughts can occur during other tasks such as writing: “Getting my thoughts together and writing the historiography” (C-11). Choosing a topic and developing a thesis posed difficulties for some students as noted by student C-27 who described a challenge of “[B]ecoming overwhelmed by all the information - it was hard to pinpoint my research into one area” and student A-03 who described her challenge as “Getting specific in my topic.” Student D-09 notes that choosing a topic involves estimating the degree of information available for her project: “Choosing a topic that was broad enough that I could find information but not too broad so that there was too much information to cover.”

The code for “developing a thesis” was applied to seven passages including a statement from student F-05 who described his challenge as “[D]eveloping my thesis statement into one that can adequately address a significant historical question, and making sure that I was able to carry out that thesis in my research paper.” Students at site C expressed this succinctly, describing their challenges as “Narrowing my topic down and establishing a thesis” (C-18) and “Trying to determine what my thesis would actually be and begin conducting research” (C-07).

Student B-08 was also preoccupied with positioning her work within the context of other scholarship, as she described her challenge as “[D]eveloping a thesis statement to differentiate project from other scholars.” This angst was expressed by students in the process of building their arguments as well. Student E-19 said that, “I kept thinking that scholars had already argued my argument. And that was the worst.” Student E-10 brought up the issue of making use of information resources when building an argument when she stated, “I was not sure how to take the sources I did find and organize them into a coherent argument.” Challenges associated with writing ranged from meeting the demands for a specific page limit, as noted by student A-15, whose challenge was “[W]riting enough pages,” to making use of available evidence: “Putting all of my information together into a cohesive paper was a difficult task” (A-05), to writing specific sections of the paper: “Starting to write the paper and writing the historiographical portion” (C-11).

There were five codes related to information seeking challenges. Five passages were related to ‘selecting a tool or resource.’ Student E-01 said of his challenge: “It was tough picking the right electronic resource to use.” A student at site D said that, “I was unaware of most of the reference materials available” (D-03) and a student at site E wrote, “It can be difficult to identify the best database to consult” (E-23).

The code for finding information was applied to 16 different passages, ranging from a simple assertion like, “I could not find sources” (C-29), to needs for specific types of information such as, “I couldn't find appropriate sources that represented public opinion” (F-07) and “Just being able to find sources that were translated...” (E-24). Twenty two passages were coded for ‘finding primary sources.’ These issues were expressed plainly by some students as in these challenges: “I had a hard time finding some primary sources” (B-15) and “Finding primary sources” (C-28). Others named specific types of information needed, as in, “Information on many aspects of 1970s Soviet culture was hard to find ...” (E-11) and

“I was somewhat frustrated when trying to find useful newspaper articles in the New York Times archive. The search terms I wanted to use were not bringing up valuable results, so I had a hard time finding the right terms to use, but I eventually did find what I wanted” (F-03).

Six passages could be coded specifically as challenges finding secondary sources, such as, “I had trouble finding secondary sources to incorporate into my work” (D-05) and “I had a very hard time locating scholarly articles on the subject” (F-12). Finally four passages were coded as the activity ‘interpreting information’ as reported by student B-11 who described her challenge as “interpreting conflicting primary source material.”

### ***Sources of challenges***

Sources categories described aspects of information use, personal attributes such as affect, skills and knowledge, or time management, library policies, and library equipment (see Table 6.66). Nominal k-alpha for agreement between coders regarding sources of challenges was 0.7398 (with a 95% confidence interval of .5987 to .8595) over 115 coding units and 87%

agreement between coders. Sixty five coding units were unclassifiable by source of challenge.

Ultimately 56 codes were applied to responses left by 50 students.

Table 6.66 Frequency with which codes were assigned as sources of challenges

Code	Label	Domain	Codes applied
AI	Access to information	Information	9
NE	Not enough information	Information	7
T	Too much information	Information	10
O	Overwhelmed	Affect	6
A	Anxious	Affect	3
LC	Lack confidence	Affect	1
LS	Lack of skill/ability/knowledge	Skill/Knowledge	3
TM	Time Management	Time management	9
EQ	Equipment trouble	Library Facility	2
SP	Space	Library Facility	1
POL	Library policy	Library Policy	3
GA	General Assignment	Assignment	2
Total			56

Three codes were used to classify challenges that stemmed from information use information use: access to information, not enough information, and too much information. Access to information, as the source of a challenge included passages where students had identified the needed resource, but had difficulties accessing the information such as these statements, “I had trouble getting certain biographies and books written by individuals discussed in my paper” (F-15) and “[S]everal of the books I needed were being rebound and I had a draft due two days later” (B-05). In seven cases students could not find enough information as illustrated by these challenge descriptions: “getting enough info” (C-35), “lack of current information on my topic” (C-04), “lack of available primary sources” (C-06), and “we didn’t have enough books (E-08). An abundance of information can be overwhelming as noted by students at site B: “too much information” (B-09) and “I had way too much information” (B-14). Ten passages were coded as ‘too much information’ as the source of a challenge.

‘Too much information’ can have an affective influence on students, like the student at site C who wrote she was “Becoming overwhelmed by all the information - it was hard to pinpoint my research into one area” (C-27) and a student at site E who wrote, “I had too much information and was overwhelmed” (E-01). The lack of information can cause anxiety as well, as stated by this student who described her challenge as “Trying to find resources for my topic. There were only mentions of my topic in books and articles. I was worried that I would not be able to gather enough information” (F-11). Coming to terms with the effort required to complete tasks in a project caused stress for students as expressed by E-07 who wrote “I had trouble narrowing my topic, and I was overwhelmed by the number of sources and the amount of information I had to go through to effectively answer my research question.”

A lack of confidence or a lack of skill or knowledge can impact performance. Student D-04 wrote, “I am not very confident using online sources for my research. I sometimes have trouble navigating websites or finding the information I need online. I much prefer using books for my research.” Three students mentioned a lack of skill or knowledge, as in this challenge from student A-04: “Finding relevant information pertaining to my time period. ...Lack of research outlets and knowledge to use them.” The code for ‘Time management’ was applied nine times to challenge descriptions like: “No challenges, just time consuming” (A-17), “just didn't have enough time with other classes and work for those to work on thesis” (B-20), “Balancing my time” (E-02), and “time and space to work on my paper” (C-25).

Library policies, space, and equipment issues round out this group of codes. Loan policies were an issue for 3 students who had problems with library hours (B-13) and renewal periods for interlibrary loan (F-04) and DVDs (F-08). Two students had difficulties with photocopiers (A-03) and microfilm readers (D-02). In 3 cases students’ responses could not be coded as a challenge at all as in these statements: “I felt confident the whole time” (C-03) and “This project actually went really smoothly, I did not face challenges during the research or construction of the project” (E-03).

Respondents were asked if their challenge were related to the use of library resources, services, or facilities. Responses to this question are consistent with coded responses about the source of each challenge. Almost 61% of the respondents indicated that library offerings were not the source of their problem (see Table 6.67). A little over 21% of the respondents reported the source of their challenge was related to electronic resources and 20% indicated that traditional resources were the source of their challenge. Less than 10% of students reported issues with library services and facilities or equipment.

Table 6.67 Proportion of respondents reporting challenges related to library uses

	Site A	Site B	Site C	Site D	Site E	Site F	RM	BW	SS	All sites
Electronic resources	0.0%	18.2%	19.2%	37.5%	30.0%	35.7%	0.0%	29.4%	22.2%	21.5%
Traditional resources	17.7%	31.8%	19.2%	12.5%	10.0%	28.6%	22.2%	17.7%	21.0%	20.6%
Services	0.0%	13.6%	7.7%	12.5%	5.0%	14.3%	0.0%	17.7%	7.4%	8.4%
Facilities or equipment	5.9%	4.6%	7.7%	25.0%	0.0%	0.0%	11.1%	11.8%	3.7%	5.6%
None	58.8%	54.6%	73.1%	87.5%	65.0%	28.6%	55.6%	52.9%	63.0%	60.8%

RM=Research Methods, BW=Baccalaureate Writing, SS=Senior Seminar

\* respondents could select multiple categories, so some column totals exceed 100%

### ***How was your challenge overcome?***

Respondents also identified ways in which each challenge was overcome. Sixty-six participants responded to this question. The descriptions of each challenge were also analyzed for an answer to this question, yielding 123 coding units coded with 85 codes. Eight codes were generated through analysis of the responses and applied to the entire set by two coders as seen in Table 6.68. Nominal k-alpha for agreement between coders regarding how challenges were overcome was .6959 (with a 95% confidence interval of .5429 to .8338) over 123 units. Percent agreement between coders was 85.4%.

Table 6.68 Codes used to categorize challenges by method of resolution

Code	Label	Codes applied
CP	Consulted professor	6
CL	Consulted librarian	6
CF	Consulted friend/classmate	3
Use	Use resource, service	17
MT	Managed time/planned	4
E	Effort	44
ChT	Changed topic	2
FA	Failed to overcome challenge	3
Total		85

Coders also reviewed the responses to determine if the student had successfully overcome the challenge. Sixty two of the challenges were overcome, 3 were not and it was unknown if 33 were overcome because of a lack of a response to this question or ambiguity. Source and description texts were also analyzed for these data yielding 106 coding units. Nominal k-alpha for agreement between coders regarding success overcoming challenges was 0.8265 (with a 95% confidence interval of .7140 to .9387) over 106 units. Percent agreement among coders was 91.5%.

### ***Consulting others***

Fifteen respondents consulted others when attempting to overcome their challenge. This group constitutes almost 23% of the students leaving answers to this question. Six students consulted their professor for help. Four students consulted their professor when getting started, narrowing their topic, or developing a thesis such as this student at site E who stated that “I talked with my professor and she guided me along the way to a better thesis” (E-09). Sources of challenges for these students included having too much information and anxiety. Six students sought help from a librarian. Four students did so when overcoming a challenge related to finding secondary or primary sources like this student at site A: “Spoke to librarians, and they helped me to find other primary sources” (A-16). Difficulties encountered during these



challenges included too much information, anxiety, and access issues. Finally, 3 students mentioned consulting peers during challenges related to selecting tools (2) and finding primary sources. Student E-23 mentioned using library resources and consulting friends for advice: “I browsed the subject guides that the library provides on their website and asked some of my peers where they had been successful.”

### ***Using library resources and services***

Fifteen students said that they overcame challenges through using specific resources, services, or facilities. Three students used interlibrary loan to overcome challenges finding secondary sources, selecting tools, and narrowing a topic. Issues included having too much information, not enough information, and access challenges related to “books being rebound” (B-05). Electronic resources and services such as Google (2), JSTOR, e-books, and ‘e-resources’ were used to overcome challenges finding information and primary sources. For example, student C-29 reported a challenge of “I could not find sources” and that the solution to the problem was due to learning about JSTOR.

### ***Effort and related strategies***

The code ‘Effort’ was applied to 44 passages and the sub-code ‘Managed time/planned’ was applied to 3 passages. Students described the application of effort to overcome information related challenges in thirty-five passages as found in these examples.

“I eventually found a book containing various primary resources.” (B-19)

“Brute force--tried new search terms until I got what I wanted” (F-03)

“I just kept searching” (A-7)

“I just did more research and filled in any gaps” (A-15)

“I spent many hours researching on the internet and speaking to peers.” (B-1)

“I dove into primary source searching and waded through a lot of irrelevant material.” (B-21)

In sixteen cases, effort overcame challenges specifically related to ‘assignment related’ activities and issues as indicated by these statements:

“Had to really work to organize the information I had collected” (A-02)

“I laid all my sources out and physically put them in the order I thought provided the strongest support for my argument.” (E-10)

“Putting time into thinking about my thesis ...” (D09)

“Worked hard and kept pushing through until I was moderately happy with what I had accomplished.” (C-10)

“Digging in and just writing” (C-11)

Two students responded to their challenge by changing their topic. Student B-07 had chosen a topic that was “too large in scope” and noted that “... [I] shifted my topic and thesis.” Three students were unable to overcome their challenge.

### ***Challenges faced by learning activity***

Respondents also identified the ‘learning activities’ during which each challenge was encountered. One-hundred-fourteen of the 127 respondents (89%) chose learning activities during which their challenges were encountered (see Table 6.69). Nine additional students at site A (2), site C (5), and site E (2) selected the option “none, I had no challenges with this project.” These 9 responses are excluded from this part of the analysis. Respondents in phase 1 could select from seven learning activities, select none, or write in their own activity. Phase 2 respondents were also able to select ‘preparing for an oral presentation.’ The instrument allows respondents to select multiple learning activities per challenge. Respondents in this study reported an average of 3.4 learning activities per challenge.

Table 6.69 Respondents who identified learning activities during challenges

Site	n	%
Site A	16	94.1%
Site B	24	100.0%
Site C	29	80.6%
Site D	10	90.9%
Site E	21	87.5%

*Continued*

Site F	14	93.3%
Research Methods	9	100.0%
Baccalaureate Writing	19	90.4%
Senior Seminar	93	95.8%

Challenges can be analyzed by task type and by learning activity. Challenges by task type are presented in Table 6.70 and will be summarized here. Twenty of 33 challenges reported in phase 1 involved information seeking tasks and 13 involved academic work tasks. In phase 2 more challenges were coded for academic work tasks (39) than for information seeking tasks (33). Four of the challenges in phase 2 were coded as both types of tasks. Among all sites, narrowing or choosing a topic (7 respondents), developing a thesis (7), building an argument (5), and writing (4) were the most common academic work tasks noted by respondents. Twenty two of 105 challenges (21%) were coded for the information seeking task of finding primary sources. Tables 6.70 (phase 1) and 6.71 (phase 2) present the frequency with which codes were applied to challenges by task type, site and phase.

Table 6.70 Task type codes assigned to challenges by activity, sites A and B

Activity	Academic work tasks	Information seeking tasks
getting oriented	5	6
choosing a topic	5	7
developing a thesis	10	9
gathering evidence	3	15
finding other sources	2	11
creating a bibliography	0	1
Writing	4	6

Table 6.71 Task type codes assigned to challenges by activity, sites C, D, E, and F

Activity	Academic work tasks	Information seeking tasks	Both types
getting oriented	11	10	2
choosing a topic	10	8	3
developing a thesis	16	9	3
gathering evidence	15	24	3

*Continued*

finding secondary sources	8	12	2
creating a bibliography	3	2	
writing	16	10	4
preparing for an oral presentation	2	1	

As seen in Figure 6.23, challenges were prevalent in all learning activities except for creating a bibliography and preparing for an oral presentation. The number of coded passages by activity builds from the earliest stages of getting started and choosing a topic, then peaking during the developing a thesis and gathering evidence activities. A slight decline is seen during the ‘finding other relevant sources’ activity and another peak is seen during the ‘writing’ stage. Challenges coded as academic work tasks were clustered in the first four learning activities, getting started through gathering evidence, and the writing stage. Challenges coded as information seeking tasks were encountered throughout the project, but were more prominent during the ‘gathering evidence’ and ‘finding other sources’ stages.

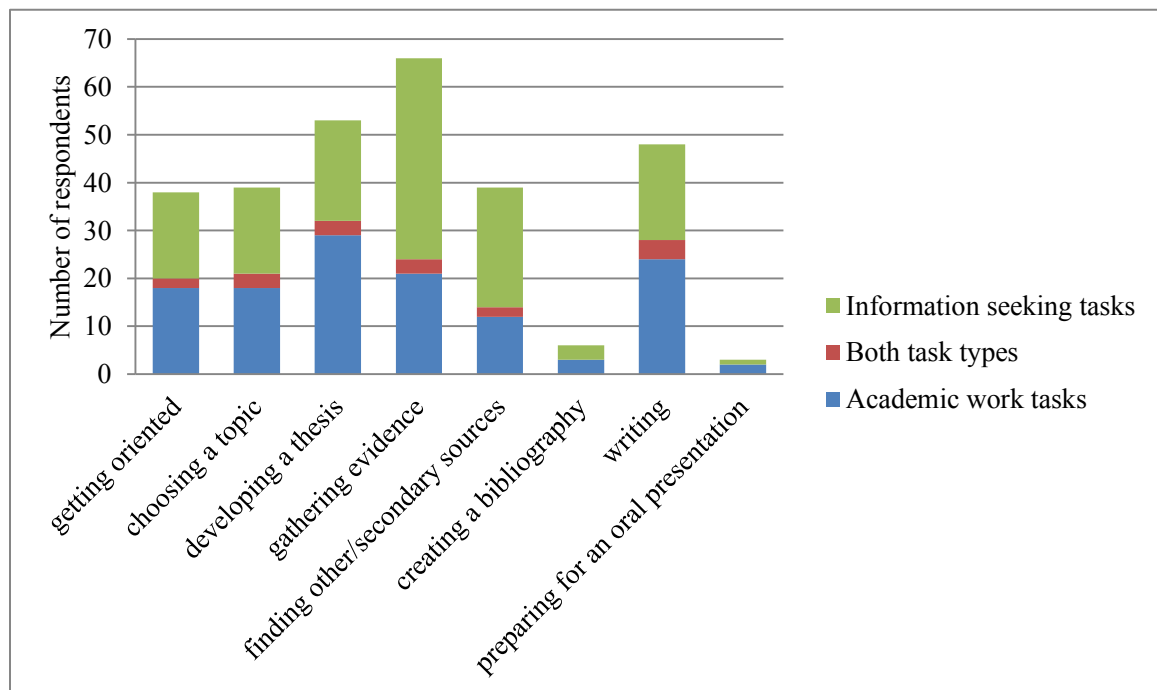


Figure 6.23 Challenges by type of task and learning activity

Challenge sources can also be examined by learning activity as demonstrated in Figure 6.24. The most prominent theme among sources was ‘issues with information’ such as problems accessing information, not having enough information, and coping with too much information. These issues plagued students during the first five stages of the project and during writing. Affective issues, such as anxiety and being overwhelmed, were the second most prominent themes among. As can be seen in Figure 6.24, the challenges coded for this theme also occurred throughout the project. The few challenge sources coded as lack of skill and knowledge, library policies, and library facilities and equipment are evenly dispersed as well. Time management and the source of challenges was an issue for five students during the gathering evidence stage and the writing stage.

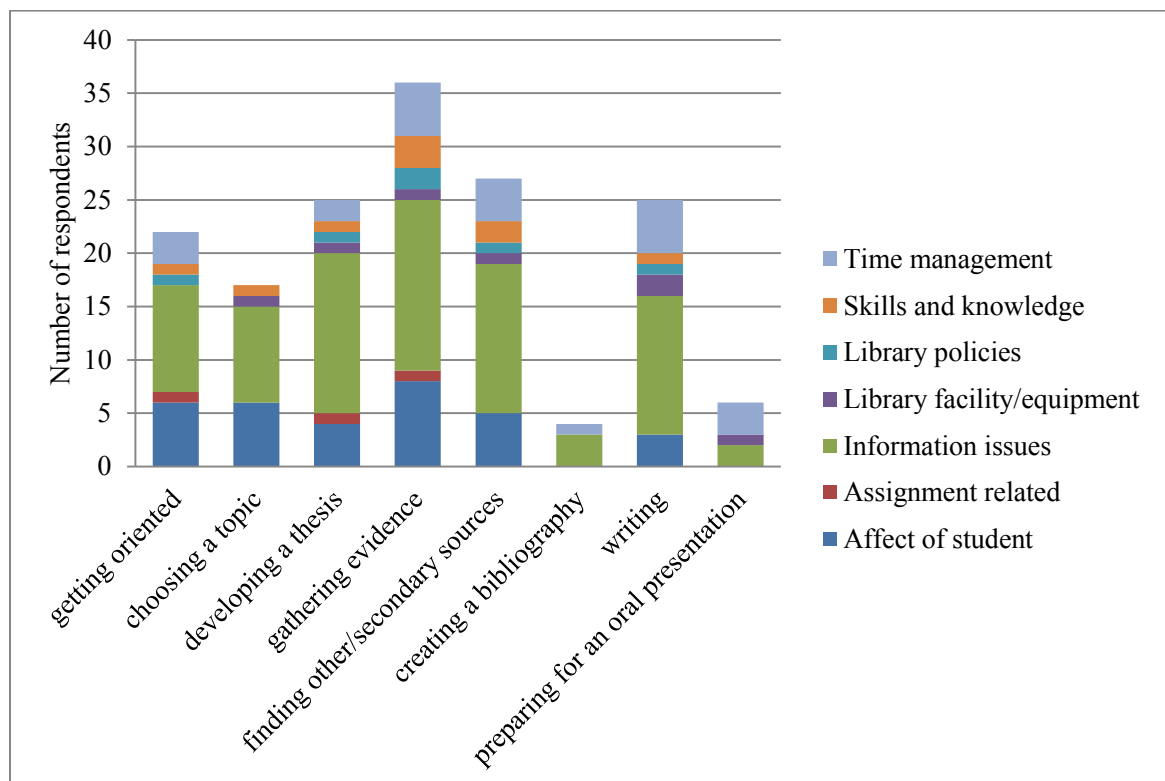


Figure 6.24 Challenges by source and learning activity

### ***Discussion and implications for practice***

Eighty-seven student challenges were coded as academic work tasks or information seeking tasks. Fifty three of these challenges (61%) were related to information seeking tasks and

a full 40% of respondents said that their challenge was related to a library provided resource, service, or facility. Fifty student challenges could be analyzed and coded by their sources. The most prevalent category of source had to do with information issues such as difficulties accessing needed information, not having enough information, and having too much information. The second most prevalent category had to do with student affect. These findings are consistent with and complement data gathered regarding factors of use in section 6.2.7 in which 61.4% of students reported problems related to access to information and 35.4% of students reported problems related to research anxiety and being overwhelmed.

While information issues made up a majority of the challenges reported by the students, 34 out of 87 (39%) of the student responses were coded for one or more academic work task. Further, 60% of students said their reported challenge had nothing to do with the library. The academic work tasks coded in this section closely align with the stages of the research process represented by the learning activities, such as choosing a topic, developing a thesis, and gathering evidence. It is possible that the presence of the learning activities in each of the use blocks served as prompts, encouraging students to select challenges related to these academic tasks. However, students went beyond parroting these activities in their responses and provided background and context for the challenges they experienced. Students mentioned other academic task categories, such as ‘organizing my thoughts’ and ‘placing my work in the context of other scholarship’ which were not explicitly stated in the learning activities. These questions gathered rich data about academic work tasks that were problematic for students. This offers teaching faculty and librarians alike with a rich view into the experience of students and suggests opportunities to enhance support.

Passages left by 66 students were coded according to how students worked to overcome their challenges (see Figure 6.25). Two thirds (44 out of 66) of the respondents overcame their challenges through effort, either by expending energy on information seeking tasks or applying themselves in their academic work. Seventeen passages related how students used specific

information resources and services to overcome their obstacles. These are generally positive findings. One of the purposes of going to college is to apply oneself and learn from the process. These remarks are evidence that students are indeed conducting these activities. However, only 25% of these students consulted a professor, a librarian, or a friend for help when they experienced a challenge. Most of the passages coded for ‘Effort’ suggest students work through their challenges alone and without asking for help. This is consistent with the finding from section 6.2.4.1 that only 46% of students took advantage of in-person services such as reference and research consultations during their coursework.

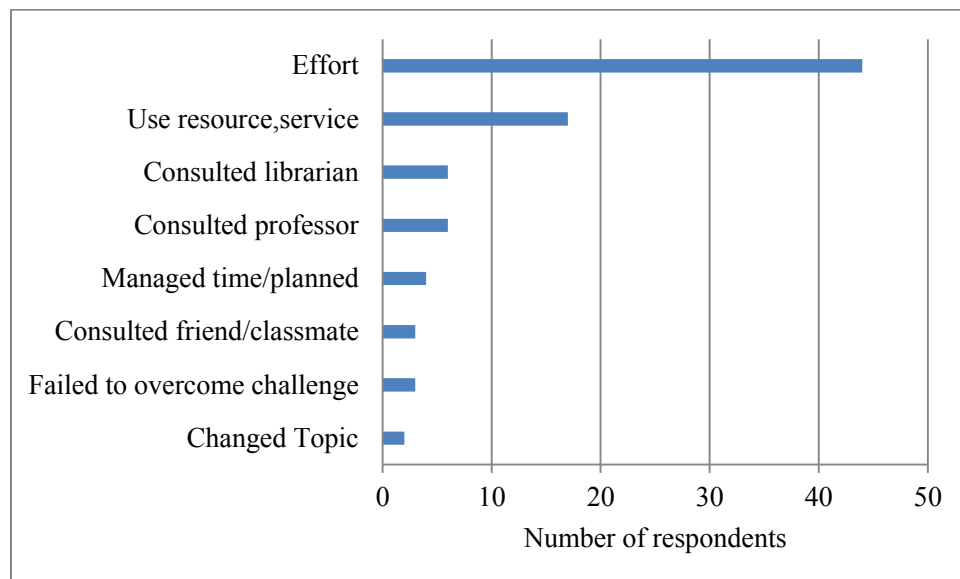


Figure 6.25 How students overcame challenges

These results suggest implications for practice for librarians and history faculty alike. Students have information seeking and academic work task challenges throughout the project lifecycle. A relatively high percentage of challenges were related to academic work tasks. This speaks well of the protocol’s utility for exploring students’ academic experiences and not just their information seeking practices. Further, for the most part students attempt to overcome these challenges on their own. This suggests that faculty and librarians have opportunities to intervene to help students at known points of difficulty during projects. The preponderance of ‘finding and evaluating’ challenges faced by students provide evidence that libraries need to improve

collections, increase access to resources, and position services at the point of need. While the internet continues to grow in its sophistication, these results suggest that students still need strong library collections and effective services and systems for accessing these collections.

### 6.2.8.3 Open ended questions related to ‘top ranked’ uses

A set of open ended questions applied a variation of the contingent valuation method to understand what library uses were most important to the respondents and what they would have done if their top-ranked use hadn’t been available. Participation rates for this question are displayed in Table 6.72.

Table 6.72 Participation rates for top ranked and alternate uses questions

	Site A	Site B	Site C	Site D	Site E	Site F	RM	BW	SS	All sites
Top ranked uses	100%	83%	94%	81%	92%	93%	100%	86%	92%	91%
Alternate uses	94%	75%	86%	54%	88%	87%	100%	72%	84%	83%

RM=Research Methods, BW = Baccalaureate Writing, SS = Senior Seminar

#### *Top ranked uses*

One hundred sixteen respondents (91.3%) answered the question, "What was the most important library service, resource, or facility you used?" Each response was coded by use and use type as displayed in Table 6.73 and Figure 6.26. Almost 60% of the top-ranked uses were information resources, evenly divided between electronic and traditional resources.

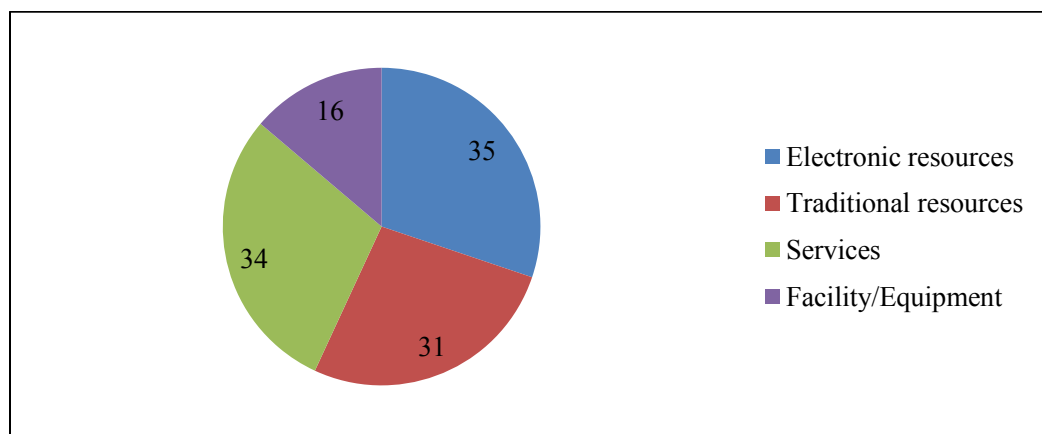


Figure 6.26 Top ranked uses by type



Table 6.73 Top-ranked resources, services, and facility/equipment

Electronic resources (30 %)		Traditional resources (27 %)	
Use	n	Use	n
Library catalog	11	Books	23
Research databases	9	Archives	4
E-Journals	8	Journals	1
E-Primary sources	2	Reference Books	1
Summon	1	Microfilm	1
Newspapers, online and microfilm	1	Books/Internet	1
E-Books	1		
Search engines	1		
Research guide	1		
Total	35	Total	31

Services (29 %)		Facility/Equipment (14 %)	
Use	n	Use	n
ILL	23	Library space	7
Research help	8	Computers	6
Instruction	2	Printers	2
Services	1	Microfilm readers	1
Total	34	Total	16

Catalogs, databases, and search engines make up over two thirds of the electronic resources selected by these respondents. The remainder includes content-oriented resources such as electronic journals and primary sources. Books and interlibrary loan top the lists of traditional resources and services by an overwhelming margin. Eleven students named in-person research help or instruction as their top choices. Study space and library computers top the lists of facilities and equipment.

### ***Alternate uses***

Students were next asked what they would have done if their most important resource, service, or facility had not been available during the project. One hundred and five respondents (82.7%) answered this question. Eighty seven of these responses could be coded as shown in Table 6.74.

Table 6.74 Alternate activities, by type

Alternate activity	n
Persist (visit other libraries, purchase materials, use ILL, etc.)	40
Find alternative sources	25
Cope with available sources	15
Give up / fail	4
Ask for help	3
Total	87

Forty of these responses could be characterized as persisting in some way or another.

Twenty nine students said they would have visited other libraries to use books, archives, and online resources needed for their projects as stated by these students:

“I would have gone to the local library which would take more time.” (C-08)

“If the library did not carry the Official Records of the War of Rebellion or Southern Historical Society, then I would have had to travel to another university to use the materials there.” (C-22)

“Gone to other libraries” (or a variant) (A-1, A-10, A-11, A-14, B-08, B-10, B-11, B-19, C-28, C-36, D-04, -02, E-09, F-02, F-12)

Regarding the consortium-based interlibrary loan system, one student wrote

“I would've had to drive to libraries around the state and do research of my own at these libraries. It saved me so much time!” (F-04)

Twelve respondents noted they would have purchased needed materials, mostly books, if their library hadn't provided them, as typified by this comment from a student at site E: “I would have to purchase the films” (E-05) if he hadn't been able to borrow them through interlibrary loan.

Twenty-five students said they would seek alternate resources or services for meeting their project needs. ‘Going online’ and using search engines such as Google were mentioned by 7 students. Five students said they would work elsewhere on campus if study space was not available in the library. Several students said they would use materials in alternate formats such as e-books (1), books (3), print journals (1), and an online newspaper. Nineteen students said they would ‘struggle, get by, or change their topic’:

“scrambled for info” (A-3)

“It would have taken me longer to gather sources, I probably wouldn't have used such a wide array of sources” (B-2)

“I would not have completed any of my research and would have had a very difficult time putting everything together.” (A-6)

“I honestly have no idea. Changed my topic, most likely.” (A-9)

However, only three students claimed they would ask their professor (1 respondent) or a librarian (2) for help. For instance a student at site B wrote, “I would have set up a meeting with a librarian to learn about how to find sources for this type of project...” (B-22). Further analysis of the alternate activities reveals that 50 of 105 respondents (47.6%) thought they would have incurred additional time commitments if their top ranked uses hadn't been available. Twelve would have incurred financial costs through purchasing materials and three thought they would have failed the assignment.

### ***Implications for practice***

This artificial obstacle prompted lengthy and visceral responses from students such as this entry left by respondent B-6 when asked if her top resource, JSTOR, had not been available:

“Floundered and sobbed uncontrollably. I honestly have no idea. I may have been able to get by with just the books I checked out and [G]oogle searching, but those databases, JSTOR specifically, really helped me.” (B-6)

Furthermore, 83 of 105 students (82.8%) who responded to the alternate activities question said they would expend effort of one sort or another to overcome such a barrier. This suggests these students are confident and aware of alternate ways to gather needed information to meet their scholarly needs. Each study site should be pleased with this finding. These data are consistent with the finding in 6.2.8.2 that over 44 out of 66 students overcame a ‘challenging time’ in their project through effort of one sort or another. However, only three of 105 students (2.85%) said they would ask for help from a faculty member or a librarian. The findings from this study suggest both librarians and faculty have the opportunity to market the availability of help to students who are having difficulties in their work.

#### **6.2.8.4 Discussion**

Research question #6 asked if the open-ended questions reinforced or complemented findings from other portions of the study. In each case, open ended questions about library use, challenges faced during the project, and most important library uses returned rich data from participants. Participation rates for these questions ranged from 50% to 100% for each cohort, suggesting the cost to students of completing the questions was not prohibitively high. Results from the responses corroborated, reinforced, or complemented data gathered in other portions of the instrument. Finally, the rich qualitative feedback can provide libraries and faculty with ‘student stories’ which may be more effective than statistics in driving internal improvements or advocating for resources and support.

## **7. Statistical analysis**

Statistical analysis was conducted to evaluate premises of the ULI framework and generate evidence for retaining or discarding questions in the survey instrument. One set of analyses investigated environmental or personal characteristics that influenced use or non-use of the library during coursework. A second set of analyses explored relationships between library use and non-use and students' anxiety and confidence before, during, and after the project.

### **7.1 Use and non-use of the library**

A premise of the ULI protocol is that students' information behaviors will be influenced by the nature of the tasks they are striving to complete. Chief among these are the pedagogical influences of the discipline and the challenges associated with the academic work. Therefore, the use of library resources and services was not expected to vary as much by institution as by the nature of the students' assignments, the availability of resources and services to match the demands of the task, and pedagogical emphases reinforced by faculty. Levels of academic challenge are expected to influence information behaviors as well. That is, students who report exerting higher levels of effort in their academic work are expected to exhibit higher levels of library use. Demographic characteristics such as nontraditional student status, residence, and work-status are variables known to influence academic and social integration among college students. Therefore these characteristics were also expected to influence the degree to which students engage with library and information services appropriate for the discipline. Analysis of the affective state questions is intended to determine if levels of anxiety influence use patterns, if use impacts anxiety during a project, and to determine what impact library use has on confidence.

### 7.1.1 Dependent variables

Three indices were used to characterize respondents' diversity of library resource, service, and facility use, the degree to which respondents used in-person services, and the degree to which respondents are non-users of resources, services, or facilities. These indices were used as dependent variables in the subsequent analysis.

The first index represents heavy use of the four types of resources, services, and facilities. The index was created in multiple steps. First, a count of the different use types made by individual respondents for all four types of uses was completed: electronic resources, traditional resources, library services, and facilities and equipment. For instance if a student claimed to use books and archives during her project she would have a claimed use count of 2 for traditional resources. Descriptive statistics for the distribution of these counts from phase 1 (sites A and B) and phase 2 (sites C, D, E, and F) are displayed in table 7.1.

Table 7.1 Descriptive statistics for number of claimed uses, by type and phase

	Electronic resources		Traditional resources		Services		Facilities/ Equipment	
	Phase 1	Phase 2	Phase 1	Phase 2	Phase 1	Phase 2	Phase 1	Phase 2
Max	8	10	6	6	6	8	7	5
3rd quartile	<u>6</u>	<u>8</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>3</u>	<u>4</u>	<u>4</u>
Median	5	6	2	2	2	2	3	3
1st quartile	5	5	2	1	2	1	2	2
Min	1	1	1	0	0	0	0	0

Respondents whose use-count scores were in the upper quartile for each use type were considered 'high use respondents' as noted in four new binary variables: e-topuser, t-topuser, s-topuser, and f-topuser for electronic sources, traditional sources, services, and facilities respectively. For instance, the cutoff for the upper quartile of electronic uses in phase 1 is 6 uses. Respondents in phase 1 who used 6 or more types of electronic resource were assigned an e-topuser score of 1; respondents who reported using fewer electronic resources were assigned an e-

topuser score of 0. However, in phase 2, students were presented with more types of electronic resources from which to choose. The cutoff for the upper quartile of electronic resource users in phase 2 was 8. These four variables (e-topuser, t-topuser, s-topuser, and f-topuser) were summed to create the first index, a top\_total variable which could range between 0 and 4 for each respondent.

The second index focused on the use of in-person library services. The inperson\_user variable is a sum of the different types of in-person uses of reference, chat reference, or research consultations claimed by respondents. The values of the variable among this sample could range between 0 and 3.

The third index focused on lack of use of a given type of resource. If a respondent reported using no traditional resources during the study, her t-nonuser score would be 1. The values of e-nonuser, t-nonuser, s-nonuser, and f-nonuser were summed to create the nonuser\_total variable with a range of possible values from 0 to 4.

### **7.1.2 Independent variables**

Several independent variables covered basic demographic characteristics such as site, course type, academic year, academic major, sex, and ethnicity. Independent variables that have demonstrated relationships to academic integration and engagement were selected including age, first generation college student status, living and working off campus, and a nontraditional student scale. The levels of effort students expend in academic work were measured through responses to questions that make up the Deep Learning Scale and the CSEQ library experiences scale. Student anxiety and confidence finding information were measured using 5 point Likert scales and are discussed in detail in section 7.2. Independent variables used in the study include:

- SITE, Study site A - F
- COURSE, Research methods, Baccalaureate writing, and Senior Seminar

- ACADEMICYEAR, freshman = 1, sophomore = 2, junior = 3, senior = 4, 5 = 5<sup>th</sup> year senior
- MAJOR, History major = 1, non-History major = 0
- SEX, female=1, male=0
- AGE, 18-22, 23-30, 31-40, 41+
- FIRSTGEN, first generation college student = 1, non-first generation college student = 0
- TRANSFER, transferred from another institution = 1, native = 0
- RESIDENCE, off campus = 1, on campus = 0
- WORKTOTAL consists of bins for each increment of 10 hours of work per week in on-campus jobs, off-campus jobs, and internships. Values ranged from 0 to 7.
- WORKOFFCAMPUS
- GT20, works in a job more than 20 hours per week = 1
- Nontraditional student scale - An index was also created to represent nontraditional students. This variable took into consideration the following attributes of students: delayed enrollment into college, part-time attendance, working full-time while enrolled, having dependents other than a spouse, being a single parent, and not having earned a traditional college diploma. For instance a student who attended college part-time and worked a full-time job would have a score of 2. As reported in section 6.2.2.3, the scores for this sample ranged from 0 to 3. That is, none of the students possessed more than 3 characteristics of the nontraditional student.

Scale scores were also used as independent variables in the analysis.

- DEEP\_SCALE. The Deep Learning Scale scores for each student range from 0 to 100. These scores were converted to bins to support categorical analysis. Scores between 0 and 20 inclusive were converted to 1, scores between 21 and 40 were



converted to 2, and so on in a variable called DEEP\_BIN. Bin values within this sample ranged from 2 to 5.

- CSEQ\_SCALE. The mean scale scores for each student range from 10 to 40. These scores were converted to bin scores from 1 to 10, first by subtracting ten from the scale score and dividing the result by 5. The remainder was rounded up to form 6 bins in a variable called CSEQ\_BIN. Bin values for this sample ranged from 2 to 6.

### **7.1.3 Statistical associations with use and non-use of the library**

Chi-square tests for independence and the Kruskal-Wallis one-way analysis of variance were used to test for statistically significant relationships among these variables. Wilcoxon ranked sums tests were used for post-hoc testing where Kruskal-Wallis tests revealed statistically significant relationships. Two-sided exact p values were computed for the Wilcoxon ranked sums tests due to the small sample sizes and the absence of normality found in some of the groups. Alpha was set at .05 for all statistical tests. Statistically significant findings are reported by independent variable.

#### **7.1.3.1 Site, course, and major**

Tests for relationships between site, course, and major and the dependent variables were conducted to check for the presence of disciplinary influences. No statistically significant relationships were found by type of course and the dependent variables. However, relationships were discovered by site and students' academic major.

Kruskal Wallis tests were conducted and statistically significant relationships between inperson\_user scores and site were observed ( $H(5) = 20.0753$ ,  $p = 0.0012$ ). Wilcoxon signed rank sums tests detected statistically significant differences between sites B and A ( $z = 2.1905$ ,  $p = 0.0284$ ), sites B and C ( $z = 3.1582$ ,  $p = 0.0011$ ), sites B and D ( $z = 3.0762$ ,  $p = 0.0019$ ), sites B and E ( $z = 3.5547$ ,  $p = 0.0003$ ), and sites B and F ( $z = 2.7688$ ,  $p = 0.005$ ). Respondents at site B

were more likely to use in-person services than respondents from other sites. Descriptive statistics for the variable, by site, are displayed in Table 7.2 and Figure 7.1.

Table 7.2 Ranges and quartiles for the inperson\_user variable, by site

	A	B	C	D	E	F
Max	1	3	2	1	1	2
3Q	1	2	1	1	1	1
Median	0	1	0	0	0	0
1Q	0	1	0	0	0	0
Min	0	0	0	0	0	0

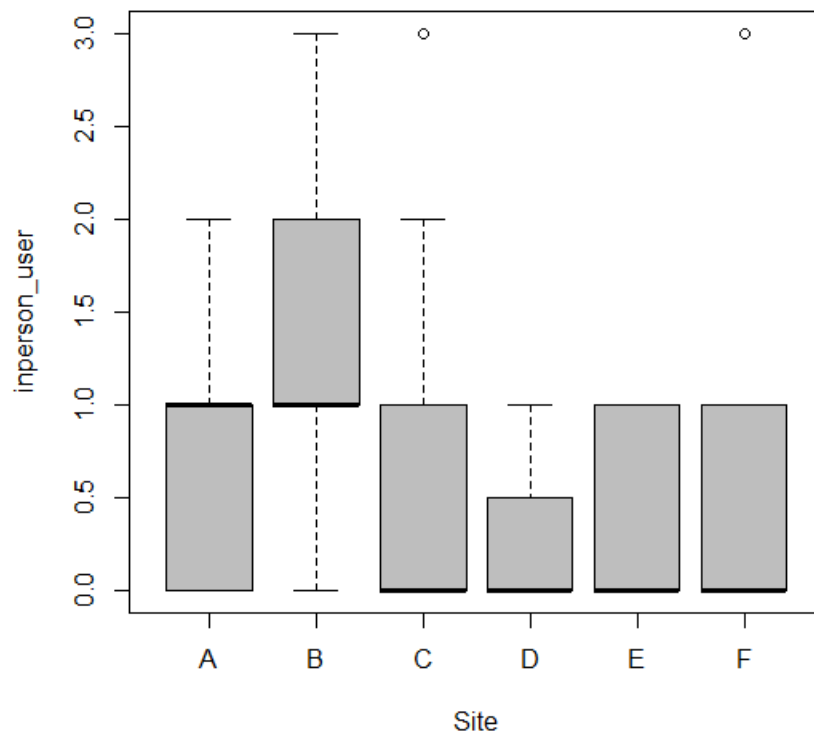


Figure 7.1 In-person user scores by site

There was also a statistically significant relationship between nonuser\_total scores and site ( $H(5) = 11.5169$ ,  $p = .042$ ) (see Table 7.3). Post-hoc testing revealed significant differences between students at site D and A ( $z = 2.4645$ ,  $p = 0.0151$ ), sites D and B, ( $z = 2.2323$ ,  $p = 0.02$ ), and sites D and F ( $z = 2.2921$ ,  $p = 0.0438$ ). Almost half of the students at site D, 5 of 11, exhibited nonuser\_total scores of 1 or 2. Further examination of the underlying variables included in the nonuser\_total index revealed statistically significant relationships between

s\_nonuser (non-use of services) and site. Chi-square tests of independence revealed statistically significant differences on the s\_nonuser variable between sites D and A ( $\chi^2 = 6.2166$ ,  $df = 1$ ,  $p = 0.0127$ ), sites D and B, ( $\chi^2 = 9.0525$ ,  $df = 1$ ,  $p = 0.0026$ ), sites D and E ( $\chi^2 = 4.6457$ ,  $df = 1$ ,  $p = 0.0311$ ), and sites D and F ( $\chi^2 = 5.3786$ ,  $df = 1$ ,  $p = 0.0204$ ). As depicted in Table 7.4, respondents at site D were more likely to be non-users of library services than students at these sites. No statistically significant differences in the index top\_total were observed by site.

Table 7.3 Descriptive statistics for nonuser\_total by site

Site	N	M	SD
A	17	0.06	0.24
B	24	0.13	0.34
C	36	0.28	0.51
D	11	0.64	0.81
E	24	0.38	0.65
F	15	0.07	0.26

Table 7.4 Descriptive statistics for s\_nonuser by site

Site	N	M	SD
A	17	0.06	0.24
B	24	0.04	0.20
C	36	0.22	0.42
D	11	0.45	0.52
E	24	0.13	0.34
F	15	0.07	0.26

Students majoring in history likely spend more time in history courses and socializing with other history majors and history faculty than non-majors. These experiences would hypothetically expose them to the norms of the discipline at higher rates than students majoring in other disciplines. If so, this did not manifest itself in dramatically different library use behaviors among the two groups. In this sample one hundred fourteen (89.8%) of 127 students majored in history. Statistically significant differences on the top\_total variable were not found by academic major. However, further analysis showed that History majors were more likely to have ftouser ( $\chi^2 = 4.9880$ ,  $df = 1$ ,  $p = 0.0255$ ) and s-topuser ( $\chi^2 = 6.7211$ ,  $df = 1$ ,  $p = 0.0095$ ) scores of 1.

Students who declared History as a first or second major used a wider range of services ( $M = 0.42$ ,  $SD = 0.49$ ) than their peers ( $M = 0.11$ ,  $SD = 0.32$ ). Likewise history majors used a wider range of library services ( $M = 0.30$ ,  $SD = 0.46$ ) than non-majors ( $M = .05$ ,  $SD = 0.23$ ). No statistically significant relationships were found by history major status and in\_personuser or nonuser\_total variables. The statistically significant findings regarding facilities and services use suggests the choice of major may have an influence on information behaviors independent of site and type of course.

#### **7.1.3.2 Demographic characteristics**

Chi-square tests of independence revealed statistically significant differences on the inperson\_user variable by the independent variable sex ( $\chi^2 = 10.2097$ ,  $df = 3$ ,  $p = 0.0169$ ). Females were had higher inperson\_user scores ( $M = 0.76$ ,  $SD = 0.80$ ) than males ( $M = 0.36$ ,  $SD = 0.64$ ). Only 15 out of 47 male respondents used reference or research consultation services, and of those students, only 3 reported participating in a research consultation. Forty-one of 80 female respondents used in-person services, and 10 of these students reported participating in a research consultation. No statistical differences were found however, after removing responses from site B from the analysis. Site B was an all-women's college whose respondents were demonstrated in section 7.3.1 to be more likely to use in-person services than respondents at other sites.

#### **7.1.3.3 Nontraditional student status and related variables**

A nontraditional scale was employed to explore differences in information behaviors for students exhibiting one or more nontraditional characteristics: delayed enrollment, part-time attendance, and working full-time while enrolled, having dependents other than a spouse, being a single parent, and not having earned a traditional college diploma. As reported in section 6.2.3.3, only twenty students out of 127 exhibited at least one trait of the nontraditional student. The most prominent nontraditional characteristics were part time enrollment, working full-time, and having a dependent other than a spouse. No statistically significant relationships between nontraditional

scale scores and the dependent variables were observed. Other demographic variables such as off-campus residence and first generation college student status were also evaluated. No statistical significant differences in the dependent variables were observed by these variables.

A statistically significant relationship between transfer status and non-use of library services was observed ( $\chi^2 = 16.98$ ,  $df = 1$ ,  $p = .002$ ). The 21 transfer students who participated in the study had higher nonuser\_total scores ( $M = 0.619$ ,  $SD = 0.8$ ), than students who had initially enrolled at the college attended during the study ( $M = 0.17$ ,  $SD = .40$ ). Nine of these 21 students were nonusers of library services, while 10 out of 106 'native' students were nonusers.

A statistically significant relationship was found difference in the values of the nonuser\_total variable was found by age of the student ( $H(2) = 6.8186$ ,  $p = 0.0331$ ). Post-hoc Wilcoxon sum of ranks tests showed that the significant difference was between students of traditional college age (18-22) and students aged 23 to 30 ( $z = -2.2264$ ,  $p = .0201$ ). Students in the age group 23 to 30 were more likely to be non-users of library services ( $M = 0.69$ ,  $SD = 0.95$ ) than students aged 18-22 ( $M = 0.18$ ,  $SD = 0.42$ ). Five of 13 students aged 23-30 exhibited nonuser\_total scores of 1 or 2, while 19 of 110 students aged 18-22 had nonuser\_total scores of 1 or 2.

There was a statistically significant difference in the top\_total variable by GT20. Working more than 20 hours per week in a job was associated with the top\_total variable, ( $\chi^2=13.850$ ,  $df=4$ ,  $p=.0078$ ). Post-hoc analysis revealed a statistically significant relationship between working more than 20 hours per week and t\_topuser ( $\chi^2=7.99$ ,  $df=1$ ,  $p=.0047$ ). Students who worked a job more than 20 hours per week, were more likely to use a greater diversity of traditional resources [13/29 vs. 16/74] than those who did not. Working off campus is also a predictor of top\_total ( $\chi^2=10.4999$ ,  $df=4$ ,  $p=0.0328$ ) and inperson\_user ( $\chi^2=8.225$ ,  $df=3$ ,  $p=0.0416$ ). However, the differences were no longer statistically significant after students from site B were removed from the analysis.

### 7.1.3.6 Academic challenge and student effort

Deep Learning Scale scores and CSEQ scale scores were converted to bins for non-parametric statistical analysis. Tests were conducted to determine if scale scores were correlated to the three dependent variables: top\_total, inperson\_user, and nonuser\_total.

Statistically significant differences in the inperson\_user variable were observed by DEEP\_BIN scores ( $H(4) = 9.2868$ ,  $p = 0.0257$ ). Post-hoc analysis revealed significant differences between responses in bins 4 and 5 ( $z = -2.7697$ ,  $p = 0.0053$ ). Students whose scores were in bin 5, whose Deep Learning Scale scores range from 80 to 100, were more likely to have higher inperson\_user scores than students whose scores were in bin 4 (60 to 79) (see Table 7.5). No statistically significant differences on the top\_total and nonuser\_total indices were found by DEEP\_BIN.

Table 7.5 Ranges and quartiles for inperson\_user by DEEP\_BIN

	2 (n=3)	3 (n=15)	4 (n=49)	5 (n=57)
Max	1	2	2	3
3 <sup>rd</sup> quartile	1	1	1	1
Median	1	0	0	1
1 <sup>st</sup> quartile	0	0	0	0
Min	0	0	0	0

Statistically significant differences for the top\_total variable were found by CSEQ\_BIN ( $H(4) = 14.1105$ ,  $p = 0.0149$ ). Post-hoc tests revealed statistically significant differences between respondents in bins 6 and 2 ( $z = 2.7818$ ,  $p = 0.0044$ ), 6 and 4 ( $z = 2.9616$ ,  $p = 0.0023$ ), and 6 and 5 ( $z = 2.162$ ,  $p = 0.0302$ ). Ranges and quartiles for these groups are shared in Table 7.6. Examining the use patterns of respondents in bin 6 reveals that 3 students were in the top quartile for one use type, 3 were in the top quartiles for 2 use types, 4 were in the top quartiles for 3 use types and 2 were in the top quartiles for all 4 use types.

Table 7.6 Ranges and quartiles for top\_total by CSEQ\_BIN

	2 (n=9)	3 (n=20)	4 (n=37)	5 (n=46)	6 (n=13)
Max	2	3	4	4	4
3 <sup>rd</sup> quartile	1	2	1	2	3
Median	0	1	1	1	2
1 <sup>st</sup> quartile	0	1	0	1	1
Min	0	0	0	0	0

A statistically significant difference was also observed for the variable nonuser\_total by independent variable CSEQ\_BIN ( $H(4) = 44.3668$ ,  $p < .0001$ ). Significant differences were found between bins 2 and 3 ( $z = 3.4732$ ,  $p = 0.0004$ ), bins 2 and 4 ( $z = 4.0678$ ,  $p = 0.0001$ ), bins 2 and 5 ( $z = 4.4631$ ,  $p < 0.0001$ ), and bins 2 and 6 ( $z = 2.7771$ ,  $p = 0.0041$ ). Descriptive statistics are displayed in Table 7.7. Students whose CSEQ scores ranged from 10 to 15 (bin 2) were more likely to exhibit non-user behaviors.

Table 7.7 Ranges and quartiles for nonuser\_total by CSEQ\_BIN

	2 (n=9)	3 (n=20)	4 (n=37)	5 (n=46)	6 (n=13)
Max	2	1	2	1	1
3 <sup>rd</sup> quartile	2	0	0	0	0
Median	1	0	0	0	0
1 <sup>st</sup> quartile	1	0	0	0	0
Min	0	0	0	0	0

### 7.1.3.8 Relationships between dependent variables

Predictably, there are associations between the dependent variables. Statistically significant differences were observed in the values of the inperson\_user variable by top\_total ( $H(4) = 21.9092$ ,  $p = 0.0001$ ). Further evaluation revealed that users in the upper quartile for traditional resource use (t-topuser) ( $\chi^2 = 8.8009$ ,  $df = 3$ ,  $p = 0.0321$ ) and service use (s-topuser) ( $\chi^2 = 35.0229$ ,  $df = 3$ ,  $p < .0001$ ) are more likely to have higher inperson\_user scores as depicted in Tables 7.8 and 7.9.

Table 7.8 Descriptive statistics for inperson\_user by t-topuser

t-topuser	N	M	SD
0	92	0.51	0.72
1	35	0.89	0.83

Table 7.9 Descriptive statistics for inperson\_user by s-topuser

s-topuser	N	M	SD
0	80	0.31	0.54
1	47	1.13	0.82

There was also a relationship between nonuser\_total and inperson user ( $H(2) = 16.1918$ ,  $p = .0001$ ). Respondents with nonuser scores of 0 were more likely to have higher inperson\_user scores than respondents with nonuser scores of 1 ( $z = 3.2783$ ,  $p = .0009$ ) and 2 ( $z = 2.4313$ ,  $p = 0.0192$ ) as depicted in table 7.10.

Table 7.10 Descriptive statistics for inperson\_user by nonuser\_total

nonuser_total	N	M	SD
0	101	0.74	0.80
1	21	0.14	0.36
2	5	0.00	0.00

#### 7.1.4 Discussion

There is evidence that students' information behaviors are driven by the discipline and the nature of the task at hand. This evidence is masked by the statistically significant findings regarding site and type of course that were found. No statistically significant differences in the three use indices were observed by type of course. However, higher rates of in-person service use were observed at site B and higher rates of non-use of the library were observed at site D. Rather than concluding there are differences between sites, a look at the syllabi and the demographic characteristics of these students suggests that pedagogical and perhaps demographic influences are at play. Students at site B attended a year-long capstone seminar in which each student was expected to write a 40 page research paper based on an original thesis. Students in the capstone seminar at site F were assigned a 25 page paper; but none of the other students, including those



enrolled in capstone seminars, were expected to write as much as students at site B. These students had access to library instruction as part of their course syllabus and were encouraged to use archival resources in their projects. Only one of these students possessed a single trait of the nontraditional student; she attended college part time. Students at site D were enrolled in a one-semester long thematic Baccalaureate Writing class and were expected to write 15-page papers on topics related to the class theme, perhaps reducing the need for original research. A library instruction session was not listed in their syllabus, perhaps resulting in decreased awareness of these services.

There is slight evidence to suggest that the norms of the academic environment, the history major, influenced students' information use behaviors. History majors were more likely to use library facilities and services than non-history majors. Further evaluation with a broader sample is needed to explore this possibility in more detail.

Several analyses were conducted to examine the influence of nontraditional student status and related variables on student information behaviors. Nontraditional status was not found to predict any of the use variables. In part this may be due to the fact that only 16.5% of respondents possessed a single trait of the nontraditional student, so this class of student is under-represented in the sample when we consider up to 70% of today's undergraduates in the U.S. possess at least one nontraditional trait. Statistically significant relationships between the related variables of transfer status and age were found. Transfers and students aged 23-30 were more likely to be non-users of one or more types of library offerings than 'natives' and students of traditional college age. An unexpected relationship between working more than 20 hours per week and the use of a diverse array of traditional sources was found. It was anticipated that working in a job would impact use negatively. None of the work-related variables had positive associations with non-use behaviors. In all, the influence of nontraditional student status and related variables on the use and non-use of the library is inconclusive in this dataset.

Statistically significant relationships between Deep Learning Scale scores and the library use indices were observed. This finding, however, is tempered by the lack of variation in the Deep Scale scores. This variation may be explained by the fact that the Deep Learning Scale questions were delivered at the end of the instrument and respondents may have answered the questions based on their experience during the project just completed, instead of their experiences over the last 12 months. Relationships between the CSEQ Library Experiences Scale scores and the `inperson_user` and `nonuser_total` variables suggest that the CSEQ questions may be gathering redundant data and can be dropped in future iterations of the instrument. These relationships also speak well of the indices themselves. Future work should be done to validate these measures. The low levels of association between the `top_total` index and other related variables raise doubts regarding its utility.

## 7.2 Statistical associations with affect

Two sets of questions related to student affect were used in the survey instrument (see Table 7.11). The first set of questions inquired about respondents' self-assessment of their anxiety, confidence, and ability to get started before the project began. The second group of questions came at the end of the survey and ascertained student anxiety during the project and confidence in their ability to complete a similar project in the future. Responses were recorded using a 5 point Likert scale (1= strongly disagree, 2 = somewhat disagree, 3 = neither agree nor disagree, 4 = somewhat agree, 5 = strongly agree).

Table 7.11 Questions probing respondents' affective state

Please complete this sentence: "At the beginning of the project ..."	Variable
I was worried about being able to find enough information	preAnxiety
I knew how to get started	preAbility
I had confidence in my research skills	preConfidence
Please rate your agreement with these statements	Variable
At times during this project I became anxious about finding information	duringAnxiety
I would be confident in my abilities to conduct research for a similar project in the future	postConfidence

Two other variables were generated from these scores. TotalAnxiety included the combined scores on the preAnxiety and duringAnxiety variables with a range of 2 - 10. DiffConfidence was generated by subtracting the value of preConfidence from the value of postConfidence. Values for diffConfidence ranged from -4 to 4. Negative values indicate a student's postConfidence response was lower than his or her preConfidence response. Chi-square tests for independence and the Kruskal-Wallis one way analysis of variance were used to test for statistically significant variations on these measures. The usage indices top\_total, inperson\_user, and nonuser\_total were used as independent variables in these analyses. Demographic measures were used occasionally to explore relationships observed in the initial analysis.

## 7.2.1 Anxiety and confidence

### 7.2.1.1 preAnxiety and duringAnxiety

These questions measured a students' anxiety about finding information before beginning the project and while completing the project. Students who exhibit the traits of non-users have lower levels of preAnxiety. Furthermore, it appears that students in this study who had higher levels of preAnxiety are more likely to use in-person services.

Statistically significant differences were observed on the variable preAnxiety by nonuser\_total ( $H(2) = 7.4407$ ,  $p = 0.0242$ ). Students with nonuser\_total scores of 0 were more likely to have higher preAnxiety scores than students with nonuser\_total scores of 1 ( $z = -2.606$ ,  $p = 0.0086$ ) (see Table 7.12). In other words, nonusers of at least one type of library use (electronic resources, traditional resources, services, or facilities/equipment) had lower preAnxiety than students who made use of all categories of library use.

Table 7.12 Descriptive statistics for preAnxiety by nonuser\_total

nonuser_total	N	M	SD
0	101	3.31	1.12
1	21	2.52	1.36
2	5	2.80	1.10

Statistically significant differences were observed on preAnxiety by inperson\_user score ( $H(3) = 8.4573$   $p = 0.0374$ ). Post-hoc analysis revealed significant differences in preAnxiety scores between respondents with inperson\_user scores of 2 and 1 ( $z = 2.0219$ ,  $p = 0.0468$ ) and 2 and 0 ( $z = 2.6235$ ,  $p = 0.0081$ ). That is, students who used more in-person services were more likely to report higher levels of anxiety before the project began (see Table 7.13).

Table 7.13 Descriptive statistics for preAnxiety by inperson\_user

inperson_user	N	M	SD
0	68	2.96	1.25
1	43	3.28	1.05
2	13	3.92	0.95
3	3	2.67	1.53

It follows that statistically significant differences on the totalAnxiety variable were observed by inperson\_user ( $H(3) = 7.9055$   $p = 0.048$ ). Post-hoc analysis again revealed significant differences in totalAnxiety scores for respondents with inperson\_user scores of 2 and 1 ( $z = 2.4877$ ,  $p = 0.0113$ ) and scores of 2 and 0 ( $z = 2.6075$ ,  $p = 0.0080$ ). Students with higher inperson\_user scores were more likely to experience anxiety before the project (see Table 7.14), and that trend continued during the project. No statistically significant relationships were observed between totalAnxiety and top\_total or nonuser\_total. And no statistically significant relationships were observed between the indices of use and duringAnxiety scores. Finally, one-way ANOVA demonstrated a statistically significant relationship between preAnxiety and duringAnxiety scores ( $F(4,122) = 12.36$ ,  $p < 0.0001$ ).

Table 7.14 Descriptive statistics for totalAnxiety by Site

inperson_user	N	M	SD
0	68	6.49	2.27
1	43	7.05	1.69
2	13	8.31	1.11
3	3	6.33	3.79

### 7.2.1.2 preConfidence and preAbility

These variables reflected the respondent's perception of his or her confidence and ability to complete the project prior to beginning work. A strong relationship was detected between preAbility and preConfidence scores ( $F(4,122) = 17.64, p < 0.0001$ ). No statistically significant relationships were observed between the independent variables and preAbility.

There were two statistically significant relationships between demographic characteristics and preConfidence. Statistically significant differences in preConfidence were observed by site ( $H(5) = 14.8557, p = 0.011$ ). Post-hoc analysis revealed statistically significant differences in preConfidence between respondents at sites A and B ( $z = 3.293, p = 0.0007$ ), sites C and B ( $z = 2.4134, p = 0.0145$ ), sites D and B ( $z = 2.3717, p = 0.0162$ ), sites E and B ( $z = 2.6838, p = 0.0073$ ), and sites F and B ( $z = 2.3514, p = 0.0174$ ). As shown in Table 7.15 and Figure 7.2, students at site B reported lower levels of confidence before undertaking their project than did students at the other sites. Nontraditional students, exhibiting nontraditional scale scores of 1, 2, or 3 exuded higher levels of preConfidence than their peers ( $\chi^2 = 11.59, df = 4, p = .0206$ ) (see Table 7.16).

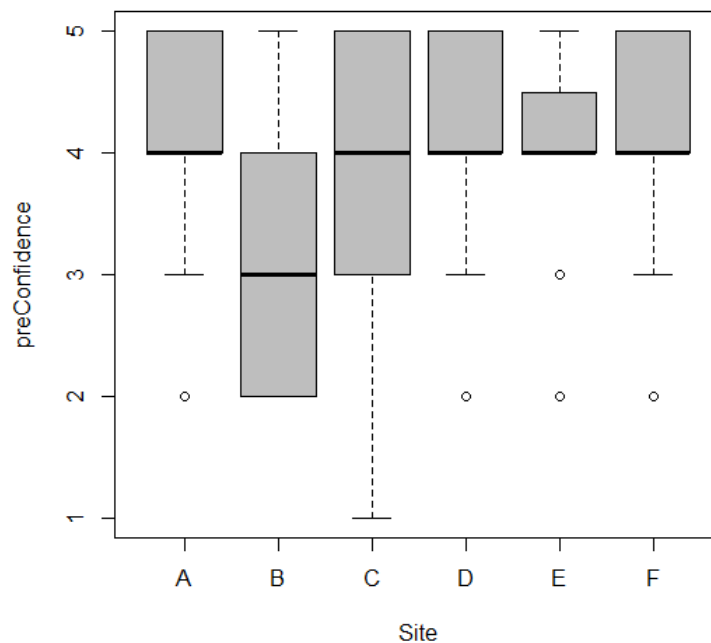


Figure 7.2 Distribution of preConfidence by site

Table 7.15 Descriptive statistics for preConfidence by Site

Site	N	M	SD
A	17	4.29	0.85
B	24	3.21	0.98
C	36	3.83	1.13
D	11	4.09	0.94
E	24	3.96	0.91
F	15	4.00	1.00

Table 7.16 Descriptive statistics for preConfidence by nontraditional scale scores

nontraditional_scale	N	M	SD
0	106	3.90	0.98
1	14	3.50	1.22
2	6	4.17	0.75
3	1	1.00	-

Statistically significant differences in preConfidence were also observed by inperson\_user scores ( $H(3) = 11.501$   $p = 0.0093$ ) (see Figure 7.3). Post hoc analysis revealed statistically significant differences between preConfidence scores of students with inperson\_user scores of 0 and 2 ( $z = -2.0946$ ,  $p = 0.0361$ ) and scores of 0 and 1 ( $z = -3.1306$ ,  $p = 0.0011$ ). Students with inperson\_user scores of 0 had higher preConfidence ( $M = 4.11$ ,  $SD = .86$ ) than students with inperson\_user scores of 1 ( $M = 3.65$ ,  $SD = 1.13$ ) and students with inperson\_user scores of 2 ( $M = 3.23$ ,  $SD = 1.01$ ). That is, respondents who did not seek help from a librarian had, on average, higher levels of preConfidence than those who did use in-person services. No statistically significant relationships were found between preConfidence and nonuser\_total or top\_total.

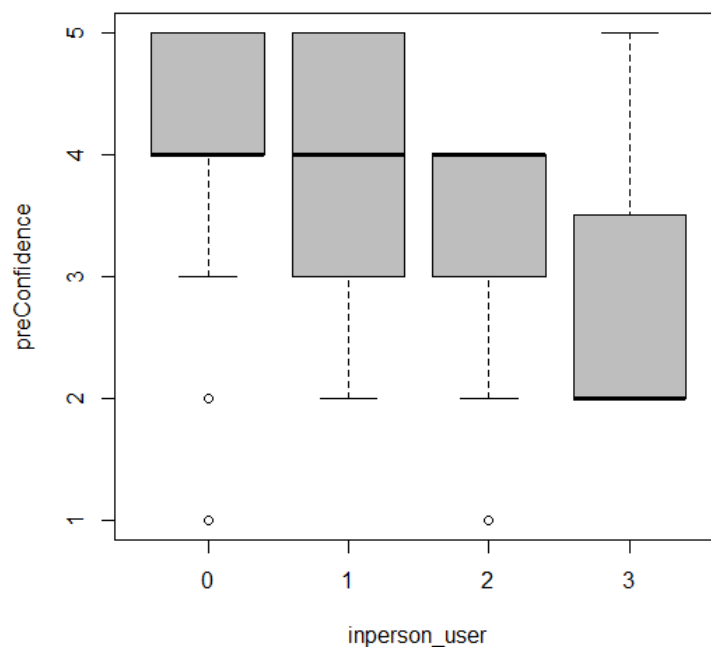


Figure 7.3 Distribution of preConfidence by inperson\_user

#### 7.2.1.3 postConfidence

No statistically significant relationships were found between postConfidence and any of the indices of use, top\_total, inperson\_user, and nonuser\_total. The postConfidence mean across the entire study was 4.04 and the standard deviation was 0.83.

#### 7.2.1.4 diffConfidence

The difference between postConfidence and preConfidence scores was computed to create the diffConfidence variable. These values ranged from -4 to +4 ( $M = .5669$ ,  $SD = 1.110$ ) across the entire study. Statistically significant differences on the diffConfidence variable were observed by site (see Figure 7.4). Post-hoc analysis revealed statistically significant differences between sites B and A ( $z = 2.0233$ ,  $p = 0.0408$ ), sites B and C ( $z = 2.641$ ,  $p = 0.0076$ ), sites B and D ( $z = 2.3753$ ,  $p = 0.0177$ ), and sites B and E ( $z = 2.9463$ ,  $p = 0.0024$ ). Students at site B reported higher gains in confidence than students at any other site. Descriptive statistics for this variable, by site are presented in Table 7.17.

Table 7.17 Descriptive statistics for diffConfidence by Site

Site	N	M	SD
A	17	0.59	0.80
B	24	1.17	0.96
C	36	0.36	1.44
D	11	0.36	0.50
E	24	0.25	1.03
F	15	0.73	0.88

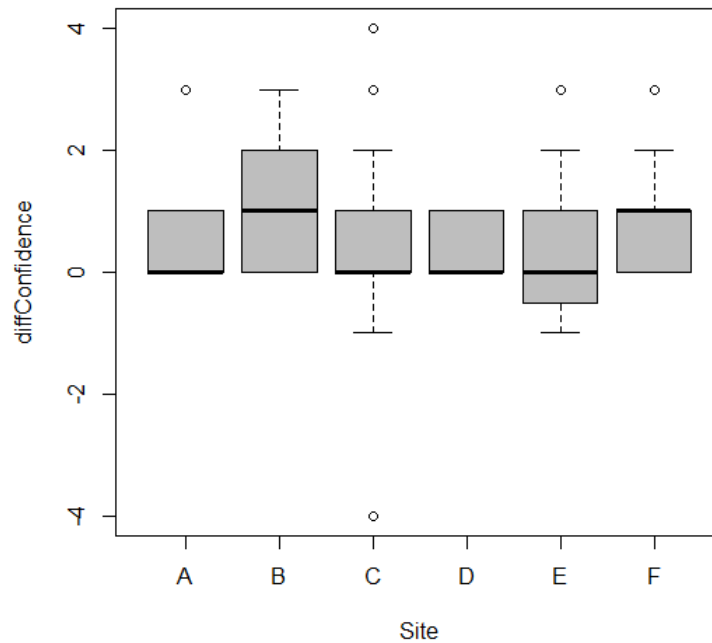


Figure 7.4 Distribution of diffConfidence by site

Statistically significant differences on the variable diffConfidence were observed by inperson\_user scores ( $H(3) = 18.1008$   $p = 0.0004$ ). Post-hoc analysis revealed significant differences among respondents with inperson\_user scores of 1 and 0 ( $z = 2.2914$ ,  $p = 0.0213$ ), 2 and 0 ( $z = 3.9755$ ,  $p = <.0001$ ), and 2 and 1 ( $z = 2.2499$ ,  $p = 0.0239$ ) (see Table 7.18 and Figure 7.5). Respondents who used in-person services reported higher gains in confidence after completing the project than students who did not use in-person services.



Table 7.18 Descriptive statistics for diffConfidence by inperson\_user

inperson_user	N	M	SD
0	68	0.25	1.06
1	43	0.77	1.09
2	13	1.46	0.88
3	3	1	1

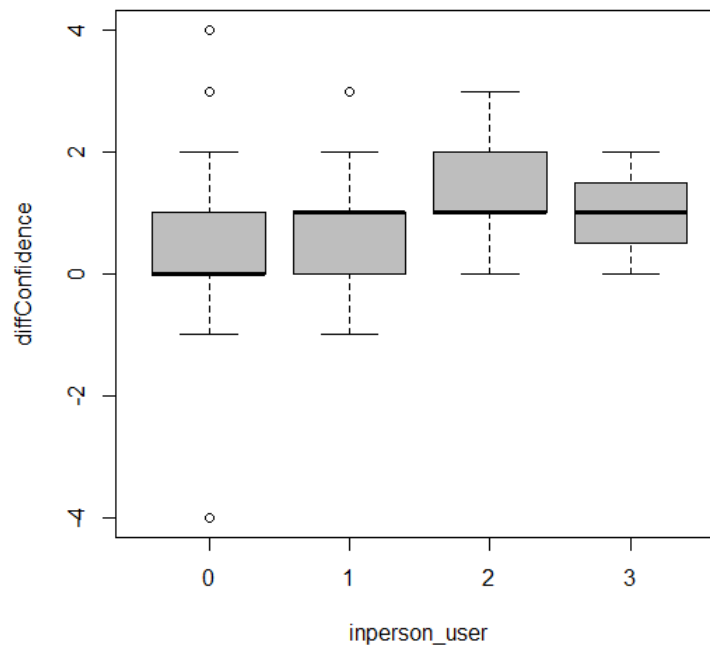


Figure 7.5 Distribution of diffConfidence by inperson\_user

Further analysis showed differences on the diffConfidence score by use of a research consultation ( $\chi^2 = 19.5847$ ,  $df = 6$   $p = 0.0033$ ) and using in-person reference services ( $\chi^2 = 14.695$ ,  $df = 6$   $p = 0.0228$ ) during the project. Students who used research consultations during the project reported higher increases in confidence ( $M = 1.54$ ,  $SD = .967$ ) than those who did not ( $M = 0.46$ ,  $SD = 1.07$ ) (see Figure 7.6). Students who used reference services reported higher increases in confidence ( $M = 0.96$ ,  $SD = 1.06$ ) than those who did not ( $M = 0.30$ ,  $SD = 1.07$ ) (see Figure 7.7).

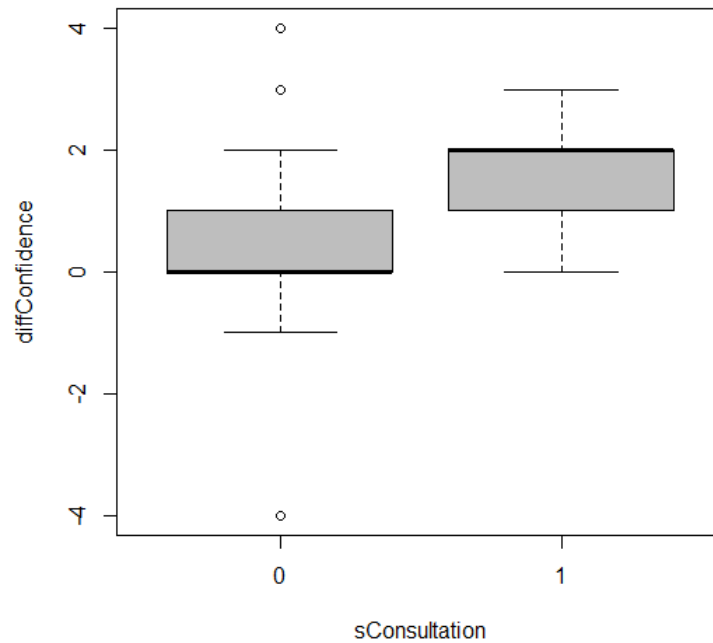


Figure 7.6 Distribution of diffConfidence by sConsultation

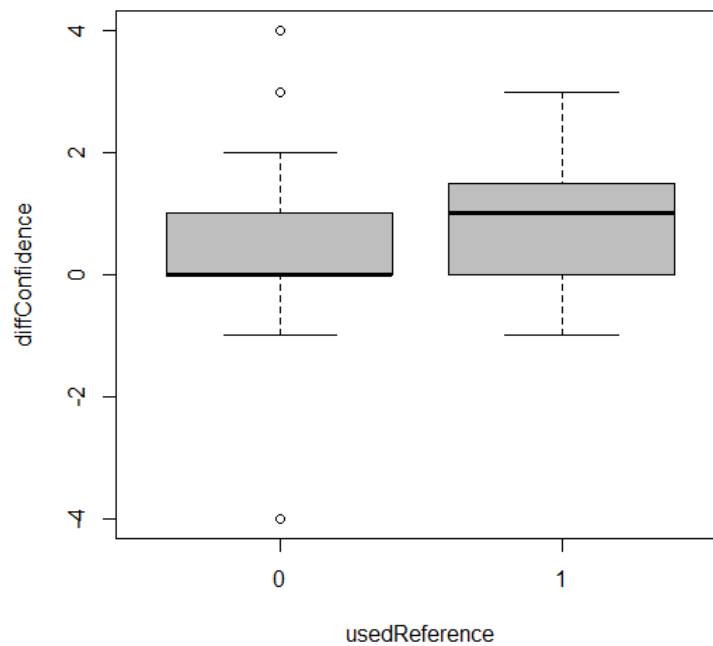


Figure 7.7 Distribution of diffConfidence by usedReference

### 7.2.2 Discussion

The instrument's affective questions sought to understand the influence of anxiety on use of the library and the influence of library use on changes in respondents' confidence and anxiety.

Higher levels of preAnxiety seem to predict use of in-person services. Furthermore, the use of reference and research consultations seems to have a positive association with increases in confidence but no influence on anxiety levels during the project. Evidence from the ‘factors of use’ gathered in this study provide support for these findings. As reported in section 6.2.7, among ‘most important uses’ 13 respondents (11%) named reference as their top-ranked library service, and 10 of these students (77%) reported that reference or other in-person services ‘helped them overcome their fear of research.’ Qualitative results gathered from comments in the responses to open-ended questions also support this conclusion. Ten of 21 comments spoke to the helpfulness of in-person library services as expressed by student A-16: "[T]he librarians were able to help me find a lot of reference books with primary sources I had been missing." These findings are encouraging to those who provide these services, yet disappointing when we consider that only about one half of respondents took advantage of these services during their coursework. Furthermore, as reported in section 6.2.8.2 less than 10% (6 out of 66) students reported overcoming their challenge by consulting a librarian.

Non-users of at least one type of library use seem to have higher levels of preAnxiety and duringAnxiety respectively than other students in the study. Further investigation of these types of associations is warranted in a more diverse study sample. Relationships between the preAbility and preConfidence scores suggest that one of these questions, preAbility perhaps, can be dropped from the instrument.

## **8. Discussion and conclusion**

This study was conducted to evaluate a new approach for exploring and communicating library impact on student learning outcomes. The project was carried out during 2011 with the cooperation of librarians, faculty, and students at six study sites as well as volunteers who assisted with coding tasks. Undergraduate students enrolled in upper-level and capstone courses in the discipline of history participated in this project. The results are discussed in light of eight research questions which guided decisions about research design, data collection, and analysis. Results are compared with findings of other LIS research projects where appropriate.

### **8.1 Research questions**

The project addresses eight research questions. The first three research questions investigate the value of the protocol for understanding the information behaviors of undergraduates enrolled in upper-level and capstone courses in History. Findings are compared with other studies of undergraduates' information behaviors to test concurrent validity of the results and affirm the choice of units of analysis. These data were also shared with the study sites. Questions four through eight were used to evaluate the instruments themselves.

#### **8.1.1 Research question #1**

What library resources, services, facilities, and equipment (hereafter types of library use) do students in this study use to complete their projects?

As reported in section 6.2.4, students reported heavy use of library resources, services, and facilities during their projects. All 127 respondents reported using electronic resources sometime during their projects. Ninety seven percent of respondents reported using traditional

resources, 94% reported using library facilities or equipment, and 85% reported using library services when completing coursework. Several data points are worth mentioning.

First, students did report using internet search engines for their projects, but very few of the students reported that internet search engines were the most important electronic resource used during the project. The most commonly chosen ‘most important’ electronic resources were the library catalog (26.8%), digitized primary source material (24.4%), electronic journals (22%), and electronic indexes or databases (17.1%).

Second, while the convenience of electronic resources was noted by 81% of students, traditional resources were used at high rates as well. Ninety-eight per cent of respondents reported using books, 35% used reference books, 61% used interlibrary loan to request traditional resources, 28% used manuscripts or archives, and 20% reported using print journals. Further, respondents reported that their ‘most important’ traditional resource provided ‘the best information for my project’ (72%), ‘led them to other relevant sources’ (55%), and ‘provided information that could not be found elsewhere’ (57%). The degree to which electronic and traditional resources complement one another in these results is revealed in this quote from a student at site B:

“Electronic resources are great but by no means is everything I used for my project digitized. In fact, most of the time I used the electronic databases to find where I needed to obtain or go for the actual copy of the work I was interested in.” (B-10)

These findings are consistent with those reported in other studies. OCLC (2006a) found that 76% of the students they surveyed rated libraries higher than search engines as sources of trustworthy, credible, and accurate information. These findings are also consistent with those reported by Wong et al. (2009), who found that the most common reason among students for using ‘internal’ resources such as library-acquired books and databases was the “quality and credibility of material and broad subject coverage” (Wong et al., 2009, p. 79). Further, these authors found that more experienced, expert users were more likely to use internal resources than inexperienced users. Among the respondents in this ULI study, 84% were seniors and 91%

majored or minored in history, groups of students who ostensibly should be more experienced with resources for the discipline than younger students or non-History majors.

These findings may also corroborate the results of other recent studies (e.g. Head & Eisenberg 2009, 2010; Prabha, et al., 2007) suggesting that student information behaviors are influenced by the expectations of teaching faculty. For instance, syllabi from sites C, D, E, and F frequently defined primary and secondary sources acceptable for papers. In the themed seminars, teaching faculty frequently recommended a range of sources specific to students' paper topics. Syllabi from sites C, D, and E clearly established prohibitions regarding unapproved 'Internet' sources. Frequently faculty members set a minimum number of sources and page counts for bibliographies and papers. These factors probably influenced students' decisions to prefer library-provided materials.

Third, 46% of students reported the use of in-person services including reference or research consultations. While national trends in the use of reference and other in-person services, show dramatic declines, these figures suggest that undergraduate use of in-person services, at least for these respondents, may play a more significant role during challenging aspects of the undergraduate experience such as a capstone project. Use levels varied significantly among the sites though. Seventy percent of students at site B and 50% of students at site A used reference services, while approximately 30% of respondents at the other sites reported using reference. Twenty-nine percent of students at site B used research consultations, yet none of the students at sites A, D, or E reported using a research consultation.

Fourth, 70% of respondents reported using study space in the library; 66% and 67% reported using computers and printers, respectively, during their projects. These data are consistent with national surveys of library use that show library building use remains stable. One trend mentioned in the literature is that the reason for using the library among undergraduates has shifted from collection use to the use of study space and equipment. These data do not

necessarily affirm this finding, as traditional library resource use remained high for the students who participated in this study.

As reported in section 6.2.4.2, there was some variation in the proportion of students using services and facilities by site and type of course, especially with regard to claiming benefits of library instruction and making use of reference and research consultation services. There was little variation by site or type of course in the proportion of students using the most common electronic resources (the library catalog, indexes and databases, and electronic journals) and in the proportion of respondents using the most common traditional resources (books and archives). There was a significant difference in the proportion of students making use of reference books as students at Sites A and F were more likely to use this resource than students at other sites.

Further there was considerable agreement across sites with regard to ‘most important’ resources, services, and facilities selected by students. The library catalog, electronic databases, electronic primary sources, and electronic journals were the most commonly select ‘most important’ electronic resources chosen by students across all six sites. Books and interlibrary loan were far and away the ‘most important’ traditional resources and services to students at all six sites as well. Study space, computers, and printers were the top three ‘most important’ facilities / equipment at all six sites. These findings suggest that academic discipline and the nature of the academic task may be strong influences on ‘norming student’ selection of information resources, services, and facilities. In other words, students working on History projects across multiple institutions may value similar types of information resources, services, and facilities. Presumed causes for this behavior are the guidelines faculty set for student assignments and possibly norming influences of the academic major. The influence of pursuing a history major was subtly detected in terms of increased diversity of use of library services and facilities (see section 7.1.3.1)

These findings are consistent with Leckie, Pettigrew, and Sylvain’s (1996) model suggesting work role, associated tasks, source awareness, source availability, and outcomes are

significant factors driving information source selection. These results are also consistent with Byström's (2000, 2005) findings that task complexity drives information source selection decisions. Two examples provide supporting evidence.

Students at site D were more likely to be non-users of library services than students at other sites. These site D students were enrolled in writing-intensive baccalaureate courses and were expected to write papers on twentieth century topics. Characteristics of the task including its topic and level of complexity, students' unawareness of library services, and students' demographic characteristics may have influenced the information behaviors of students at site D. Neither of these courses had a scheduled library instruction class in the syllabus, possibly reducing respondents' awareness of the availability of in-person library services. These students were heavy users of electronic primary sources and used microfilm at higher rates than other students. The nature of the assignments may have driven this resource preference as well. The theme of one of the seminars at site D was the Vietnam War. It is conceivable that newspapers on microfilm provided the best, and perhaps only, source of primary material for papers on this topic. Furthermore, several of these students possessed nontraditional traits including completing a GED, delayed entry into college, and single parent-hood. Theoretically, these characteristics should make it more difficult to fully engage with the resources and services of the university. And finally, their other life responsibilities perhaps explain why they did not rate study space at the library very highly.

Similarly, the responses from site B varied in several significant ways. These students were more likely to claim benefits from library instruction, more likely to seek reference help, and more likely to engage in research consultations than other sites. These students also had higher levels of anxiety and lower levels of confidence before the project than other respondents and then reported the highest gains in confidence. I would argue that these differences may reflect pedagogical, environmental, and perhaps demographic differences specific to students at this site. First, their course was a two-semester capstone course with expectations for original



research and a 40-page senior thesis. None of the other respondents faced these requirements, possibly accounting for higher levels of preAnxiety and lower levels of preConfidence. Second, these students attend an all-women's small liberal arts college and library instruction was embedded in the curriculum for the class. These students were more likely to have attended a library instruction class and also were more likely to have used reference services. When compared to students at site D, who had no library instruction and asked very few reference questions, we might conclude that library instruction increases the likelihood of using reference services because of increased awareness. This point is affirmed in the literature (e.g. Julien and Boon, 2004) and also through statistical tests in the current study showing that among these respondents, attending a library instruction class was correlated with using reference services. Demographic factors may also be in play as an association between sex and use of reference services was found, though it disappeared when students at site B were removed from the analysis.

High rates of students at sites A, E, and F noted that library instruction was their 'top' library service and that it was helpful to them during the 'Finding other sources' stage. Even up to 44% of respondents at site F claimed they benefited from this 'top' library service during this activity. Students at sites B, C, and D demonstrated much lower rates of enthusiasm for this service during this stage. The timing of library instruction sessions during the semester at sites A, E, and F may have some bearing on this result. Library instruction sessions at sites A, E, and F were conducted in the first 4 weeks of one semester capstone courses. This is also the time when students were expected to develop topics and compile bibliographies, presumably requiring the skill of finding secondary sources.

### **8.1.2 Research question #2**

Does the choice of resource type vary by stage of the research process, by demographic categories, by levels of academic effort, or intensity of library use?

This study provided evidence that the importance of certain types of resources, services, and facilities varies by stage of the research process during undergraduate history projects. As reported in section 6.2.5.2 and seen in Figure 8.1, the proportion of students using their most-important electronic resource varied from 32% during the ‘choosing a topic’ activity to 80% during the ‘gathering evidence activity’. The use of library facilities and equipment varied from 14% for the ‘choosing a topic’ activity to 53% during the ‘writing’ activity. Similar variations can be seen for traditional resources and services. While these variations seem natural, they must be treated with caution in this dataset. ‘Most important’ library uses account for 462 of the 1,806 uses reported by all students. This accounts for 25.6% of all uses, leaving 74.4% of all use during the project untracked by learning activity. Respondents’ use of their second and third most popular library uses in each category may have varied in significant ways.

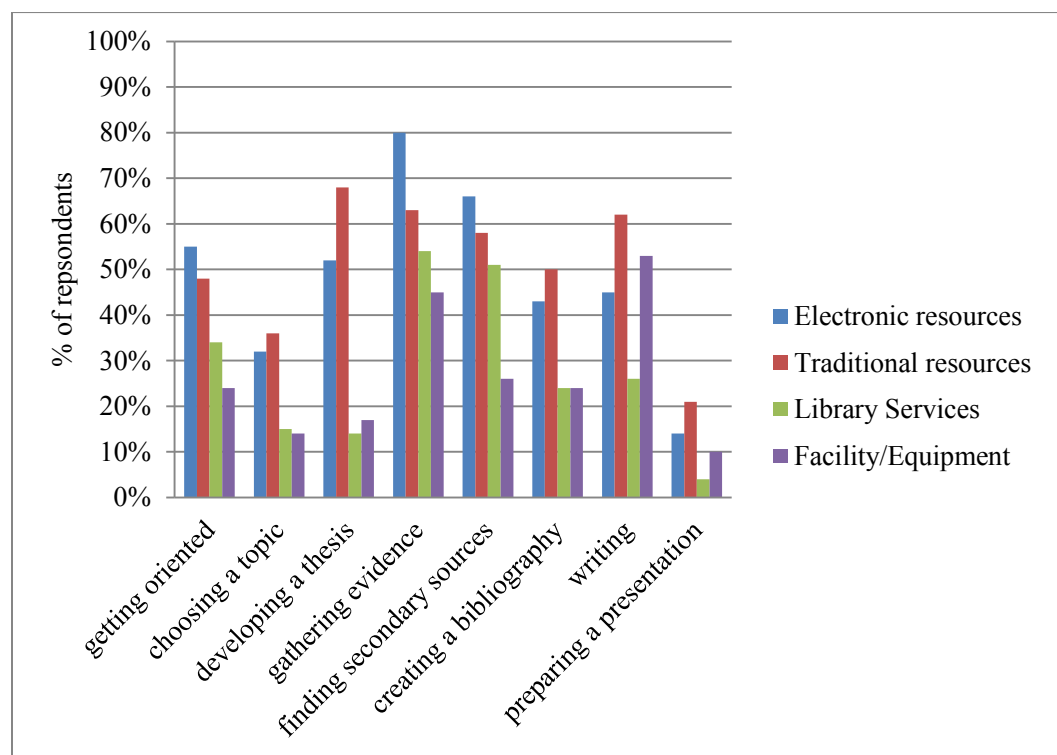


Figure 8.1 'Most important' uses by type and learning activity

As reported in chapter 7, very few demographic variables predicted use or non-use of library resources, services, or facilities. The nontraditional scale did not predict use behaviors

among this sample. Transfer students and older students in this sample were more likely to be non-users. By and large though, relatively few demographic variables were predictors of use. This can be explained, in part perhaps, by the relatively homogeneous population of students who participated in the study. A vast majority of students were of traditional college age and attended college full-time. Relatively few respondents reported their status as nontraditional (16.5%), non-white (7.9%), or first generation (8.7%) college students.

Diversity of use does seem to vary by site in this sample. Students at site B were more likely to be users of in-person services and students at site D were more likely to be non-users of in-person services. Curricular influences may be at work here, in that students at site B participated in year-long senior seminars and received library instruction where they may have been encouraged to use in-person services. Students at site D were enrolled in Baccalaureate Writing courses that covered a single semester. A review of the syllabi for these courses suggests that a library instruction session was not offered during the semester for students at site D, potentially reducing the level of awareness of in-person services among these students.

Three scales were used in the study to describe the study sample. The Deep Learning Scale measures the degree to which the student believes she has engaged in academically challenging, integrative, and reflective learning practices during the past academic year (refer to Appendix A for the specific questions used to make up this scale). Students with Deep Learning Scale scores of 80 or above were more likely to be users of in-person services than students with Deep Learning Scale scores between 60 and 79. This finding suggests students who exert more effort and are engaged in Deep learning practices are more likely to be users of in-person services. These findings are consistent with those reported by Whitmire (2001) and Gonyea and Kuh (2003) who reported library use to be associated with engagement in academically challenging activities. Deep Learning Scale scores did not predict that a student would use a wide range of resources, services, or facilities as measured by the *top\_total* index or that he would be a non-user of specific types of resources, services, or facilities as measured by the

nonuser\_total index. This is unsurprising, as very little variation on the Deep Learning Scale scores was observed among these respondents (see section 6.2). The Deep Learning Scale questions may be retained in future iterations for purposes of comparing study samples with the broader population at a given study site on this dimension. There was a statistically significant relationship between CSEQ library experiences scale scores and the top\_total dependent variable and the nonuser\_total dependent variable. The CSEQ library experiences scale measures the quantity and quality of effort students put forth in library-related activities associated with academic work. Students whose CSEQ scores ranged from 35 to 40 were more likely to have top\_total scores of 1 or greater. Students whose CSEQ scores ranged between 10 and 15 were more likely to be non-users of library services. This finding suggests that the CSEQ scale provides information that is redundant to that gathered in ULI critical incidents. Therefore the CSEQ library experiences scale may be left out of the protocol in the future.

Nontraditional students made up 21 of the 127 respondents (16.5%) and there were few statistically significant differences between these respondents and their peers. One statistically significant finding is that these students exhibited higher levels of preConfidence than did traditional college students ( $\chi^2 = 11.59$ ,  $df = 4$ ,  $p = .0206$ ), but the practical significance of this finding is unclear as this had no impact on information use behaviors and there was no difference in postConfidence or diffConfidence when comparing traditional and nontraditional students in this study. The nontraditional student scale will be retained for future analyses because of its potential with other student populations. Approximately 70% of college students enrolled in college today exhibit at least one nontraditional trait (U.S. Department of Education, National Center for Education Statistics, 2002), and examining library support for these students will be increasingly important from a policy and planning perspective.

### **8.1.3 Research question #3**

What aspects of library use are found to help or hinder student efforts to achieve learning objectives associated with their academic work?

One-hundred-twenty-seven respondents identified 2,138 factors related to ‘most important’ library uses, 75% of which were helpful. Factors were categorized by theme and subjected to inter-coder agreement testing as described in section 6.2.7:

- Access to information
- Access to tools
- Affect of staff
- Anxiety
- Availability of space
- Convenience
- Ease of use
- Help finding information

Participation rates for these themes exceeded 25% in the current study suggesting their validity, at least among these respondents (see Table 8.1). Exhaustiveness rates also contribute to their validity among this sample of responses. Seventy five percent of helpful factors were expressed by the first 20% or fewer respondents at all six sites. And seventy five percent of problematic factors were expressed by the first 35% or fewer respondents at five of the six sites. This steep increase in the number of themes noted among the responses across all six cohorts followed by a leveling off indicates the themes are expressed thoroughly both within and between groups.

Table 8.1 Participation rates for factors of use by theme

	Total	
	Helps	Problems
Access to information	99.2%	61.4%
Access to tools	28.4%	9.5%
Affect of staff	40.2%	2.4%
Anxiety	16.5%	35.4%
Availability of space	75.6%	35.4%
Convenience	88.2%	26.0%
Ease of use	83.5%	23.6%
Help finding information	58.3%	17.3%
Issue with assignment	0.8%	2.4%

While inter-coder agreement tests and participation and exhaustiveness rates suggest these themes are stable, the underlying factors assessed in this project could be enhanced. These suggested changes, discussed in detail in section 6.2.7.3, will be summarized here.

In several cases, students entered other factors which were more precise than the response categories. For instance, several students mentioned the fact that electronic resources provided access to electronic full-text or “provided information in the language I needed.” These benefits could fall under the factor ‘provided information I needed,’ yet this category was too general to articulate their concerns. In other cases students elaborated on their computer problems. In future projects, new factors will be added to support the more common benefits or problems noted by students. Factors associated with influences of staff affect could also be expanded in this manner.

Factors in the ‘availability of space’ theme were very popular with this cohort, but new factors are needed to clarify how students use library space. Specific enhancements may be drawn from a pool of questions used in the Learning Behaviors survey created by Scott Bennett (2011). Bennett generated his list of learning behaviors from NSSE survey questions which isolate activities such as ‘studying alone,’ ‘studying in groups,’ and ‘studying alone, in proximity to other students.’ Other factors will be added to determine cross-use of library facilities, services, and resources. For instance, students in participant checks reported using library space because of its proximity to equipment like computers or microfilm readers, traditional resources, or service points. New categories which tap these benefits will be added and evaluated in future projects. Librarians seeking feedback to improve services will benefit from more precise ‘factors of use’ in the instrument.

#### **8.1.4 Research question #4**

A premise of the ULI framework is that focusing on library use during high-impact coursework in the academic major will be an effective approach for demonstrating library impact on student learning. Does the ‘Learning Activities Crosswalk’ provide support for this assertion?

The ‘Learning Activities Crosswalk’ consisted of three parts, learning activities, student learning outcomes, and mappings to the rubric/tuning outcomes, each is discussed in turn.

Learning activities are the ‘work tasks’ associated with an academic project. The activities used in this project were derived from qualitative studies (Rodriguez, 2006, 2007) and informed by Carol Kuhlthau’s model of the information seeking process (2004). These activities provide the mechanism for linking information behaviors to student learning outcomes. In the ULI framework for undergraduate History (Figure 8.2), library use is viewed as a component of student effort during high-impact activities such as writing-intensive and capstone courses. These are times when students develop and demonstrate the competencies expected for the academic major. Activities used in this study are reproduced in Table 8.2.

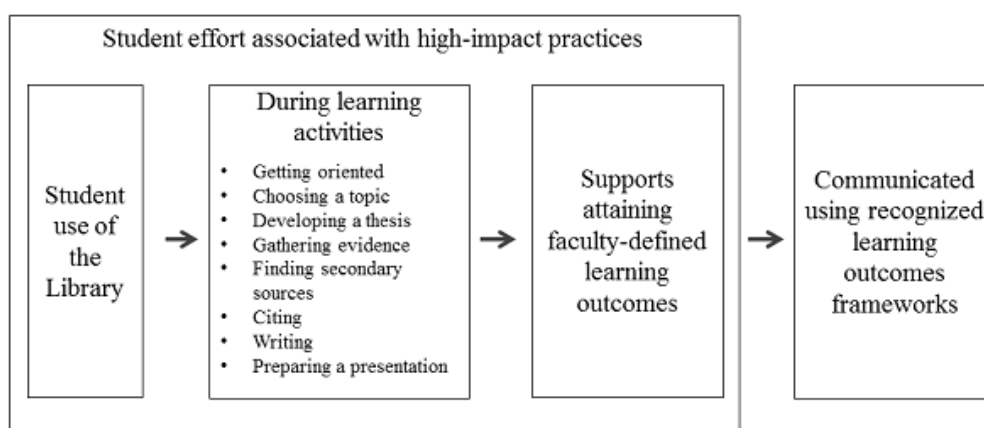


Figure 8.2 Learning activities and the Understanding Library Impacts framework

Table 8.2 Learning activities for History majors

Activities	Definitions
1 - getting oriented	Similar to the ISP’s ‘initiating task’ in that the student may be coming to terms with the scope of the assignment and the range of information resources appropriate for their project.
2 - choosing a topic	Similar to the ISP’s selection and exploring stages. The student is actively looking for a topic now and they may be analyzing and evaluating primary and secondary sources in part to look for a topic and also to be assured that there are adequate resources available to support a significant research paper.

*Continued*

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3 - developing a thesis statement	Similar to the ISP's formulation stage. The student is creating his or her argument and will likely be in the process of writing a research proposal for his or her professor's review and approval.
4 - gathering primary sources as evidence to support my thesis	Similar to the ISP's collection stage. The thesis is likely already decided upon and the student is pulling together resources to support their argument. This stage likely includes acts of finding, evaluating, analyzing, and using primary materials.
5 - finding secondary sources	Also similar to the ISP's collection stage, but focused on secondary sources which are important in History coursework
6 - creating a bibliography or documenting my work	Related to the ISP's presentation stage. This is a discrete deliverable in the writing of a research paper, but information use activities in support of this task likely occur throughout the research and writing process.
7 - writing or creating the final product for the assignment	This activity is intended to align with the ISP's presentation stage. While writing likely occurs throughout the project, much of this activity probably occurs during preparation of proposals, drafts, and then the final product.
8 – preparing for a presentation	This activity is intended to align with the ISP's presentation stage as well.
9 - other (write in)	Respondents may write in their own activities

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In this study, 127 students recalled memorable times when using information resources and services during these learning activities in relatively consistent patterns across each cohort. Seven activities were used in phase 1 (see Table 8.3). Participation rates exceeded 88% across six of seven activities at site A and rates exceeded 70% across six of seven activities at site B. Minor changes and a new activity, preparing for an oral presentation, were added to the crosswalk in phase 2. Participation rates exceeded 70% for 6 of 8 activities at site C and site E. Participation rates exceeded 70% of respondents for seven of eight activities at site F. Participation rates at Site D, where lower use of services was reported, exceeded 60% for 5 activities and rates exceeded 70% for 3 activities. Participation rates varied most during the



choosing a topic, creating a bibliography, and preparing for an oral presentation activities (phase 2 only). Butterfield et al. (2005) cite a 25% participation rate in a given category or theme is an adequate ceiling for accepting the validity of a theme in a CIT study. All of the learning activities used in this study meet these criteria.

Table 8.3 Respondents reporting 'most important' uses by learning activity, sites A & B

	Site A	Site B
getting oriented	88%	83%
choosing a topic	53%	71%
developing a thesis statement	88%	79%
gathering evidence	100%	92%
finding other relevant sources	100%	79%
creating a bibliography	88%	58%
writing	88%	88%

Table 8.4 Respondents reporting 'most important' uses by learning activity, sites C - F

	Site C	Site D	Site E	Site F
getting oriented	75%	64%	83%	87%
choosing a topic	61%	36%	42%	67%
developing a thesis statement	83%	64%	88%	87%
gathering primary sources as evidence	89%	91%	75%	87%
finding secondary sources	83%	82%	100%	87%
creating a bibliography	75%	45%	71%	73%
writing	86%	82%	96%	87%
preparing for an oral presentation	44%	9%	54%	73%

Responses to open-ended questions about a challenge faced during a project also included references to the learning activities used in the crosswalk. As shown in Figure 8.3, 96 students identified the activities during which they faced a challenge. Patterns again emerge as approximately one third of respondents reported challenges during the early stages of the project with a peak when developing a thesis and gathering evidence. Forty percent of the 96 'challenges' respondents reported challenges during the finding secondary sources activity and 50% reported challenges during the writing activity. These patterns echo the patterns of use reported for 'most important uses' suggesting the activities reflect common stages experienced by

students completing history projects. The frequent mentions of the stages in the qualitative comments such as ‘developing a thesis,’ ‘finding primary sources,’ and ‘writing’ again affirm the authenticity of the activities.

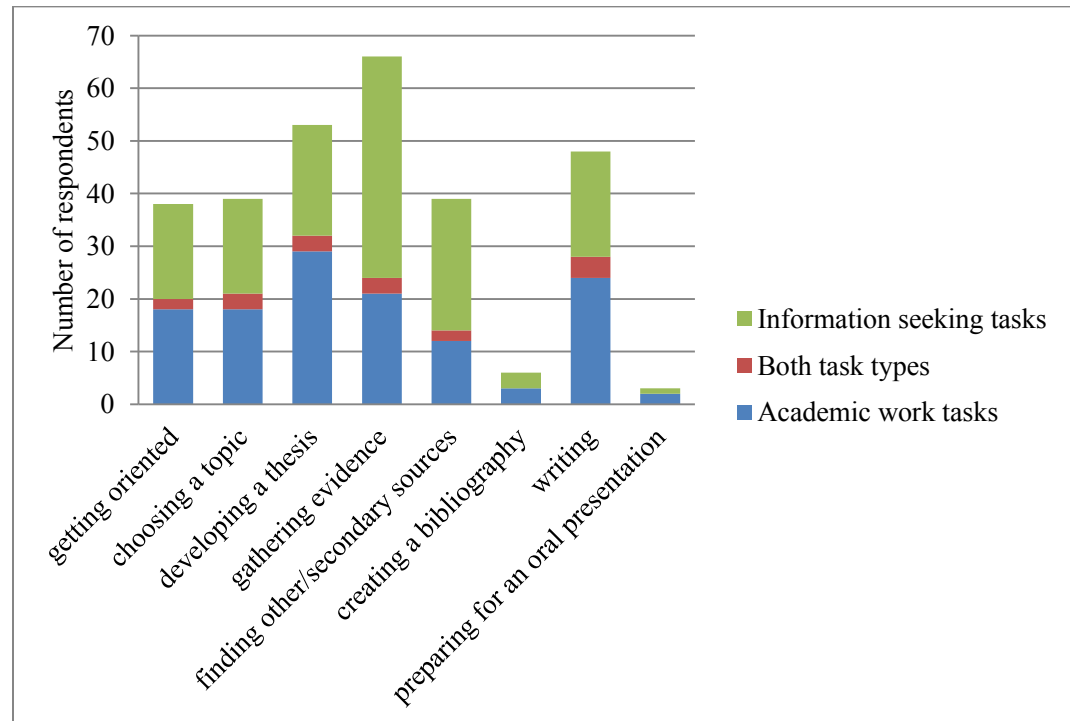


Figure 8.3 Learning activities during which challenges were encountered by type of task

The learning activities were also mentioned in open-ended responses to questions about challenges faced during the project. Thirty-four of 87 challenges (39%) reported by respondents were categorized as academic work tasks including getting started, choosing and narrowing a topic, developing a thesis and building an argument, and writing (see Figure 8.3). Fifty-three of 87 challenges (61%) pertained to information seeking tasks that also aligned with learning activities used in the instrument. Post-survey participant checks also asked if the learning activities reflected the students’ experiences during their project. Each of the three respondents reported participating in all of the activities mentioned in the instrument. Interviews with participants after completing the survey, review of syllabi, and conversations with faculty suggest two further changes to the categories are needed. The activity of preparing for an oral presentation should be expanded to cover a wider range of presentations such as multi-media and

poster presentations. Peer-review is another activity which should be represented in the list of activities. This activity was mentioned in 2 of 3 participant-check interviews and is mentioned in several documents regarding evidence for student learning including syllabi and the Tuning Outcomes from History developed in Indiana (ICHE, 2010).

Caution should be taken when interpreting reported behaviors associated with these academic tasks as several data points suggest they may not be temporally distinct. This was evident as respondents noted use of most important resources, services, and facilities during an average of 3.4 learning activities each. For instance, a student may have used a ‘top-ranked’ resource while choosing a topic, developing a thesis, and finding secondary sources. Similar data emerge from analysis of the challenges data, where 87 respondents reported challenges occurring during an average of 3.45 learning activities. The experience of student B-19 illustrates this point. Her reported challenge was, “I was having a difficult time locating primary sources,” which was faced during four learning activities: ‘choosing a topic,’ ‘developing a thesis statement,’ ‘gathering evidence to support my thesis,’ and ‘finding other relevant sources.’ Similarly student D-09 wrote that she had problems “choosing a topic that was broad enough that I could find information but not too broad so that there was too much information to cover” during the learning activities of ‘getting started,’ ‘choosing a topic,’ ‘developing a thesis statement,’ ‘finding other relevant sources,’ and ‘writing.’ These findings are consistent with those reported by Kuhlthau when she found that stages of the ISP overlapped (2004, p. 83).

As discussed in section 6.1, a common set of expectations for student learning was derived from three sources: prior studies (Rodriguez, 2006, 2007), reports of learning expectations for history majors (e.g. Galgano, 2007), and documentation from study sites. Coders conducted multiple iterations of document analysis to refine the common set of expectations into learning expectations in four areas: discipline specific skills, evidence and analysis, developing the thesis, and communication. Subsequent assessment suggested the common set is a coherent and reasonably complete description of discrete outcomes associated with capstone coursework in

undergraduate history. Further mapping was conducted linking the common student learning outcomes to elements of the VALUE rubrics and the Tuning outcomes for History.

All of the ‘discipline-agnostic’ outcomes from the common set mapped to elements of the VALUE rubrics (see Table 6-10). Basic disciplinary skills of finding and locating information and skills of evaluating and interpreting information mapped clearly to the information literacy rubric. Discipline-specific skills of distinguishing among sources and using secondary sources to place an argument in the context of previous scholarship were not present in the VALUE rubrics at all. Expectations related to the use of evidence and analysis mapped to information literacy, inquiry and analysis, and critical thinking rubrics. Outcomes related to thesis and argument as well as communication mapped to elements of the critical thinking, inquiry and analysis, and writing rubrics. The VALUE rubrics are intended to support local assessment of student achievement of general education outcomes. The success in demonstrating these mappings in the ULI provides a clear mechanism to connect library use to general education assessment efforts.

Mappings to the Tuning outcomes for History were largely successful as well. The Tuning mappings are demonstrated with examples from a capstone rubric developed by the Utah State University History department (2009) intended to serve as a “scoring guide” to “help clarify how instructors evaluate tasks within a course” (McInerney, 2010). The rubric was derived during the Utah Tuning project (TuningUSA, 2009) and defines a set of expectations for grading capstone projects, such as:

1. Student demonstrates an understanding of the key historical events related to the thesis
2. Student frames historical questions in a thoughtful, critical manner
3. Student evaluates and analyzes primary sources
4. Student evaluates and analyzes secondary sources, demonstrating an awareness of interpretive differences
5. Student employs a range of primary sources appropriate to the informing thesis of the paper
6. Student employs a range of secondary sources appropriate to the informing thesis of the paper
7. Student presents a well-organized argument
8. Argument is well-substantiated; student properly cites evidence
9. Student demonstrates proper mechanics of writing

The Utah State learning outcomes were incorporated into the ULI data model. For instance, a student who is ‘choosing a topic’ or ‘developing a thesis’ is developing and demonstrating the ability to ‘frame a historical question.’ A student ‘gathering primary sources as evidence’ is developing and demonstrating the abilities of ‘evaluating and analyzing primary resources’ and ‘employing a range of primary sources appropriate to the informing thesis.’

Aggregate results from the study help demonstrate connections between library use and expectations for learning outlined in the Utah State capstone rubric.<sup>3</sup> For instance,

- 46% of respondents at Site F used their most important traditional resources (principally books) when choosing a topic; 88% of respondents at Site A and 64% of respondents at Site C used their most important traditional resource when developing a thesis.
  - These are times when students develop and demonstrate the abilities of
    - framing a historical question (rubric expectation 2) and
    - evaluating and analyzing primary and secondary sources (expectations 3 and 4)
- 73% of respondents at Site D, 75% of respondents at Site E, and 92% of respondents at Site B used their ‘most important’ electronic resources (the library catalog, e-journals, digital primary sources, and indexes and databases) when *gathering evidence to support a thesis*.
  - This is a time when students develop and demonstrate the abilities of
    - evaluating and interpreting primary sources (expectation 4) and
    - employing primary sources appropriate to the informing thesis (expectation 5).
- 54% of respondents at Site E, 64% of students at Site D, and 67% of students at Site F used their ‘most important’ facility or equipment (including study space and library computers) during the task of *writing*, a time when students develop and demonstrate the abilities of
  - organizing an argument (expectation 7),
  - citing evidence (expectation 8), and
  - demonstrating proper writing mechanics (expectation 9).

Quantitative and qualitative data gathered for individual students reinforce these connections: Student F-05, for instance, used 14 types of resources, services, and facilities during

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<sup>3</sup> Portions of this section appeared in “Answering questions about library impact on student learning” (Rodriguez, 2012).

his project including interlibrary loan, visiting the archives, and participating in a library instruction class. His interpretation of the learning objectives for the project matches the Utah State rubric expectations of ‘evaluating and interpreting primary sources’ and ‘employing secondary sources toward his thesis’ (expectations 5 and 6):

“My professor wanted us to be able to study primary sources in-depth, while using multiple, effective, secondary sources in order to produce a substantial piece of professional historical writing.”

His ‘most important’ uses by learning activity are presented in table 8.5.

Table 8.5 Student F-05's ‘most important’ library uses and challenge by learning activity

getting oriented	choosing a topic	developing a thesis	gathering evidence	finding secondary sources	Citing	writing	preparing to present
						electronic books	
			book(s) checked out from the library				
	interlibrary loan (ILL)					ILL	
				study carrel in the library			
		challenge				challenge	

He also described a challenge that clearly reflects effort toward demonstrating the ability to

‘frame a historical question in a thoughtful manner’ (expectation 2):

“Developing my thesis statement into one that can adequately address a significant historical question, and making sure that I was able to carry out that thesis in my research paper.”

He said he faced this challenge when developing his thesis and writing his paper. These are also times when he used his most important resources and services. Like many of the male respondents, he did not use in-person services. Female respondents were more likely than men to use in-person services like reference services or research consultations. However, there is hope that next time he will ask for help:

“I am confident that I have met expectations for this project. In the future, I would have started writing the paper earlier and therefore have understood the problems of my particular paper earlier and would have therefore been able to seek the appropriate help (through the library, professor, peers, etc.)”

Another example is from Student C-12, who is aged 23-30 and a 5<sup>th</sup> year senior attending college full-time. She worked 2 jobs and held an internship when completing her capstone project. She used 24 types of library resources, services, and facilities and her most important uses were electronic journals, books, research consultation, and computers in the library (see Table 8.6). Her reflections on the learning objectives associated with the project mirror the rubric expectations of ‘employing a range of primary sources appropriate to the paper’:

“... When it came to the paper she [my professor] wanted us to work with many sources learning how to decide which ones are the best to put towards our paper. She also wanted us to learn how to become better writers.”

Table 8.6 Student C-12's ‘most important’ library uses and challenge by learning activity

getting oriented	choosing a topic	developing a thesis	gathering evidence	finding secondary sources	citing	writing	preparing to present
			e-journals				
			books I checked out from the library				
			research consultation				
			computers in the library				
challenge			challenge				

Student C-12 reported a challenge narrowing her topic related to the Utah rubric element ‘framing a historical question’ (element 2) and concerns about finding enough resources related to the Utah rubric element ‘employing a range of primary and secondary sources’ (elements 5 and 6):

“Narrowing down my topic as much as the teacher wanted. I was concerned that I was not going to be able to find enough information and write such a big paper on a narrow topic.”

This challenge occurred during the getting oriented, choosing a topic, and gathering evidence stages of the project. She overcame this challenge when gathering evidence and finding secondary sources:

“[I] Did a [research consultation] session and worked with a librarian to find many more sources through different databases and journals.”

Student C-12 was anxious before and during the project, but reported improved confidence after completing the project. Respondents like her, who used research consultations and reference services were more likely to report increases in confidence than those who did not. Later she said she thought she achieved the learning objectives associated with the project:

“I think I did. If I could do this project again I would try to not wait till so far at the end to put the paper together.”

A fundamental assumption of the ULI framework is that focusing library assessment efforts on work tasks in high-impact activities within the academic major will yield credible and authentic evidence of library impact on student learning. The theoretical basis for analyzing information use by work tasks, the high levels of agreement found between the common set of SLOs and the Tuning outcomes for History, participation rates in the learning activities categories observed in the critical incidents, and the quantitative and qualitative data generated in the incidents provided compelling evidence of the utility of this approach.

#### **8.1.5 Research question #5**

Are the CIT survey content categories and item response categories representative of respondents' experiences using library related resources, services, and facilities in the course of their academic work?

As discussed previously, participation rates regarding types of library uses and the factors (helps and problems) associated with that use exceeded the minimum threshold of 25% for validity suggested by Butterfield et al. (2005) and in many cases exceeded 75%. While the themes seemed stable, some changes are required. New factors of use may be added in the future as noted in response to research question #3. Additional learning activities associated with preparing multiple types of presentations and conducting peer-review activities should be incorporated into the crosswalk. Finally, the instrument used in phase 2 was tuned to account for the variety of information resources and services students use during history projects. Other resources and services may need to be added to account for student effort toward learning



outcomes associated with a different academic major. Similarities between these study findings with results of other projects (e.g. Saracevic and Kantor, 1997a, 1997b; OCLC, 2006a; Head and Eisenberg, 2009, 2010; Wong, et al. 2009, Hampton-Reeves et al., 2009; Prabha, et al, 2007) lends criterion validity to these findings and coherence of the response categories.

Responses to open-ended questions, as reported in section 6.2.9, reinforced or complemented findings from the partially-open questions. For example, 15 out of 50 recommendations (30%) for the libraries (section 6.2.8.1) were related to issues with library space, echoing and elaborating on the factors found in the ‘Availability of Space’ theme. ‘Access to information’ and ‘ease of use’ factors were elaborated upon in ‘open-ended’ comments regarding electronic and traditional library resource uses. The ‘Access to information’ theme was also reinforced by the high proportion of students reporting library use and challenges during the gathering and finding activities. Recommendations for the libraries also reinforced this theme as stated by this student at site A: “We just need more books and archived information... not enough resources, but inter-library loan helps!” (A-8)

The theme of anxiety was reinforced in two ways. First, anxiety due to being overwhelmed was the second strongest theme emerging from the analysis of challenges reported by students as measured by participation rates. Second, the distribution of responses to questions about anxiety before and during the project demonstrates the strength of this theme. A majority of respondents reported agreeing or strongly agreeing with the statements:

“[Before starting the project]I was worried about being able to find enough information”  
(preAnxiety)  
“At times during this project I became anxious about finding information”  
(duringAnxiety)

The left-skewed and bi-modal distributions of these responses displayed in Figure 8.4 illustrate this point.

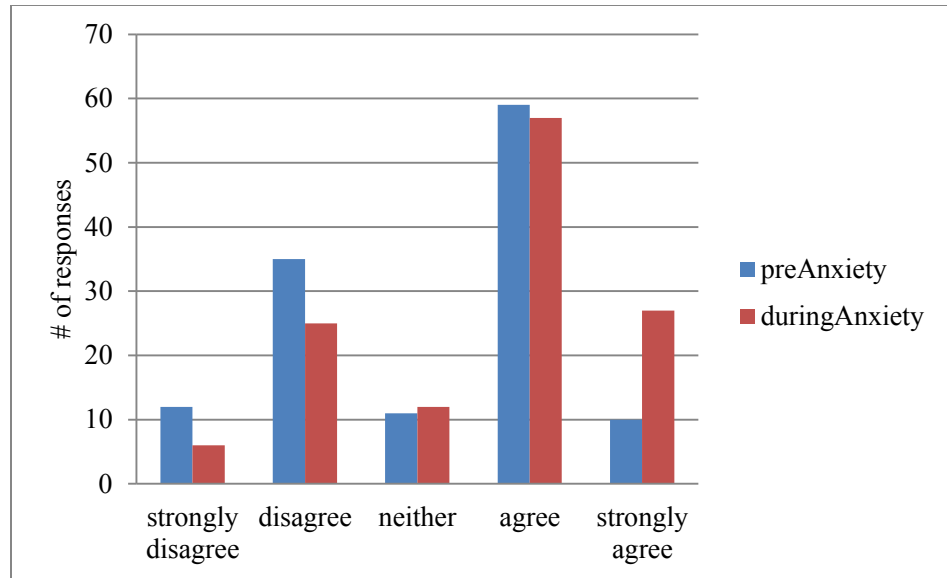


Figure 8.4 Distribution of responses to preAnxiety and duringAnxiety questions

#### 8.1.6 Research question #6

Do open-ended questions in the CIT survey gather information about library impact that complement and augment data gathered in other parts of the instrument?

As reported in detail in sections 6.2.8, 8.1.4, and 8.1.5, responses to open-ended questions reinforced and complemented other findings. This fact alone justifies retaining these questions. As observed in section 6.2.8, the richness of student responses to these questions suggests the effort required to answer these questions is within reason.

#### 8.1.7 Research question #7

Do students' reports of their behaviors regarding academic challenge and effort expended in library-related activities as measured using responses to the NSSE and CSEQ questions correlate with responses in other parts of the survey? If not, can retaining the NSSE and CSEQ questions in future versions of the CIT instrument be justified?

A statistically significant association was found between Deep Learning Scale scores and the use of in-person services ( $H(4) = 9.2868$ ,  $p = 0.0257$ ). Students with scores above 80 were more likely to use in-person services than respondents with scores between 60 and 79. This finding hints at a relationship between library use and academic challenge as found by Gonyea

and Kuh (2003). The practical significance of this finding in this study is muted by the low degree of variation found in Deep Learning Scale scores among these students ( $M = 77.25$ ,  $SD = 15.7$ ). Independent sample t-tests and one-way ANOVA tests revealed no statistically significant differences on the Deep Learning Scale scores or the three subscales by site, course, gender, first generation student status, transfer status, ethnicity, residence, work status, or traditional student status. This lack of variation suggests this sample of students exerts relatively high levels of effort during coursework. However, these academic challenge questions appeared after the critical incident portion of the instrument. Therefore, it is possible that respondents were not reflecting on their effort over 'the past 12 months' as instructed, but were basing their responses on the level of effort they exerted during their project. Further evaluation is needed. One way to explore this effect would be to compare ULI data with institutionally gathered NSSE data. Students complete the full NSSE survey at the end of the first year of college and at the end of the last year of college. ULI-derived Deep Learning Scale scores could be compared with NSSE-derived Deep Learning Scale scores to explore the possibility that ULI-derived Deep scores are 'colored' by the recent academic experience of a capstone or writing-intensive experience. Another approach would be to implement ULI in phases throughout a semester. The Deep Learning Scale questions could be asked at the beginning of the semester, before the students begin work on their projects, and linked to data gathered in subsequent ULI administrations.

Similarly, there was little variation on CSEQ scale scores ( $M = 29.28$ ,  $SD = 5.21$ ) among the respondents. Independent sample t-tests and one-way ANOVA tests revealed no statistically significant differences on the CSEQ scale scores by gender, first generation student status, ethnicity, residence, or work status. Significant differences were found by site. Post-hoc comparisons using revealed the mean score for students at site D was significantly lower than the mean score for students at site A and mean score for students in Baccalaureate Writing courses was significantly lower than the mean score for students in Senior Seminars. Statistically

significant differences were also found by transfer status and nontraditional student status.

Transfer and nontraditional students had lower CSEQ scale scores than other students.

However, as reported in chapter 7, CSEQ scale scores were related to the use of in-person library services and the non-use of library services. This suggests the data gathered with the CSEQ may be redundant when compared with data generated by the ULI critical incident survey. For this reason, the CSEQ questions may be removed from the ULI instrument in future projects.

#### **8.1.8 Research question #8**

Do students recall incidents from 1 semester or one year ago as clearly as they recall recent incidents?

The survey at study site A was administered in late April and early May 2011. Students enrolled in research methods and senior seminar courses during the fall of 2010 and spring 2011 responded to the survey. Fifteen of seventeen responses received were from students enrolled during the spring of 2011. Further analysis of responses indicates that the 2 responses from students enrolled during the fall of 2010 are just as rich as those provided by students in the other cohorts. These students both left remarks to all open-ended questions. Further, the number of factors these students selected, 13 and 20 respectively, were within one standard deviation of the mean number of factors selected by other students enrolled in the senior seminar at Site A: ( $M = 18.75$ ,  $SD = 4.166$ ). However, the sheer lack of response from research methods students from fall 2010 and the low response rate from the fall cohort is a clear signal that the instrument is best distributed during the semester in which the course project is completed. A similar time-lag was observed when collecting responses at site C during August 2011. In this case, four of six students enrolled in a seminar held during summer session (late June through early August) responded to the survey and eleven of 54 (20.4%) of students enrolled during the spring semester responded to the survey.

## 8.2 Limitations and methodological considerations

### 8.2.1 Limitations

This study focuses exclusively on the information use experiences of undergraduate students enrolled in upper-level and capstone courses in History in the United States. This was an intentional design choice to narrow the scope of the study and to conduct a thorough evaluation of the framework and its instruments within the context of a single discipline. As noted in chapter one, the framework is intended to be applied in other disciplines, yet it would need to be altered to match assumptions about the learning outcomes and learning activities appropriate for a given discipline and the range of information resources and services students use during these learning activities. No attempt was made in this project to adapt the framework to other disciplines.

The instruments evaluated in this study focus on students' information behaviors when participating in high-impact learning experiences such as writing-intensive and capstone coursework in the discipline of history. A limitation of the study is that definitions of high-impact experiences will likely vary by discipline (e.g. history vs. psychology) and level (e.g. associate vs. bachelor's degree programs). Further there is evidence that access to high-impact experiences varies by institutional type and personal student characteristics. For instance, George Kuh (2008) reports that in 2005, 55% of students at liberal arts colleges (Carnegie class B&AS) like sites B and F had access to a culminating experience in the academic major compared with 29% of students enrolled at very high research universities like site E.

Table 8.7 Percentage of U.S. college students with access to senior experiences, 2005

Characteristic	% of students with access to culminating senior experience	
Sector	Private: 42%	Public: 29%
Enrollment status	Full-time: 35%	Part-time: 22%
Ethnicity	White: 34%	African-American: 27%
First-generation	No: 36%	Yes: 29%
Transfer	No: 38%	Yes: 25%
Age	< 24 years of age: 37%	24 years & older: 24%

Source: Adapted from Kuh, 2008, Table 3: Percent participation in High-Impact Activities by Institutional and Student Characteristics, p. 16.

There are several limitations to this study related to sampling and data analysis methods. The critical incidents survey yielded 127 critical incidents accounting for response rates ranging from 24% to 55% at each site. Participation rates and exhaustiveness tests suggest the instrument captured the essence of these students' experiences. However, the data collected may not be representative of all students enrolled in these specific courses both because of the low response rates and the possibility that those students who elected to participate varied in significant ways from their non-responding peers. Further the target population included students enrolled in upper-level, writing-intensive, or capstone courses. Eighty-four percent of these students were seniors. Given attrition rates at these institutions,<sup>4</sup> these students represent the 'survivors' and so the perspectives of students who drop-out are not reflected in these data. All of the students who participated in the project were enrolled in undergraduate history classes, but this does not suggest findings from the study are generalizable to all students taking college history courses.

While the Critical Incident Technique is a widely accepted approach to gather and interpret self-reported data, some have doubts regarding the use of self-reported data in information behavior studies. No attempt was made to gather other artifacts of library use or academic performance to corroborate student self-reported data.

The ULI protocol uses the Critical Incident Technique to encourage student respondents to recall aspects of their experiences in detail, increasing the authenticity and credibility of the results. Rich results from the respondents suggest this was successful, but the instrument may

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<sup>4</sup> Six-year graduation rates for students enrolling during 2004 at the three public institutions in the study ranged from 50% to 80%. Six-year graduation rates at the three private institutions in the study ranged from 75% to 88%. Source: United States Department of Education. National Center for Educational Statistics. (2012). *The College Navigator*. Retrieved 4/14/2012 from <http://nces.ed.gov/collegenavigator/>

have missed important influences. For instance, portions of the instrument focus on the ‘most important’ library uses of each use category. This emphasis on ‘most important’ uses may have resulted in missing factors of use associated with ‘second or third most important’ uses. Therefore aspects of ‘most important’ library uses during capstone coursework may be *under-*reported by the CIT survey instrument. This is especially the case when considering the likelihood that a respondent’s second or third ‘most important’ electronic resource, may have been more important than any of the traditional resources used in the project. An alternate approach would have involved successive blocks of questions by learning activity, first asking respondents if they participated in a given activity and if so, drilling down into their experiences using library and information sources in each activity. This approach would have likely increased cognitive load during the survey and survey attrition rates would have been much higher.

A caveat for consumers of these results is that the instrument may not have captured all of the pertinent library and information use activities students engaged in during these projects. The relatively robust number of responses for a critical incident based study (127), the high participation rates for learning activities, library uses, and factors of use, as well as saturation rates for the factors of use suggests, though, that the instrument has captured some of the most important and most memorable uses, activities, and factors to respondents in this study.

Five questions probed student perceptions of their anxiety before and during their research projects. Some students may have been more prone to anxiety than others. No attempt was made to assess or control for students’ predisposition for anxiety.

The learning activities crosswalk is a novel approach to the challenge of examining library use as a component of student effort toward achieving student learning outcomes. However, due to the limited nature of the study, the common set of learning objectives derived for this study may be missing key learning expectations that are important for undergraduate history majors. In some ways drawing on the VALUE rubrics and the Tuning learning outcomes should alleviate these concerns. Yet, these frameworks themselves are under development and

being evaluated. Reliability and validity testing of VALUE rubrics was occurring concurrent with the present study (Finley, 2012), and the Lumina Foundation has funded a 3-year national study to evaluate the Tuning Outcomes for History with the American Historical Association. This project was initiated in January 2012. The ULI protocol will incorporate future findings from these projects as they emerge.

### 8.2.2 Methodological considerations

The mapping process used to create the learning activities crosswalk was labor-intensive. Furthermore, course syllabi proved to be unreliable documentation of learning objectives for undergraduate history courses. A solution may be to distribute a brief checklist (see Table 8.8) to faculty participating in a ULI study. Expectations for student learning from the common set are listed on the y-axis and assignment types are listed on the x-axis. Faculty members would check a box if students are expected to demonstrate a given ability through a given assignment. A department completing the checklist will have created a curriculum map that can serve as inputs to the ULI model and also guide curriculum planning.

Table 8.8 Student Learning Outcomes checklist (excerpt)

Discipline: History						
Institution:		Course #:				
Professor:		Course type:				
		<i>Assignment</i>				
		Article review	Essay	Research paper pages	Bibliography	Test ...
<i>Students are expected to be able to ...</i>						
<i>Discipline specific skills</i>						
SLO001	locate secondary sources	X				
SLO002	locate primary sources					
SLO003	distinguish among sources (Primary vs. secondary)					
...						



## **8.3 Implications**

### **8.3.1 Implications for library and information science research**

This project makes contributions to the user-oriented literature of library and information science (LIS). The project illustrates the utility of the Critical Incident Technique (CIT) for examining library impact and adds to the growing ‘CIT-based’ literature in LIS. The project also demonstrated several methods for assessing the validity and reliability of CIT gathered data.

The project demonstrated the value of exploring information and library use as a component of student effort within the context of academic ‘work tasks.’ Several influences supported this choice. Paul Solomon’s (1997b) finding that individuals involved in work projects did not think of their information behaviors separate from their work tasks and Katina Byström’s (2000) ideas about task complexity drove the decision to focus the assessment lens on academic work tasks such as capstone projects. Carol Kuhlthau’s stages of the Information Search Process (2004) also informed the decision to isolate information uses by learning activity. Finally, Brenda Dervin’s Sense-making methodology was used to shape the factors of use probes and the open ended question about ‘a significant challenge faced’ during the project.

The decision to focus on a single work project and then break it down into discrete work tasks or learning activities paid several dividends. First, it was a natural fit for the Critical Incident Technique, which focuses on key aspects of a memorable experience to generate an understanding of factors that influence success or cause failure in a given activity. The learning activities themselves, ‘getting oriented,’ ‘choosing a topic,’ and so on, were easily recognized by student participants, encouraging authentic feedback. This application of a variation of the model of the Information Search Process (Kuhlthau, 2004) affirms its place as a useful framework for research design.

The probes used to derive factors of use and questions asked about challenges faced by the respondents demonstrated the feasibility of employing Brenda Dervin’s Sense-making methodology within the context of another method. The ‘challenge’ questions in particular

surfaced information about ‘gap-defining’ and ‘gap-facing’ behaviors, which reinforced other findings and generated user stories. These questions, coupled with the emphasis on learning activities also generated a wealth of information about non-library aspects of the projects. For instance, 39% of the challenges reported by respondents were related to academic work tasks such as choosing a topic or building an argument. History faculty participating in the project found these data particularly helpful for guiding curriculum revisions.

### **8.3.2 Implications for practice**

The ULI protocol is intended to answer the ‘how’ and ‘why’ questions of academic library impact. Demonstrating ‘how’ libraries contribute to student learning can help libraries address accountability concerns. An understanding of the factors of library use that support or inhibit student learning helps answer ‘why’ questions about library impact and can be used to improve services or reallocate resources.

#### **8.3.2.1 Demonstrating ‘how’ libraries contribute to student learning**

This project demonstrated a method for articulating library contributions to student learning outcomes defined by faculty and valued by stakeholders. The focus on academic work projects and the discrete (yet overlapping) learning activities yielded rich connections between library use and expectations for student learning. The learning activities were recognizable to students and served as the ideal unit of analysis for connecting information behaviors to expectations for learning. Crosswalks to learning outcomes frameworks such as the VALUE rubrics and the Tuning outcomes for History increased the value of the approach by making it possible to communicate library impact in terms of student learning outcomes recognizable within and across institutions. In section 8.1.4, connections between library use and the Tuning outcomes for History were illustrated with examples from the Utah State University History Department’s capstone rubric.

An implication for the library profession is that librarians should no longer feel constrained to library-centric measures when attempting to measure and demonstrate library impact. Instead libraries have a vehicle for working with teaching faculty and institutional research staff to examine the influence of library impact on student learning. This is a two-edged sword. Creating such partnerships and embarking on these kinds of analyses requires effort, trust, and a certain amount of risk on the part of the library.

#### **8.3.2.2 Understanding ‘why’ library use supports student learning**

The ULI protocol is intended to generate results libraries can use to adjust services and offerings to meet students’ needs, reallocate resources, or eliminate un-needed offerings. The project demonstrated how the Critical Incident Technique can be used to isolate factors of library use which help students or identify problems that plague them. Factors of use associated with eight themes were generated:

- Access to information
- Access to tools
- Affect of staff
- Anxiety
- Availability of space
- Convenience
- Ease of use
- Help finding information

Drilling down into these themes and examining their component factors can support improvement efforts. For instance, within the ‘Access to Information’ theme, 10-20 % of respondents reported finding too much or too little information when using their ‘most important’ traditional or electronic resources. Coupled with the finding that 23% and 24% of respondents reported being overwhelmed when using their most important traditional and electronic resources, respectively, these data suggest an opportunity to intervene through instruction or in-person services to help students improve their filtering skills. Comments about library space also suggest opportunities to make improvements. Fifty-five percent of students valued library space

as a quiet place to study, but 24% had trouble finding space to work and 13% reported difficulties with noise.

Open-ended responses complemented these data. For instance, numerous students expressed the need for more ‘primary sources’ appropriate to their project in open-ended responses in the survey. Further, a majority of students reported using electronic primary sources (70%) echoing the importance of this class of resource for professional historians (Rutner, 2012). However, 40% of the respondents who claimed e-primary sources to be their most important electronic resources also reported being overwhelmed when using them. Clearly, collecting and increasing the discoverability of these materials and helping students learn to use them should be high priorities for academic libraries.

Patterns of use of in-person services can also illustrate opportunities for adjusting services. Forty-six percent of respondents reported seeking help from a librarian during their projects. These figures are higher than those reported in other studies (e.g. OCLC, 2006a; Head and Eisenberg, 2009), but still one half of the respondents did not seek help from a librarian. Further, relatively few respondents sought help from a faculty member or librarian during a challenge faced in the project and fewer still said they would ask for help when faced with the artificial challenge of losing access to their top-ranked library use.

These data points present the libraries and history departments that participated in the study with the challenge or opportunity of increasing the proportion of students who take advantage of in-person services. This becomes apparent when analyzing data regarding the challenges faced during the project. Most of the challenges occurred in the choosing a topic, developing a thesis, and gathering evidence stages which correspond to Kuhlthau’s topic-selection and focus-formulation stages. Kuhlthau also found students had a good deal of difficulty during these stages in her studies. These are times when students are engaged in acts of construction in which the “user actively pursues meaning from information encountered over a long period of time” (Kuhlthau, 2004, p. 109) and can be accompanied by affective responses in

the forms of anxiety and a decrease in confidence. The current study reported similar phenomena as 84 (66%) of 127 of the respondents reported experiencing anxiety during their projects.

Kuhlthau (2004) suggests that these times are zones of intervention where libraries and, I suggest, faculty can intervene to help students overcome difficulties and move on in their work. At the same time, we must return to the second half of C. Robert Pace's remarks from 1984, when he stated: "Accountability for achievement and related student outcomes must consider both what the institution offers and what the students do with those offerings" (Pace, 1984, p. 4). That is, students also bear a responsibility for exerting effort to take advantage of the services, facilities, and resources their colleges and universities make available.

#### **8.4 Future work**

The current study focuses on undergraduate students' use of standard library sources and services when pursuing student learning outcomes associated with an undergraduate degree in history. However, the protocol should be extensible to a broad range of academic levels (associates, bachelors, or masters), disciplines (humanities, social sciences, sciences, or health sciences), and types of information or academic support resources (hybrid document-centric libraries, digital libraries and completely 'virtual' learning environments, or tool-intensive facilities like geographical information system 'GIS' and computing labs). Future projects may extend the protocol in these dimensions.

The current study demonstrated the feasibility of creating credible connections between student use of the library and *expectations* for student learning. Future projects will extend the protocol to support joining ULI results with individual students' achievement and attainment results. This development has benefits for libraries and teaching faculty alike. Libraries will gain of course further evidence of the aspects of library and information use which contribute to student learning. Teaching faculty will gain insights into how classroom emphases influence information behaviors and their subsequent impact on student performance. These projects will focus librarian and faculty attention on the same set of learning activities, learning outcomes,

student information behaviors, and curricular interventions. These projects will require collecting, encrypting, and storing student identifiers in the ULI database. Once implemented, this framework should support longitudinal studies for tracking student development and performance over time, supporting the evaluation of library service improvements and curricular interventions. New and deeper collaborations between libraries and teaching faculty will therefore be a side-benefit of projects which use this framework.

## **AppendixA. The Deep Learning Scale**

The Deep learning scale is generated using responses to twelve questions drawn from the National Survey of Student Engagement (Nelson Laird, Shoup, & Kuh, 2006).

### **Integrative learning**

In your experience at this college over the past year, how often have you done each of the following? 1 = never, 2 = sometimes, 3 = often, 4 = very often

Included diverse perspectives (different races, religions, genders, political beliefs, etc.) in class discussions or writing assignments

Put together ideas or concepts from different courses when completing assignments or during class discussions

Discussed ideas from your readings or classes with faculty members outside of class

Worked on a paper or project that required integrating ideas or information from various sources

Discussed ideas from your readings or classes with others outside of class (students, family members, co-workers, etc.)

### **Academic Challenge**

Over the past year, how much has your coursework emphasized the following mental activities?

1 = very little, 2 = some, 3 = quite a bit, 4 = very much

Analyzed the basic elements of an idea, experience, or theory, such as examining a particular case or situation in depth and considering its components

Synthesized and organized ideas, information, or experiences into new, more complex interpretations and relationships

Made judgments about the value of information, arguments, or methods, such as examining how others gathered and interpreted data and assessing the soundness of their conclusions

Applied theories or concepts to practical problems or in new situations

### **Reflective learning**

Over the past year, how often have you done the following?

1 = never, 2 = some, 3 = quite a bit, 4 = very much

Examined the strengths and weaknesses of your own views on a topic or issue

Tried to better understand someone else's views by imagining how an issue looks from his or her perspective

Learned something that changed the way you understand an issue or concept

## Appendix B: Tuning outcomes for History

The Indiana Commission for Higher Education (ICHE) led a Tuning project in 2009 with financial support from the Lumina Foundation. The project involved faculty, students, and employers and generated the following set of competencies in four areas: knowledge, thinking and analytical skills, communication skills, and personal motivation and initiative. The descriptions are drawn from the revised learning outcomes for bachelor's degrees presented in the ICHE final report (Indiana Commission on Higher Education, 2010, p. 121 – 123). The researcher provided the codes and labels for use during the study.

Table B.1

Learning outcomes for History, bachelor's degree

Code	Label	Learning outcome
<i>Historical Knowledge</i>		
T001	Knowledge of the past	Demonstrate an understanding of how people have existed, acted, and thought in the always different context of the past to be assessed through course work [lecture and discussion], and by quizzes and tests
T002	Understanding situations	Demonstrate an understanding of the complexity and diversity of situations, events and past events and of the importance and critical perspective of historical knowledge for contemporary society to be assessed through course work [lecture and discussion]; by quizzes and tests; through specifically designed individual and group project assignments [oral and written presentations]
T003	Respect points of view	Demonstrate respect for points of view derived from other national or cultural backgrounds to be assessed through course work [discussion]
T004	Understand history as a discipline	Demonstrate an understanding of the nature of history as a discipline; the interdisciplinary and global dimensions of professional history; and an appreciation of the temporary and complex character of historical knowledge, research, and record , to be assessed through course work [lecture and discussion]; by quizzes and tests; through specifically designed project assignments [oral and written presentations]



*Thinking and Analytical Skills*

T005	Acquire broad historical knowledge and understanding	Acquire broad knowledge and understanding of the basic facts, concepts, themes and theories in history to be demonstrated through course work [lecture and discussion], assessed by quizzes and tests; specifically designed project assignments [oral and written presentations]
T006	Demonstrate basic historiography	Demonstrate broad understanding of basic historiography to be assessed through specifically designed project assignments [oral and written presentations]
T007	Understanding development of human society	Demonstrate understanding of factors in the development of human society to be assessed through specifically designed project assignments [oral and written presentations]
T008	Familiarity with time periods, geographic regions, and themes	Demonstrate familiarity with two or more time periods, geographic regions and/or thematic fields of history to be assessed through specifically designed project assignments [oral and written presentations]
T009	Knowledge of historical research methods	Demonstrate basic knowledge of major historical research methods, including quantitative and qualitative techniques to be assessed through specifically designed project assignments [oral and written presentations]
T010	Find and handle information	Effectively and efficiently find and handle information, data and evidence on complex historical problems to be assessed through specifically designed project assignments [written projects]
T011	Search for secondary sources	Demonstrate ability to search for appropriate secondary literature, including the use of scholarly references, design and annotation of bibliographies, and address questions of genre, content, perspective and purpose to be assessed through specifically designed project assignments [written projects]
T012	Search for primary sources	Demonstrate ability to conduct searches for primary sources to be assessed through specifically designed project assignments [written projects]
T013	Evaluate texts and primary sources	Read, analyze and critically evaluate texts and other primary sources to be assessed through specifically designed individual and group assignments [oral and written presentations]

T014	Read and develop maps and timelines	Read and develop maps and timelines, to be assessed through specifically designed individual and group project assignments [oral and written presentations]
T015	Place events and structures in context	Place events, processes and structures in their historical context to be assessed through specifically designed individual and group project assignments [oral and written presentations]
T016	Place new data into context	Place new data and interpretations into context, to be assessed through specifically designed individual and group project assignments [oral and written presentations]
T017	Determine quality of research	Determine the quality of research, to be assessed through specifically designed individual project assignments [written projects]
T018	Use basic interpretation and evaluation methods	Demonstrate the ability to use basic historical interpretation and evaluation methods, to be assessed through specifically designed individual and group project assignments [oral and written presentations]
T019	Use genre specific techniques for document preparation	Comment, annotate and/or edit documents correctly according to the critical canons of history, to be assessed through specifically designed individual assignments [written projects]
T020	Formulate and test hypotheses	Formulate and test plausible historical hypotheses and marshal an argument, to be assessed through specifically designed individual assignments [written projects]
<i>Communication skills</i>		
T021	Communicate complex historical topic coherently	Explain a complex historical topic in a coherent manner using terminology and techniques accepted in the historical profession, to be demonstrated through specifically designed individual and group project assignments [oral and written presentations]
T022	Argue for knowing the past to understand contemporary society	Demonstrate the ability to present arguments for the importance of knowing the past to understand contemporary society to be assessed through specifically designed individual and group project assignments [oral and written presentations]

T023	Respectfully participate in discussions	Participate actively and knowledgeably in discussions with respect for the reasoned views, opinions and feelings of others to be assessed through specifically designed individual and group assignments [oral presentations]
T024	Use historical discourse	Make effective use of historical discourse to be assessed through specifically designed individual and group project assignments [oral and written presentations]
T025	Accept instruction and criticism	Follow instructions and respond maturely to criticism to be assessed through specifically designed assignments [written projects]
T026	Work independently	Demonstrate ability to work independently and systematically on a defined topic to be assessed through specifically designed individual and group assignments [projects in oral and written formats]
<i>Personal motivation and initiative</i>		
T027	Analyze one's point of view	Analyze and critique one's own point of view, to be assessed through specifically designed individual and group assignments [projects in oral and written formats]
T028	Actively participate in group projects	Participate actively in collaborative projects, to be assessed through specifically designed group assignments [projects in oral and written formats]
T029	Lead a group project	Demonstrate the ability to effectively lead a group project, to be assessed through specifically designed group assignments [projects in oral and written formats]
T030	Write extended research paper	Demonstrate knowledge, understanding and skills in an extended research paper, including critical use of primary sources, to be assessed through specifically designed individual project assignment [written presentation]
T031	Write short scholarly articles	Write short scholarly articles, to be assessed through specifically designed individual assignments [book reviews and discussion of historical subjects in essay form]
T032	Engage in peer teaching	Effectively engage in peer-to-peer teaching experiences, to be assessed through specifically designed group assignments [in oral and written formats]

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### **Appendix C. CSEQ Library Experiences Scale**

The College Student Experiences Questionnaire includes fourteen scales that measure students' effort in behavior spaces. Students report the frequency with which they participated in these experiences using a four point Likert scale. The ten questions that make up the Library Experiences Scale (below) were drawn from the 4<sup>th</sup> edition of the CSEQ survey (Center for Postsecondary Research, 1998). Question 1 was amended to encompass the possibility of conducting reference interviews with instant message.

Over the last 12 months, how frequently have you participated in the following activities?

Asked a librarian for help either in person, by telephone, by email, or via instant message/chat

Gone to a campus library to do research for a course assignment

Used your institution's Web-based library resources when completing class assignments

Participated in an instructional session led by a librarian or other library staff member

Used the library as a quiet place to read or study with materials you brought with you

Found something interesting while browsing in the library

Read assigned readings other than textbooks (reserve readings) in the library

Developed a bibliography or reference list for a term paper or another project

Gone back to read a basic reference or document referred to by another author

Made a judgment about the quality of information obtained from the library, the World Wide Web, or other sources

## Appendix D: The Revised Taxonomy of Learning Objectives

The Revised Taxonomy of Learning Objectives	
The Types and subtypes of the Knowledge Dimension	Definitions
Factual Knowledge - Knowledge of terminology - Knowledge of specific details and elements	The basic elements students must know to be acquainted with a discipline or solve problems in it
Conceptual Knowledge - Knowledge of classifications and categories - Knowledge of principles and generalizations - Knowledge of theories, models, and structures	The interrelationships among the basic elements within a larger structure that enable them to function together
Procedural Knowledge - Knowledge of subject-specific skills and algorithms - Knowledge of subject-specific techniques and methods - Knowledge of criteria for determining when to use appropriate procedures	How to do something, methods of inquiry, and criteria for using skills, algorithms, techniques, and methods
Metacognitive Knowledge - Strategic knowledge of techniques that are relevant in a given context - Knowledge about cognitive tasks including appropriate contextual and conditional knowledge - Self-knowledge and awareness of one's strengths or weaknesses	Knowledge of cognition in general as well as awareness and knowledge of one's own cognition
The types and subtypes of Cognitive Process Dimension	Definitions
Remember - Recognizing - Recalling	Retrieve relevant knowledge from long-term memory
Understand - Interpreting - Classifying - Summarizing - Inferring - Comparing - Explaining	Construct meaning from instructional messages, including oral, written, and graphic communication
Apply - Executing - Implementing	Carry out or use a procedure in a given situation
Analyze - Differentiating - Organizing - Attributing	Break material into its constituent parts and determine how the parts relate to one another and to an overall structure or purpose
Evaluate - Checking - Critiquing	Make judgments based on criteria and standards

<p>Create</p> <ul style="list-style-type: none"> <li>- Generating</li> <li>- Planning</li> <li>- Producing</li> </ul>	<p>Put elements together to form a coherent or functional whole; reorganize elements into a new pattern or structure</p>
<p>Source: Adapted from Anderson, Lorin W., David R. Krathwohl, Peter W. Airasian, Kathleen A. Cruikshank, Richard Mayer E., Paul R. Pintrich, James Rath, and Merlin C. Wittrock, eds. <i>A Taxonomy for Learning, Teaching, and Assessing A Revision of Bloom's Taxonomy of Educational Objectives</i>. Abridged Edition ed. New York: Longman, 2001.</p>	

## **Appendix E: The student interview script from Pilot Study B**

Question 1: What are you supposed to learn in your major? Probes: How are you supposed to be changed by this experience? What does the History department expect of its History majors?

Question 2: Can you tell me about a significant project or assignment in your major? Probe: This can be a project you recently completed or one you are currently working on.

Question 3: What learning goals are associated with this assignment? Probes: What was the purpose of the assignment? What did your professor expect you to learn?

Question 4: How did you feel when you started? Probes: Did you feel prepared to complete this assignment? Had you ever completed an assignment like this before?

Questions 5 and 6: Did you use library resources to achieve these goals? Did you communicate with a librarian in person or via electronic means during this project?

Question 7: How did that work for you? Probes: How did you learn about this resource/service? How did you learn how to use this resource or service? How did you go about using this resource? (repeat as needed for each resource and service mentioned in response to questions 5 and 6)

Question 8: What aspects of those services or resources were helpful to you? Probe: How did these factors help you achieve the expected learning objectives?

Question 9: Did you have any problems? Probes: How did you handle this problem? Did you overcome it? How did this problem impact your ability to achieve expected learning objectives?

Question 10: Did you accomplish the learning goals associated with this assignment? (repeat for each learning objective identified in question 3)

Question 11: How did you feel after you were done? Probes: Would you feel confident if you had to complete another assignment like this in the future? Why are you more (or less) confident now?

Question 12: What if <study site> didn't facilitate access to these resources? What if <study site> didn't provide any of the services that you used? Probes: How would you compensate for the lack of these tools? Would you still be able to accomplish the learning objectives associated with this project or assignment?

(Repeat questions 2 – 12 as needed)

## Appendix F: Elements of the VALUE rubrics

The VALUE rubrics were designed by the American Association of Colleges and Universities (2007; Rhodes, 2010) to provide a framework for assessing college student achievement of broad abilities and skills. Four VALUE rubrics were chosen for this project: Critical thinking, inquiry and analysis, information literacy, and written communication. Each outcome and the capstone performance expectations are presented along with the code used to apply to the outcome in the Understanding Library Impacts data model.

**Critical thinking** is a habit of mind characterized by the comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating an opinion or conclusion.

Code	Outcome	Performance expectations at the capstone level
C1	Explanation of issues	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.
C2	Conclusions and related outcomes	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.
C3	Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.
C4	Student position	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue.
C5	Evidence	Information is taken from source(s) with enough interpretation/evaluation to develop a comprehensive analysis or synthesis.

**Inquiry and analysis**, Inquiry is a systematic process of exploring issues, objects or works through the collection and analysis of evidence that results in informed conclusions or judgments. Analysis is the process of breaking complex topics or issues into parts to gain a better understanding of them.

Code	Outcome	Performance expectations at the capstone level
IA1	Existing knowledge, research, and/or views	Synthesizes in-depth information from relevant sources representing various points of view/approaches.
IA2	Topic selection	Identifies a creative, focused, and manageable topic that addresses potentially significant yet less explored aspects of the topic.
IA3	Analysis	Organizes and synthesizes evidence to reveal insightful patterns, differences, or similarities related to focus.
IA4	Conclusion	States a conclusion that is a logical extrapolation from the inquiry findings.
IA5	Design	All elements of the methodology or theoretical framework are skillfully developed. Appropriate methodology or theoretical frameworks may be synthesized across disciplines or from relevant sub-disciplines.



**Information literacy**, The ability to know when there is a need for information, to be able to identify, locate, evaluate, and effectively and responsibly use and share that information for the problem at hand.

Code	Outcome	Performance expectations at the capstone level
IL1	Determine the Extent of Information Needed	Effectively defines the scope of the research question or thesis. Effectively determines key concepts. Types of information (sources) selected directly relate to concepts or answer research question.
IL2	Access the Needed Information	Accesses information using effective, well-designed search strategies and most appropriate information sources.
IL3	Evaluate Information and its Sources Critically	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.
IL4	Access and Use Information Ethically and Legally	Students use correctly all of the following information use strategies (use of citations and references; choice of paraphrasing, summary, or quoting; using information in ways that are true to original context; distinguishing between common knowledge and ideas requiring attribution) and demonstrate a full understanding of the ethical and legal restrictions on the use of published, confidential, and/or proprietary information.
IL5	Use Information Effectively to Accomplish a Specific Purpose	Communicates, organizes and synthesizes information from sources to fully achieve a specific purpose, with clarity and depth

**Written communication** is the development and expression of ideas in writing. Written communication involves learning to work in many genres and styles. It can involve working with many different writing technologies, and mixing texts, data, and images. Written communication abilities develop through iterative experiences across the curriculum.

Code	Outcome	Performance expectations at the capstone level
W1	Context of and Purpose for Writing	Demonstrates a thorough understanding of context, audience, and purpose that is responsive to the assigned task(s) and focuses all elements of the work.
W2	Genre and Disciplinary Conventions	Demonstrates detailed attention to and successful execution of a wide range of conventions particular to a specific discipline and/or writing task (s) including organization, content, presentation, formatting, and stylistic choices
W3	Sources and Evidence	Demonstrates skillful use of high-quality, credible, relevant sources to develop ideas that are appropriate for the discipline and genre of the writing
W4	Control of Syntax and Mechanics	Uses graceful language that skillfully communicates meaning to readers with clarity and fluency, and is virtually error-free.
W5	Content Development	Uses appropriate, relevant, and compelling content to illustrate mastery of the subject, conveying the writer's understanding, and shaping the whole work.

## **Appendix G: The Understanding Library Impacts critical incident survey**

This appendix includes the questions and response categories for the ULI instrument used at Site E during fall of 2011. The instrument was deployed using the Qualtrics web survey application. Skip logic has been removed from this transcript.

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Welcome to the Understanding Library Impacts Project Survey! I hope you will consider responding to this brief survey regarding your experiences using the services, resources, and facilities of <Site E>. The purpose of this study is to understand how students use the library to achieve the learning objectives associated with their academic work. Your candor in sharing your experience about what helped and where you had problems will be helpful to the <Site E> and the purposes of the study.

Participants who complete the survey will be eligible to win a drawing for a \$25 gift certificate to the <Site E> Bookstore. Three (3) participants will receive gift certificates. The survey is expected to take 10 to 15 minutes to complete.

You can skip any questions you don't want to answer.

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Your responses are private and confidential. Oversight for this project is provided by the Institutional Review Board at UNC Chapel Hill. Information about your rights and how your responses will remain private is available in the consent form available online.<consent form hyperlink>

If you have questions or concerns about this study, please feel free to contact me by email or the UNC Chapel Hill Institutional Review Board at <email address>

Thank you,

Derek Rodriguez  
School of Information and Library Science  
The University of North Carolina at Chapel Hill

For the first series of questions, please think back to a significant academic project or paper you've worked on for your History major in the last semester.

1. What course was this for?

History xxxx – Course title / professor name (1)

History xxxx – Course title / professor name (2)

History xxxx – Course title / professor name (3)

History xxxx – Course title / professor name (4)

2. What academic semester and year did you take this course?

Spring 2011 (1)

Summer 2011 (2)

Fall 2011 (3)

3. What were the product(s) of this assignment? What were you supposed to turn in?  
Please check all that apply.

short essay (9 pages or less) (1)

short research paper (9 pages or less) (2)

research paper or term paper (10 pages or more) (3)

senior thesis (4)

article review (5)

oral presentation (6)

bibliography (7)

other (8) \_\_\_\_\_

4. What do you think your professor wanted you to learn from the project?

<open ended question>

5. Please rate your agreement with these statements. (1-5)

Strongly disagree (1) Somewhat Disagree (2) Neither Agree nor Disagree (3) Somewhat Agree  
(4) Strongly Agree (5)

At the beginning of the project ...

I was worried about being able to find enough information (1)

I knew how to get started (2)

I had confidence in my research skills (3)

The next 4 parts of the survey focus on the electronic resources, non-electronic or traditional information resources, library services, and library facilities and equipment you used for the project.

Please think back to the time when you were working on the project.

6. What types of electronic information resources did you use for the project? You may select multiple answers.

- online library catalog (1)
- Summon (2)
- electronic databases on the library web site (3)
- manuscript collection finding aids (Special Collections) (4)
- electronic reference material (5)
- electronic journals (6)
- <Journal finder tool> for locating journal articles (7)
- electronic books (8)
- electronic primary sources (9)
- electronic reserve materials for this course (10)
- library provided research guide(s) (11)
- streaming videos provided by the library (12)
- internet search engines (e.g. Google) (13)
- non-library web sites (14)
- other (15) \_\_\_\_\_
- none (16)

7. Which of these electronic information resources was MOST important to you during this project?

<carry forward responses from question 6>

8. Please think about your top-ranked electronic information resource(s). If you remember the name or names of any of these resources, please feel free to enter them below.

<open ended question>

9. Which database was most important to you? Please select 'other' and write in your choice as needed.

- Historical Abstracts (1)
- America: History and Life (2)
- other (3) \_\_\_\_\_

For the following questions, please refer to your top-ranked electronic resource.

10. Please complete this sentence. "The information in this resource helped me when I was ..."  
You may select multiple answers.

- getting oriented (1)
- choosing a topic (2)
- developing a thesis statement (3)
- gathering primary sources as evidence to support my thesis (4)
- finding secondary sources (5)
- creating a bibliography or documenting my work (6)
- writing or creating the final product for the assignment (7)
- preparing for an oral presentation (8)
- other (9) \_\_\_\_\_

11. Which of the following statements are true about this resource? You may select multiple answers.

- it provided the best information for my project (1)
- it gave me information I couldn't find anywhere else (2)
- it provided information that was more current than information I found in other resources (3)
- its search functions were easy to use (4)
- it led me to other relevant resources (5)
- the resource was easy to use (6)
- it was convenient (7)
- it saved me time (8)
- it saved me money (9)
- other (10) \_\_\_\_\_

12. What problems did you have using this resource? You may select multiple answers.

- it was inconvenient for me to use this resource (1)
- it was difficult to use (2)
- its search functions were difficult to use (3)
- it was difficult to find (buried on the website, etc.) (4)
- I found too little information on my topic in this resource (5)
- I found too much information on my topic in this resource (6)
- I was overwhelmed (7)
- I had to ask for help (8)
- other (9) \_\_\_\_\_
- none (10)

13. Do you have other comments about the electronic information resources you used for your project? Your comments will be shared with the library and can help improve services to students.

<open ended question>

14. Please think back to the time when you were working on the project. What types of non-electronic information resources did you use for the project? Please check all that apply.

- book(s) I checked out from the library (1)
- print journals from the library (2)
- reference books at the library (3)
- manuscripts or archival materials (4)
- print reserve materials at the library (5)
- media (video/audio) from the library (6)
- microform material at the library (7)
- other (8)
- none (9)

15. Which of these non-electronic information resources was MOST important to you during this project?

<carry forward responses from question 14>

16. Please think about your top-ranked resource(s). If you remember the name or names of any of these resources, please enter them below.

<open ended question>

For the following questions, please refer to your top-ranked non-electronic resource.

17. Please complete this sentence. "The information in this resource helped me when I was ..."

You may select multiple answers.

- getting oriented (1)
- choosing a topic (2)
- developing a thesis statement (3)
- gathering primary sources as evidence to support my thesis (4)
- finding secondary sources (5)
- creating a bibliography or documenting my work (6)
- writing or creating the final product for the assignment (7)
- preparing for an oral presentation (8)
- other (9) \_\_\_\_\_

18. Which of the following are true about this resource? You may select multiple answers.

- it provided the best information for my project (1)
- it provided information I couldn't find anywhere else (2)
- it provided information that was more current than information I found in other resources (3)
- it led me to other relevant resources (4)
- the resource was easy to use (5)
- it was convenient (6)
- it saved me time (7)
- it saved me money (8)
- other helpful aspect (9) \_\_\_\_\_

19. What problems did you have using this resource? You may select multiple answers.

- it was inconvenient for me to use this resource (1)
- it was difficult to use (2)
- it was difficult to find (it was not on the shelf, etc.) (3)
- I found too little information on my topic (4)
- I found too much information on my topic (5)
- I was overwhelmed (6)
- I had to ask for help (7)
- other (8) \_\_\_\_\_
- none (9)

20. Do you have other comments about the non-electronic information resources you used for your project? Your comments will be shared with the library and can help improve services to students.

<open ended question>

21. Please think back to the time when you were working on the project. What types of library services did you use for the project? You may select multiple services.

- I asked a question of a reference librarian/archivist in person, by phone, or by email (1)
- I used the Ask a Librarian chat reference service (2)
- I scheduled a formal research consultation session with a librarian or archivist (3)
- I attended a library instruction class (4)
- I visited Special Collections with my class (5)
- I used ILLIAD (interlibrary loan) to request materials from other libraries (6)
- I used citation software and/or online citation guides (e.g. Endnote or Zotero) (7)
- I used services in the multimedia lab (8)
- other (9) \_\_\_\_\_
- none (10)

22. Which of these library services was MOST important to you during this project?

<carry forward responses from question 21>

For the following questions, please refer to your top-ranked library service.

23. Please complete this sentence. "This service helped me when I was ..."You may select multiple answers.

- getting oriented (1)
- choosing a topic (2)
- developing a thesis statement (3)
- gathering primary sources as evidence to support my thesis (4)
- finding secondary sources (5)
- creating a bibliography or documenting my work (6)
- writing or creating the final product for the assignment (7)
- preparing for an oral presentation (8)
- other (9) \_\_\_\_\_

24. Which of the following statements are true about this service?

- I learned about information sources for my project (1)
- it provided information I needed for my topic (2)
- staff were approachable (3)
- helped me when I got stuck (4)
- I learned new skills (5)
- it helped me overcome my fear of doing research (6)
- it saved me time (7)
- other helpful aspects (8) \_\_\_\_\_

25. What problems did you have using this service?

- it was difficult to find someone to help me (1)
- the assistance I received wasn't helpful (2)
- the service took too long (4)
- staff were not approachable (7)
- other (5) \_\_\_\_\_
- none (6)

26. Do you have other comments about the library services you used for this project? Your comments will be shared with the library and can help improve services to students.

<open-ended question>



27. Please think back to when you were working on this project. What types of library facilities or equipment did you use for this project? You may select multiple answers.

- study carrel / workspace in the library (1)
- group study room in the library (2)
- workspace in the archives (3)
- computers in the library (4)
- printers in the library (5)
- scanners/photocopiers in the library (6)
- microform reader/printers in the library (7)
- multimedia lab (8)
- other (9)
- none (10)

28. Which of these library facilities or equipment was MOST important to you during this project?

<carry forward responses from question 27>

For the following questions, please refer to the top-ranked facility or equipment from the previous question.

29. Please complete this sentence. "This facility or equipment helped me when I was ..." You may select multiple answers.

- getting oriented (1)
- choosing a topic (2)
- developing a thesis statement (3)
- gathering primary sources as evidence to support my thesis (4)
- finding secondary sources (5)
- creating a bibliography or documenting my work (6)
- writing or creating the final product for the assignment (7)
- preparing for an oral presentation (8)
- other (9) \_\_\_\_\_

30. Which of these statements is true?

- it provided a quiet place to study/research (1)
- it provided space for collaborating with project partners (2)
- the computers allowed me to access needed information (3)
- the computers provided access to productivity software (word processing, spreadsheets, etc.) (4)
- it provided space and equipment to watch videos or listen to audio for this project (5)
- the facility or equipment was available at times that were convenient for me (6)
- other (7) \_\_\_\_\_

31. What problems did you have using this library facility or equipment?

- I had trouble finding space to work (1)
- I had a hard time finding an available study room (2)
- there was too much noise (3)
- I had computer problems (4)
- I had problems with the equipment (audio-visual, photocopier, etc.) (5)
- the facility wasn't available at a time that was convenient for me (6)
- other (7) \_\_\_\_\_
- none (8)

32. Do you have other comments about the library facilities or equipment you used for this project? Your comments will be shared with the library and can help improve services to students.

<open ended question>

33. You've answered 4 sets of questions about information resources, library services, and library space and equipment you used for the project. Considering all of your work on the project, what was the single MOST important library-provided resource, service, or facility to you for this project?

<open ended question>

34. If the library hadn't provided this resource, service, or facility ... what would you have done?

<open ended question>

35. Please rate your agreement with these statements.

Strongly disagree (1) Somewhat Disagree (2) Neither Agree nor Disagree (3) Somewhat Agree (4) Strongly Agree (5)

At times during this project I became anxious about finding information (1)

I would be confident in my abilities to conduct research for a similar project in the future (2)

36. Please think back to a particularly challenging time during this project. This may have been a time when you had trouble finding information for the project, a time when you had problems, or a time when you felt particularly frustrated.

37. Briefly describe the challenges you faced at this time in the project

<open ended question>

38. Please complete this sentence. "I ran into this challenge when I was ..." You may select multiple answers.

- getting oriented (1)
- choosing a topic (2)
- developing a thesis statement (3)
- gathering primary sources as evidence to support my thesis (4)
- finding secondary sources (5)
- creating a bibliography or documenting my work (6)
- writing or creating the final product for the assignment (7)
- preparing for an oral presentation (8)
- other (9) \_\_\_\_\_
- none, I had no challenges with this project (10)

39. Did your challenge have to do with any of these library resources, services, or facilities?

- Library-provided electronic resources (1)
- Library-provided non-electronic resources (2)
- Library services (3)
- Library facilities or equipment (4)
- other (5) \_\_\_\_\_
- none (6)

40. If you answered, other, can you elaborate on the source of the challenge?

<open ended question>

41. How did you overcome this challenge?

<open ended question>

42. Are there ways the libraries' services, collections, or facilities could be changed to provide better support for your work on this project?

<open ended question>

43. Do you think you achieved the learning objectives intended for this project? What would you do differently if you faced a similar project in the future?

<open ended question>

Now there are a few demographic questions and some questions about your academic experience.

44. What is your current academic status?

- freshman (1)
- sophomore (2)
- junior (3)
- senior (4)
- 5th year senior (5)

45. What is your first major?

- History (1)
- Other (2) \_\_\_\_\_

46. What is your second major, if you have declared one?

- History (1)
- Other (2) \_\_\_\_\_
- none (3)

47. If you have declared one or more academic minors, can you please list them below?

<open ended question>

48. Did you begin college at <this institution> or did you transfer from another institution?

- I started college at this institution (1)
- I transferred from another institution (2)

49. How many courses were you taking this semester?

- 1 course (1)
- 2 courses (2)
- 3 or more courses (3)

50. How much time per week did you devote to an ON CAMPUS job this semester?

- none (1)
- 1 - 9 hours per week (2)
- 10 - 19 hours per week (3)
- 20 - 29 hours per week (4)
- 30 - 39 hours per week (5)
- 40 hours or more / week (8)

51. How much time per week did you devote to an OFF CAMPUS job this semester?

- none (1)
- 1 - 9 hours per week (2)
- 10 - 19 hours per week (3)
- 20 - 29 hours per week (4)
- 30 - 39 hours per week (5)
- 40 hours or more / week (8)

52. How much time per week did you devote to an INTERNSHIP this semester? none (1)

- 1 - 9 hours per week (2)
- 10 - 19 hours per week (3)
- 20 - 29 hours per week (4)
- 30 - 39 hours per week (5)
- 40 hours or more / week (8)

53. What is your gender?

- Female (2)
- Male (1)

54. What is your current age?

- 17 or younger (1)
- 18-22 (2)
- 23-30 (3)
- 31-40 (4)
- 41+ (5)

55. What was your age when you started college?

- 17 or younger (1)
- 18-22 (2)
- 23-30 (3)
- 31-40 (4)
- 41+ (5)

56. Which of these categories describes you? Select all that apply.

American Indian or Alaska Native (1)

African American (2)

Asian (3)

Hispanic (6)

Native Hawaiian (4)

White (5)

Other (6) \_\_\_\_\_

57. Do you live on-campus or off-campus this semester?

on-campus (1)

off-campus (2)

58. Did you earn a high school diploma?

Yes (1)

No, I earned a GED or received a high school certificate of completion (2)

59. Are you the first person in your immediate family to attend college?

Yes (1)

No (2)

60. What is your marital status?

Married (1)

Not married (2)

61. Do you have legal dependents other than a spouse?

Yes (1)

No (2)

62. In your experience at <this institution> over the past year, how often have you done each of the following

Very Often (1) Often (2) Sometimes (3) Never (4)

Included diverse perspectives (different races, religions, genders, political beliefs, etc.) in class discussions or writing assignments (1)

Put together ideas or concepts from different courses when completing assignments or during class discussions (2)

Discussed ideas from your readings or classes with faculty members outside of class (3)

Worked on a paper or project that required integrating ideas or information from various sources (4)

Discussed ideas from your readings or classes with others outside of class (students, family members, co-workers, etc.) (5)

63. At <this institution> over the past year, how much has your coursework emphasized the following mental activities?

Very Often (1) Often (2) Sometimes (3) Never (4)

Analyzed the basic elements of an idea, experience, or theory, such as examining a particular case or situation in depth and considering its components (1)

Synthesized and organized ideas, information, or experiences into new, more complex interpretations and relationships (2)

Made judgments about the value of information, arguments, or methods, such as examining how others gathered and interpreted data and assessing the soundness of their conclusions (3)

Applied theories or concepts to practical problems or in new situations (4)

64. Over the past year, how often have you done the following?

Very Often (1) Often (2) Sometimes (3) Never (4)

Examined the strengths and weaknesses of your own views on a topic or issue (1)

Tried to better understand someone else's views by imagining how an issue looks from his or her perspective (2)

Learned something that changed the way you understand an issue or concept (3)

65. Over the last 12 months, how frequently have you participated in the following activities?

Very Often (1) Often (2) Sometimes (3) Never (4)

Asked a librarian/archivist for help either in person, by telephone, by email, or via the library chat/text reference service (1)

Gone to a campus library to do research for a course assignment (2)

Used your institution's Web-based library resources when completing class assignments (3)

Participated in an instructional session led by a librarian or other library staff member (4)  
Used the library as a quiet place to read or study with materials you brought with you (5)

Found something interesting while browsing in the library (6)

Read assigned readings other than textbooks (reserve readings) in the library (7)

Developed a bibliography or reference list for a term paper or another project (8)

Gone back to read a basic reference or document referred to by another author (9)

Made a judgment about the quality of information obtained from the library, the World Wide Web, or other sources (10)

66. Please enter your email address to be eligible to win a drawing for a \$25 gift certificate to the <institution> Bookstore (optional). Remember your participation in this study and your responses to this survey will remain confidential.

67. Please check this box if you would be available for a brief follow up email/phone call about your experience during this survey.

Yes, I'm available to provide feedback on my experience during this survey (1)

Thank you for your time!



## Appendix H: Factors of use

### *Factors and their themes*

Factors by Theme	Type
<i>Access to information</i>	
it led me to other relevant resources	Help
it provided information I couldn't find anywhere else	Help
it provided information I needed for my topic	Help
it provided information that was more current than information I found in other resources	Help
it provided the best information for my project	Help
the computers allowed me to access needed information	Help
I found too little information on my topic in this resource	Problem
I found too much information on my topic in this resource	Problem
it was difficult to find (buried on the website, etc.)	Problem
it was difficult to find (it was not on the shelf, etc.)	Problem
<i>Access to tools</i>	
the computers provided access to productivity software (word processing, spreadsheets, etc.)	Help
I had computer problems	Problem
I had problems with the equipment (audio-visual, photocopier, etc.)	Problem
<i>Affect of staff</i>	
staff were approachable	Help
staff were not approachable	Problem
<i>Anxiety</i>	
it helped me overcome my fear of doing research	Help
I was overwhelmed	Problem
<i>Availability of space</i>	
it provided a quiet place to study/research	Help
it provided space and equipment to watch videos or listen to audio for this project	Help
it provided space for collaborating with project partners	Help
the facility or equipment was available at times that were convenient for me	Help
I had a hard time finding an available study room	Problem
I had trouble finding space to work	Problem
the facility wasn't available at a time that was convenient for me	Problem
there was too much noise	Problem

*Continued*

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*Convenience*

it saved me money	Help
it saved me time	Help
it was convenient	Help
it was inconvenient for me to use this resource	Problem
the service took too long	Problem

*Ease of use*

its search functions were easy to use	Help
the resource was easy to use	Help
it was difficult to use	Problem
its search functions were difficult to use	Problem

*Help finding information*

helped me when I got stuck	Help
I learned about information sources for my project	Help
I learned new skills	Help
I had to ask for help	Problem
it was difficult to find someone to help me	Problem
the assistance I received wasn't helpful	Problem

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## Appendix I: Factor participation rates by theme and type

### *Factors and participation rates*

Factor	Participation rates
<i>Access to information</i>	
Helps	
it led me to other relevant resources (Electronic Resources)	57%
it led me to other relevant resources (Traditional Resources)	55%
it provided information I couldn't find anywhere else (Electronic Resources)	55%
it provided information I couldn't find anywhere else (Traditional Resources)	57%
it provided information I needed for my topic (Library services)	57%
it provided information that was more current than information I found in other resources (Electronic Resources)	28%
it provided information that was more current than information I found in other resources (Traditional Resources)	17%
it provided the best information for my project (Electronic Resources)	45%
it provided the best information for my project (Traditional Resources)	72%
the computers allowed me to access needed information (Facility/Equipment)	43%
Problems	
I found too little information on my topic in this resource (Electronic Resources)	12%
I found too little information on my topic in this resource (Traditional Resources)	10%
I found too much information on my topic in this resource (Electronic Resources)	18%
I found too much information on my topic in this resource (Traditional Resources)	20%
it was difficult to find (buried on the website, etc.) (Electronic Resources)	17%
it was difficult to find (it was not on the shelf, etc.) (Traditional Resources)	18%
<i>Access to tools</i>	
Helps	
the computers provided access to productivity software (word processing, spreadsheets, etc.) (Facility/Equipment)	26%
Problems	
I had computer problems (Facility/Equipment)	4%
I had problems with the equipment (audio-visual, photocopier, etc.) (Facility/Equipment)	2%
<i>Affect of staff</i>	
Helps	
staff were approachable (Library services)	40%
Problems	
staff were not approachable (Library services)	1%

*Continued*

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*Anxiety*

Helps

it helped me overcome my fear of doing research (Library services) 17%

Problems

I was overwhelmed (Electronic Resources) 24%

I was overwhelmed (Traditional Resources) 23%

*Availability of space*

Helps

it provided a quiet place to study/research (Facility/Equipment) 55%

it provided space and equipment to watch videos or listen to audio for this project (Facility/Equipment) 10%

it provided space for collaborating with project partners (Facility/Equipment) 13%

the facility or equipment was available at times that were convenient for me (Facility/Equipment) 44%

Problems

I had a hard time finding an available study room (Facility/Equipment) 8%

I had trouble finding space to work (Facility/Equipment) 24%

the facility wasn't available at a time that was convenient for me (Facility/Equipment) 7%

there was too much noise (Facility/Equipment) 13%

*Convenience*

Helps

it saved me money (Electronic Resources) 33%

it saved me money (Traditional Resources) 22%

it saved me time (Electronic Resources) 64%

it saved me time (Library services) 44%

it saved me time (Traditional Resources) 26%

it was convenient (Electronic Resources) 65%

it was convenient (Traditional Resources) 46%

Problems

it was inconvenient for me to use this resource (Electronic Resources) 5%

it was inconvenient for me to use this resource (Traditional Resources) 12%

the service took too long (Library services) 9%

*Ease of use*

Helps

its search functions were easy to use (Electronic Resources) 50%

the resource was easy to use (Electronic Resources) 54%

the resource was easy to use (Traditional Resources) 57%

*Continued*

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Problems

it was difficult to use (Electronic Resources)	4%
it was difficult to use (Traditional Resources)	4%
its search functions were difficult to use (Electronic Resources)	16%

*Help finding information*

Helps

helped me when I got stuck (Library services)	26%
I learned about information sources for my project (Library services)	46%
I learned new skills (Library services)	24%

Problems

I had to ask for help (Electronic Resources)	6%
I had to ask for help (Traditional Resources)	6%
it was difficult to find someone to help me (Library services)	2%
the assistance I received wasn't helpful (Library services)	4%

*No problems*

none (Electronic Resources)	29%
none (Facility/Equipment)	31%
none (Library services)	45%
none (Traditional Resources)	28%

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## References

- ACT (2010). *Collegiate assessment of academic proficiency*. Retrieved on 4/20/2012 from <http://www.act.org/caap/>
- Adelman, C. (2009). *The Bologna Process for U.S. eyes: Re-learning Higher Education in the Age of Convergence*. Washington, DC: Institute for Higher Education Policy.
- American Institutes for Research (2006). *The national survey of America's college students*. Washington, DC: American Institutes for Research.
- American Library Association. Association of College and Research Libraries. (2011). *Standards for libraries in higher education, 2011* American Library Association, ACRL, College Libraries Section. Retrieved on 4/20/2012 from <http://www.ala.org/acrl/standards/standardslibraries>
- American Library Association. Association for College and Research Libraries. (2000). "Information Competency Standards for Higher Education," Retrieved on 4/20/2012 from <http://www.ala.org/acrl/standards/informationliteracycompetency>
- American Library Association. Association of College and Research Libraries (1998). Task Force on Academic Library Outcomes Assessment Report. Retrieved on 4/20/2012 from <http://www.ala.org/acrl/publications/whitepapers/taskforceacademic>
- American Library Association. Presidential Committee on Information Literacy. *Final Report*. (1989). Chicago: American Library Association.
- Anderson, L.W. et al, (Eds.). (2001). *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives. Abridged Edition*. New York: Longman.
- Anderson, L. W., & Sosniak, L. A. (Eds.). (1994). *Bloom's taxonomy : A forty-year retrospective*. Chicago: NSSE Distributed by the University of Chicago Press.
- Andersson, B.E. & Nilsson, S.G. (1964). Studies in the reliability and validity of the Critical Incident Technique. *Journal of Applied Psychology* 48(6) 398-403.
- Arum, R. & Roksa, J. (2011). *Academically adrift: Limited learning on college campuses*. Chicago: University of Chicago Press.
- Association of American Colleges and Universities (2010). The VALUE rubrics. Retrieved on 4/20/2012 from <http://www.aacu.org/value/rubrics>
- Association of American Colleges and Universities (AAC&U) (2007). *College learning for the new century: A report from the National Leadership Council for Liberal Education and America's Promise*. Washington, DC: AAC&U. Retrieved on 4/20/2012 from [http://www.aacu.org/leap/documents/GlobalCentury\\_final.pdf](http://www.aacu.org/leap/documents/GlobalCentury_final.pdf)
- Association of Research Libraries (2011). LibQUAL+ Retrieved on 4/20/2012 from <http://www.libqual.org/home>

- Association of Research Libraries (ARL) (2008a). Kyrillidou, M. & Young, M. eds. ARL Statistics 2005-06: A compilation of statistics from the one hundred and twenty-three members of the Association of Research Libraries. Retrieved on 4/20/2012 from <http://www.arl.org/bm~doc/arlstats06.pdf>
- Association of Research Libraries (ARL) (2008b). Annual tables from the ARL statistics, 2007-2008. Retrieved on 4/20/2012 from <http://www.arl.org/bm~doc/08tables.xls>
- Association of Research Libraries (ARL) (2004). Kyrillidou, M. & Young, M. eds. ARL Statistics 2002-03: A compilation of statistics from the one hundred and twenty-three members of the Association of Research Libraries. Retrieved on 4/20/2012 from [http://www.libqual.org/documents/admin/2012/ARL\\_Stats/2002-03arlstats.pdf](http://www.libqual.org/documents/admin/2012/ARL_Stats/2002-03arlstats.pdf)
- Association of Research Libraries (n.d.). New Measures Retrieved on 4/20/2012 from <http://www.arl.org/stats/initiatives/newmeas.shtml>
- Astin, A.W. (1999). Student involvement: a developmental theory for higher education. *Journal of College Student Development*, 40(5) 518-529.
- Astin, A.W. (1993). What matters in college? *Four critical years revisited*. San Francisco: Jossey-Bass.
- Astin, A.W. (1973). Measurement and determinants of the outputs of higher education. In Lewis C. Solmon and Paul J. Taubman., L. C. Solmon, P. Taubman & National Research Council (U.S.). Office of Scientific Personnel. Board on Human Resources. Panel on the Benefits of Higher Education. (Eds.), *Does college matter? Some evidence on the impacts of higher education*. New York: Academic Press.
- Astin, A.W. (1970). The Methodology of Research on College Impact, Part One. *Sociology of Education*, 43(Summer) 223-254
- Auerbach, C. F. & Silverstein, L. B. (2003). *Qualitative Data: An Introduction to Coding and Analysis*. New York: NYU Press.
- Auster, E. & Choo, C.W. (1993). Environmental Scanning by CEOs in Two Canadian Industries, *Journal of the American Society for Information Science*, 44(4) 194.
- Baird, L.L. (2005). College environments and climates: Assessments and their theoretical assumptions. *Higher education: Handbook of theory and research*, (Smart, J.C. ed., pp. 507-538). Great Britain: Springer.
- Baker, S. & Lancaster, F.W. (1991). *The measurement and evaluation of library services*. 2d edition. Arlington, VA: Information Resources Press.
- Banta, T. (2008). Editor's Notes: Trying to Clothe the Emperor. *Assessment Update*, 20(2), 3-4, 15-16.
- Banta, T.W., Griffin, M., Flateby, T.L., & Kahn, S. (2009). *Three promising alternatives for assessing college students' knowledge and skills*. NILOA Occasional Paper No.2. Urbana, IL: University of Illinois and Indiana University, National Institute of Learning Outcomes Assessment. Retrieved on 4/20/2012 from <http://learningoutcomesassessment.org/documents/AlternativesforAssessment.pdf>

- Barclay, D. (1993). Evaluating library instruction: Doing the best you can with what you have. *Reference Quarterly*, 33(2).
- Bates, M.J. (2005). "An introduction to metatheories, theories, and models". In Fisher, K.E., Erdelez, S. & McKechnie, L.E.F. (Eds). *Theories of information behavior*. Medford, N.J.: Published for the American Society for Information Science and Technology by Information Today, 1-24.
- Beagle, D. (1999). Conceptualizing an Information Commons. *Journal of Academic Librarianship* 25(1) 82–89.
- Beile, P. (2008). Using iSkills to measure instructional efficacy: one example from the University of Central Florida. 2008 Library Assessment Conference. Seattle WA.
- Bennett, S. (2011). Learning behaviors and learning spaces. *portal: Libraries and the Academy* 11(3), 765-789.
- Bennett, S. (2005). Righting the balance. In *Library as place: rethinking roles, rethinking space*. Washington, DC: Council on Library and Information Resources, p. 10-24. Retrieved on 4/20/2012 from [www.clir.org/pubs/reports/pub129/pub129.pdf](http://www.clir.org/pubs/reports/pub129/pub129.pdf)
- Bennett, S. (2003). Libraries Designed for Learning. Washington, D.C.: Council on Library and Information Resources. Retrieved on 4/20/2012 from <http://www.clir.org/pubs/reports/pub122/pub122web.pdf>
- Bertot, J. C. (2001). Measuring service quality in the networked environment: Approaches and considerations. *Library Trends*, 49(4), 758-775.
- Bertot, J. C., & McClure, C. R. (2003). Outcomes assessment in the networked environment: Research questions, issues, considerations, and moving forward. *Library Trends* 51(4) 590-614.
- Biglan, A. (1973a). The characteristics of subject matter in different academic areas. *Journal of Applied Psychology*, 57(3), 195-203.
- Biglan, A. (1973b). Relationships between subject matter characteristics and the structure and output of university departments. *Journal of Applied Psychology*, 57(3), 204-213.
- Björk B-C, Welling P, Laakso M, Majlender P, Hedlund T, et al. (2010). Open Access to the Scientific Journal Literature: Situation 2009. *PLoS ONE* 5(6): e11273. Retrieved on 4/20/2012 from doi:10.1371/journal.pone.0011273
- Bloom, B. S. (Ed.). (1956). *Taxonomy of educational objectives; the classification of educational goals. handbook 1 - cognitive domain* (1st ed.). New York: David McKay Company.
- Bodi, S. (1988). Critical thinking and bibliographic instruction: The relationship. *Journal of Academic Librarianship*, 14(3), 150-153.
- Borden, V.M.H. & Young, J. W. (2008). Measurement Validity and Accountability for Student Learning *New Directions for Institutional Research, Assessment Supplement 2007*, Fall 2008 p. 19-37.



- Bostick, S.L. (1992). *The development and validation of the Library Anxiety Scale*. Ph.D. Dissertation, Wayne State University.
- Bowker (2009). Book Sales Statistics 2008: an AAP Estimate. *The Bowker annual of library and book trade information*. New York: R.R. Bowker.
- Brady, E.E., McCord, S.K., & Galbraith, B. (2006). Print versus electronic journal use in three sci/tech disciplines: The cultural shift in process, *College & Research Libraries* 66 (July) 354-363.
- Brasley, S. (2008). Using iSkills to measure instructional efficacy: The CSU Experience. 2008 Library Assessment Conference. Seattle WA.  
<http://libraryassessment.org/bm~doc/brasley.pps>
- Bridges, L.M. (2008). Who Is Not Using the Library? A Comparison of Undergraduate Academic Disciplines and Library Use. *Portal*. 8(2) 187-196.
- Brim, O.G. (1966). Socialization throughout the life cycle. In O.G. Brim, Jr. and S. Wheeler (eds.) *Socialization after childhood: two essays*, 1-49. New York: Wiley.
- Brookins, J. (2012). *History faculty begin nationwide Tuning project*. Washington DC: American Historical Association. Retrieved on 4/20/2012 from  
<http://blog.historians.org/news/1568/history-faculty-begin-nationwide-tuning-project>
- Brophy, P. (2006). *Measuring Library Performance: Principles and Techniques*. London: Facet.
- Buckland, M. K. (2003). Five Grand Challenges for Library Research. *Library Trends*, 51(4), 675.
- Butterfield, L.D., Borgen, W.A., Amundson, N.E., & Maglio, A.T (2005). Fifty years of the Critical Incident Technique: 1954-2004 and beyond. *Qualitative Research*, 5(4) 475-497.
- Byström, K. (2005). Information activities and work tasks. In: K.E. Fisher, S. Erdelez, & L.E.F. McKechnie, eds. *Theories of Information Behavior*. Medford, NJ: Information Today, 174-178.
- Byström, K. (2000). The effects of task complexity on the relationships between information types acquired and information sources used. *New Review of Information Behaviour Research*, 1, 85-101.
- Byström, K. & Jarvelin, K. (1995). Task complexity affects information seeking and use. *Information Processing & Management*, 31(2), 191-213.
- Cameron, K.S. (1986). A Study of Organizational Effectiveness and Its Predictors. *Management Science* 32(1) 87-112.
- Carey, K. (2007). Truth without action: The myth of higher-education accountability. *Change: The Magazine of Higher Learning*, 39(5), 24-29.
- Carini, R.M., Kuh, G.D. & Klein, S. P. (2006). Student engagement and student learning: testing the linkages. *Research in Higher Education*, 47(1) 1-33.

- Carnegie Foundation for the Advancement of Teaching (2010). The Carnegie Classification of Institutions of Higher Education. Retrieved on 4/20/2012 from <http://classifications.carnegiefoundation.org/>
- Carr, D. (1980). The agent and the learner: interactions in assisted adult library learning. *Public Library Quarterly*, 2(2) 3-20.
- Carter, E. W. (2002). Doing the best you can with what you have:” Lessons learned from outcomes assessment. *Journal of Academic Librarianship* 28(1) 36-41.
- Case, D.O. (2005). Principle of Least Effort. In Fisher, K.E., Erdelez, S, & McKechnie, L.E.F. (Eds). *Theories of information behavior*. Medford, N.J.: Published for the American Society for Information Science and Technology by Information Today, 289-292.
- Casner-Lotto, J. & Brenner, M.W. (2006). *Are they ready to work?* The Conference Board, Corporate Voices for Working Families, the Partnership for 21<sup>st</sup> Century Skills, and the Society for Human Resource Management Report Number BED-06-Workforce.
- Chatman, S. (2007). Institutional versus academic discipline measures of student experience: A matter of relative validity. *Research & Occasional Paper Series: CSHE.8.07*. Berkeley, CA: Center for Studies in Higher Education. Retrieved on 4/20/2012 from <http://cshe.berkeley.edu/publications/publications.php?id=263>
- Chickering, A. W., & Z. F. Gamson (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin* 39(7): 3-7.
- Choinski, E., Mark, A. E., & Murphey, M. (2003). Assessment with rubrics: An efficient and objective means of assessing student outcomes in an information resources class. *Portal-Libraries and the Academy*, 3(4), 563-575.
- Choo, C.W. (1998). *Information management for the intelligent organization: the art of scanning the environment*. Medford, NJ: Information Today, 1998.
- Clougherty, L., Forys, J., Lyles, T., Persson, D., Walters, C., & Washington-Hoagland, C. (1998). The University of Iowa Libraries' undergraduate user needs assessment. *College & research libraries* 59 (6) 572-583.
- College Board (2009). Trends in college pricing, 2009. Retrieved on 4/20/2012 from [http://trends.collegeboard.org/downloads/archives/CP\\_2009.pdf](http://trends.collegeboard.org/downloads/archives/CP_2009.pdf)
- Common Data Set Initiative (2011). Retrieved on 4/20/2012 from <http://www.commondataset.org/>
- Connaway, L.S., Radford, M.L., Dickey, T.J., Williams, J.D., & Confer, P. (2008). “Sense-making and Synchronicity: Information-seeking Behaviors of Millennials and Baby Boomers.” *Libri*, 58(2) 123-135.
- Cook, C. & B. Thompson, (2000). "Reliability and validity of SERVQUAL scores used to evaluate perceptions of library service quality," *Journal of Academic Librarianship*, 26(4) 248-258.

- Cook, C., & Heath, F. M. (2001). Users' perceptions of library service quality: A LibQUAL+ qualitative study. *Library Trends*, 49(4), 548-84.
- Cook, C., Heath, F. M., Thompson, B. & Thompson, R. L. (2001). The search for new measures: The ARL LibQUAL+ study--A preliminary report. *Portal: Libraries and the Academy*, 1(1), 103-112.
- Cooperative Institutional Research Program (2010a). The Freshman Survey. Los Angeles: Higher Education Research Institute. Retrieved on 4/20/2012 from <http://www.heri.ucla.edu/cirpoverview.php>
- Cooperative Institutional Research Program (2010b). College Senior Survey. Los Angeles: Higher Education Research Institute. Retrieved on 4/20/2012 from <http://www.heri.ucla.edu/cssoverview.php>
- Council for Aid to Education (2010). *Collegiate Learning Assessment*. Retrieved on 4/20/2012 from <http://www.collegiatelearningassessment.org>
- Courtright, C. (2007) Context in Information Behavior Research. In M.E. Williams (Ed.), *Annual Review of Information Science and Technology*. Medford: NJ, Information Today, Inc. v. 41, 273-306.
- Cox, J. & Cox, L. (2008). *Scholarly Publishing Practice, Third Survey 2008: Academic journal publishers' policies and practices in online publishing*. Press release. Association of Learned and Professional Society Publishers Retrieved on 4/20/2012 from <http://www.alpsp.org/Ebusiness/ProductCatalog/Product.aspx?ID=44>
- Cram, J. (2000), "Six impossible things before breakfast": a multidimensional approach to measuring the value of libraries, Proceedings of the 3rd Northumbria International Conference on Performance Measurement in Libraries and Information Services, University of Northumbria, Newcastle upon Tyne, pp. 19-29.
- Cullen, R. (2001). Perspectives on user satisfaction surveys. *Library Trends* 49(4) 662-687.
- Dawson, M. & Rascoff, M. (2006). *Scholarly Communications in the Economics Discipline*. New York, Ithaka Retrieved on 4/20/2012 from <http://www.ithaka.org/publications/pdfs/JSTOR%20Econ%20Study%20Report%20Public%20final1031.pdf>
- Day, J.C. & Newburger, E. C. (2002). The Big Payoff: Educational Attainment and Synthetic Estimates of Work-Life Earnings. Washington, D.C.: U.S. Census Bureau, Current Population Reports, P23-10. Retrieved on 4/20/2012 from <http://www.census.gov/prod/2002pubs/p23-210.pdf>
- de Jager, K. (1997). Library use and academic achievement. *South African Journal of Library and Information Science*. v. 65 (1) p. 26-30.
- De Prospe, E. R., Altman, E., & Beasley, K. (1973). *Performance Measures for Public Libraries*. Chicago: American Library Association.
- Dervin, B. & Dewdney, P. (1986). Neutral questioning: A new approach to the reference interview. *RQ*, 25(4).

- Dervin, B. (2005a). Dervin's Sense-Making. In: K.E. Fisher, S. Erdelez, & L.E.F. McKechnie, eds. *Theories of Information Behavior*. Medford, NJ: Information Today, pp. 113-117.
- Dervin, B. (2005b). Sense-making methodology site. Retrieved on 4/20/2012 from <http://communication.sbs.ohio-state.edu/sense-making/>
- Dervin, B. (1992). From the mind's eye of the 'user': the sense-making qualitative-quantitative methodology. In: J.D. Glazier and R.R. Powell, eds. *Qualitative research in information management* Englewood, CO: Libraries Unlimited, pp. 61-84.
- Dervin, B. (1977). Useful theory for librarianship: Communication, not information. *Drexel Library Quarterly*, 13(3), 16-32.
- Dervin, B. & Nilan, M. (1986). Information needs and uses. *Annual Review of Information Science and Technology*, volume 21, edited by Martha E. Williams, New York, Knowledge Industry Publications, Inc. for American Society for Information Science, 3-33.
- Dervin, B., Reinhard, C.D., Kerr, Z.Y., et al. (2007). How Libraries, Internet Browsers, And Other Sources Help: A Comparison Of Sense-Making Evaluations Of Sources Used In Recent College/University And Personal Life Situations By Faculty, Graduate Student, And Undergraduate Users. Poster in Proceedings of the American Society for Information Science and Technology, 43 (1), 1-8.
- Dillman, D.A., Smyth, J.D., & Christian, L. M. (2009). Internet, Mail, and Mixed-mode Surveys: The Tailored Design Method. Hoboken, N.J.: Wiley & Sons.
- Directory of Open Access Journals (2012). Directory of Open Access Journals, Homepage. Retrieved on 4/20/2012 from <http://www.doaj.org/>
- Dugan, R.E., Hernon, P., & Nitecki, D.A. (2009). *Viewing library metrics from different perspectives: inputs, outputs, and outcomes*. Santa Barbara, CA: Libraries Unlimited
- Duke University Libraries (2007). LibQUAL+: 2007 Survey, Duke University Libraries. Retrieved on 4/20/2012 from <http://library.duke.edu/about/assessment/libqual/libqual-docs/libqualduke2007surveyresults.pdf>
- Dunn K., Brewer K., Marshall J.G., & Sollenberger J. (2009) Measuring the value and impact of health sciences libraries: Planning an update and replication of the Rochester Study; *Journal of the Medical Library Association* 97(4): 308-312.
- Durrance, J.C. & Fisher, K.E. (2003). Determining how libraries and librarians help. *Library Trends*, 51(4) 541-570.
- Durrance, J.C., Fisher, K.E., Hinton, M.B. (2005). *How libraries and librarians help: A guide to identifying user-centered outcomes*. Chicago: American Library Association.
- Ebrary (2007). 2007 Global Faculty E-book Survey. Retrieved on 4/20/2012 from [http://www.ebrary.com/corp/collateral/en/Survey/ebrary\\_faculty\\_survey\\_2007.pdf](http://www.ebrary.com/corp/collateral/en/Survey/ebrary_faculty_survey_2007.pdf)
- Educational Testing Service (2008) iSkills Overview. Retrieved on 4/20/2012 from <http://www.ets.org/iskills/>

- Emmons, M & Martin, W. (2002) Engaging conversation: evaluating the contribution of library instruction to the quality of student research. *College & Research Libraries* November, 545-560.
- Estabrook, L.S. (2007). What Chief Academic Officers Want from Their Libraries: Findings from interviews with Provosts and Chief Academic Officers. Retrieved on 4/20/2012 from <http://www.ala.org/acrl/sites/ala.org.acrl/files/content/publications/whitepapers/Finalreport-ACRLCAOs.pdf>
- Ewell, P. T. (2010). The national survey of student engagement (NSSE) In Dill D. D., Beerkens M. (Eds.), *Public policy for academic quality: Analyses of innovative policy instruments*. Dordrecht ;London: Springer, 83 – 97.
- Ewell, P. T. (2005). Can assessment serve accountability? it depends on the question. In J. C. Burke (Ed.), *Achieving accountability in higher education: Balancing public, academic, and market demands* (pp. 104-124). San Francisco: Jossey-Bass.
- Feldman, K. A., Smart, J. C., & Ethington, C. A. (1999). Major field and person-environment fit: Using Holland's theory to study change and stability of college students. *The Journal of Higher Education*, 70(6) 642-669.
- Finley, A. (2012). How reliable are the VALUE rubrics? *peerReview* 13(4)/14(1) Retrieved on 4/20/2012 from <http://www.aacu.org/peerreview/pr-fall14/Finley.cfm>
- Flanagan, J. C. (1953). The Critical Incident Technique. *Psychological Bulletin* 51 327-358
- Flowers, Lamont A. (2004). Examining the Effects of Student Involvement on African American College Student Development. *Journal of College Student Development*. 45(6) p. 633-654.
- Foster, N. F. & Gibbons, S. L. (Eds.) (2007). *Studying students: The undergraduate research project at the University of Rochester*, Chicago: Association of College and Research Libraries.
- Galgano, M.J. (2007). *Liberal Learning and the History Major*. Washington: DC: Teaching Division of the American Historical Association. Retrieved on 4/20/2012 from <http://www.historians.org/pubs/free/LiberalLearning.htm>
- Garcia, P. "How to Assess Value Added: The CLA Method." Paper presented at the 2007 California Association for Institutional Research, Monterey, Calif., Nov. 16, 2007. Retrieved on 4/20/2012 from <http://www.cair.org/conferences/CAIR2007/pres/Garcia.pdf>
- Gardner, S., & Eng, S. (2005). What students want: Generation Y and the changing function of the academic library. *Portal: Libraries and the Academy*, 5(3), 405-420.
- Gaston, P. (2010). *The challenge of Bologna*. Sterling, VA: Stylus.
- Gonyea, R. & Kuh, G.D. (2003). The role of the academic library in promoting student engagement in learning. *College and Research Libraries* 64(4) 256-282.
- González, J. and Wagenaar, R. (eds.) (2005). *Tuning Educational Structures in Europe II*. Bilbao, ES: University of Deusto.

- Google (2012). Google Scholar, Support for Libraries. Retrieved on 4/6/2012 from <http://scholar.google.com/intl/en/scholar/libraries.html>.
- Gordon, J., Ludlum, J., & Hoey, J.J. (2008). Validating NSSE Against Student Outcomes: Are They Related? *Research in Higher Education*, 2008 49 19-39.
- Griffiths, G. & Brophy, P. (2005). Student searching behavior and the web: Use of academic resources and Google. *Library Trends* 53(4), 539-554.
- Griffiths, R., Dawson, M. & Rascoff, M. (2006). *Scholarly Communications in the History Discipline*. New York, NY: Ithaka Retrieved on 4/20/2012 from <http://www.ithaka.org/publications/pdfs/JSTOR%20History%20Study%20Report%20Public%20final1031.pdf>
- Grimes, D.J. (1998). *Academic Library Centrality*, ACRL Publications in Librarianship 50. Chicago: Association of College and Research Libraries.
- Guthrie, K.M. (1997). JSTOR: from project to independent organization. *D-Lib Magazine* July/August 1997. Retrieved on 4/20/2012 from <http://www.dlib.org/dlib/july97/07guthrie.html>
- Hampton-Reeves, S., Mashiter, C., Westaway, J., Lumsden, P., Day, H, Howerston, H. & Hart, A. (2009). *Students' use of research content in teaching and learning: A report of the Joint Information Systems Council (JISC)*. Retrieved on 4/20/2012 from <http://www.jisc.ac.uk/media/documents/aboutus/workinggroups/studentsuserresearchcontent.pdf>
- Hardesty, L. L. (1991). The bottomless pit revisited. *College & Research Libraries*, 52, 219-230.
- Harley, D., Acord, S. K., Earl-Novell, S., Lawrence, S., & King, C. J. (2010). Assessing the Future Landscape of Scholarly Communication: An Exploration of Faculty Values and Needs in Seven Disciplines - Executive Summary. UC Berkeley: Center for Studies in Higher Education. Retrieved on 4/20/2012 from <http://escholarship.org/uc/item/0kr8s78v>
- Harrell, C. B. (1989). *The use of an academic library by university students*. Ph.D. dissertation. University of North Texas.
- Hayes, A.F. (2012). KALPHA, SAS Macro. Retrieved on 4/20/2012 from <http://www.afhayes.com/public/kalpha.sas>
- Hayes, A. F., & Krippendorff, K. (2007). Answering the call for a standard reliability measure for coding data. *Communication Methods and Measures*, 1, 77-89.
- Head, A. J. & Eisenberg, M.B. (2010). "Truth be told: How college students evaluate and use information in the digital age," Project Information Literacy Progress Report, University of Washington's Information School. Retrieved on 4/20/2012 from <http://projectinfoit.org/publications/>
- Head, A. J. & Eisenberg, M.B. (2009). "Lessons Learned: How College Students Seek Information in the Digital Age," Project Information Literacy First Year Report with Student Survey Findings, University of Washington's Information School. Retrieved on 4/20/2012 from <http://projectinfoit.org/publications/>



- Hernon, P. (2002). Outcomes are key but not the whole story. *The Journal of Academic Librarianship*, 28(1-2), 54-55.
- Hernon, P. & Dugan, R. E. (2002). An action plan for outcomes assessment in your library. Chicago: American Library Association.
- Hernon, P., & Altman, E. (1996). *Service quality in academic libraries*. Norwood, N.J.: Ablex.
- Hernon, P., Hopper, R., Leach, M. R., Saunders, L. L., & Zhang, J. (2007). E-book use by students: Undergraduates in economics, literature, and nursing. *The Journal of Academic Librarianship*, 33(1), 3-13.
- Hiscock, J. E. (1986). Does library usage affect academic performance? A study of the relationship between academic performance and usage of libraries at the Underdale site of the South Australian College of Advanced Education. *Australian Academic and Research Libraries*, 17(4), 207-214.
- Holland, J. L. (1997). *Making vocational choices: A theory of vocational personalities and work environments*. Odessa, Fla.: Psychological Assessment Resources.
- Horn, L. & Carroll, C.D. (1996). *Nontraditional Undergraduates, Trends in Enrollment From 1986 to 1992 and Persistence and Attainment Among 1989–90 Beginning Postsecondary Students* (NCES 97–578). U.S. Department of Education, NCES. Washington, DC: U.S. Government Printing Office.
- Housewright, R. & Schonfeld, R. (2008). *Ithaka's 2006 Studies of Key Stakeholders in the Digital Transformation in Higher Education*. Ithaka, S+R. Retrieved on 4/20/2012 from <http://www.ithaka.org/ithaka-s-r/research/Ithakas%202006%20Studies%20of%20Key%20Stakeholders%20in%20the%20Digital%20Transformation%20in%20Higher%20Education.pdf>
- Howe, N. & Strauss, W. (2000). *Millennials rising: the next great generation*. New York: Vintage Books.
- Huck, S. (2004). *Reading statistics and research*. Boston, MA : Allyn and Bacon.
- Indiana Commission for Higher Education (2010). *Tuning USA Final Report: The 2009 Indiana Pilot*. Retrieved on 4/20/2012 from [http://www.in.gov/che/files/Updated\\_Final\\_report\\_for\\_June\\_submission.pdf](http://www.in.gov/che/files/Updated_Final_report_for_June_submission.pdf)
- Information Commons (2012). Infocommons and beyond: considering innovative services and resources in academic libraries. Retrieved on 4/20/2012 from <http://infocommonsandbeyond.blogspot.com/>
- Jaccard, J. and Jacoby, J. (2010). *Theory construction and model-building skills: a practical guide for social scientists*. New York: Guilford Press
- Jacoby, J., & O'Brien, N. P. (2005). Assessing the impact of reference services provided to undergraduate students. *College & Research Libraries*, 66(4), 324-340.
- Jakubs, D. (2007). Out of the gray times: leading libraries into the digital future. *Journal of Library Administration*. 48(2) 235-248.

- Jiao, Q.C. & Onwuegbuzie, A.J. (1999). "Is library anxiety important?" *Library Review*, 48(6) 278 – 282.
- Jiao, Q. G., & Onwuegbuzie, A. J. (1997). Prevalence and reasons for university library usage. *Library Review*, 46(5 and 6), 411-420.
- Jiao, Q.C., Onwuegbuzie, A.J., Lichtenstein, A.A. (1996). Library Anxiety: the characteristics of ‘at-risk’ college students. *Library and Information Science Research*, 18 151-163.
- JISC and UCL. (2009). JISC national e-books observatory project: Key findings and recommendations: *Final report*. Retrieved on 4/20/2012 from <http://www.jiscebooksproject.org/reports/finalreport/>
- Jones, S. (2002). The Internet goes to college: how students are living the future with today’s technology. Washington: Pew Internet & American Life Project. Retrieved on 4/20/2012 from [http://www.pewinternet.org/pdfs/PIP\\_College\\_Report.pdf](http://www.pewinternet.org/pdfs/PIP_College_Report.pdf)
- Julien, H., & Boon, S. (2004). Assessing instructional outcomes in Canadian academic libraries. *Library & Information Science Research*, 26(2), 121-139.
- Kain, D.L. (2004). Owning significance: the Critical Incident Technique in research. In deMarrais, K. & Lapan, S.D. *Foundations for Research: Methods of inquiry in education and the social sciences*. Mahwah, NJ: Lawrence Erlbaum, 69-86.
- Katz, S. & Grossman, J. (2008). *The History Major and Undergraduate Liberal Education: Report of the National History Center Working Group to the Teagle Foundation*. Retrieved on 4/20/2012 from [http://www.princeton.edu/~snkatz/papers/NHCTeagleReportFinal\\_9-29-08.pdf](http://www.princeton.edu/~snkatz/papers/NHCTeagleReportFinal_9-29-08.pdf)
- Kayongo, J., & Jones, S. (2008). Faculty perception of information control using LibQUAL+™ indicators. *The Journal of Academic Librarianship*, 34(2), 130-138.
- Kent State University (2006). Standardized Assessment of Information Literacy Skills. <https://www.projectsails.org/>
- Kerlinger, F.N. (1986). *Foundations of behavioral research*. New York: Holt, Rinehart and Winston.
- Klein, S.P., Kuh, G.D., Chun, M., Hamilton, L., & Shavleson, R. (2005). An approach to measuring cognitive outcomes across higher education institutions. *Research in Higher Education* 46(3) 251-276
- Knight, L. A., & Lyons-Mitchell, K. A. (2001). Measure for measure: statistics about statistics. *Information Technology and Libraries*, 20(1), 34-38.
- Koltay, Z. & Li, X. (2010). *SPEC Kit 138: Impact measures in research libraries*. Washington, DC: Association of Research Libraries.
- Kramer, L. & Kramer, M. (1968). The college library and the drop-out. *College and Research Libraries* 29(4), 310-312.



- Krathwohl, D. R. (2002). A revision of bloom's taxonomy: An overview. *Theory into Practice*, 41(4).
- Krippendorff, K. (2011). Computing Krippendorff's alpha-reliability. Retrieved on 4/20/2012 from [http://repository.upenn.edu/cgi/viewcontent.cgi?article=1043&context=asc\\_papers](http://repository.upenn.edu/cgi/viewcontent.cgi?article=1043&context=asc_papers)
- Krippendorff, K. (2004). Content analysis: an introduction to its methodology. Thousand Oaks, CA: Sage.
- Kuh, G.D. (2008). *High-Impact Educational Practices: what are they, who has access to them, and why they matter*. Washington, DC: American Association of Colleges and Universities.
- Kuh, G. D. (2007). Risky business: Promise and pitfalls of institutional transparency. *Change*, 39(5), 30–35.
- Kuh, G. D. (2003). *The national survey of student engagement: Conceptual framework and overview of psychometric properties*. Retrieved on 4/20/2012 from [http://nsse.iub.edu/pdf/conceptual\\_framework\\_2003.pdf](http://nsse.iub.edu/pdf/conceptual_framework_2003.pdf)
- Kuh, G. D., Chen, D., & Nelson Laird, T.F. (2007). Why Teacher-Scholars matter: some insights from FSSE and NSSE. *Liberal Education*, Fall 2007, 40-45.
- Kuh, G.D. & Ikenberry, S. (2009). More than you think, less than we need: Learning outcomes assessment in American Higher Education. Champaign, IL: National Institute for Learning Outcomes Assessment. Retrieved on 4/20/2012 from <http://www.learningoutcomesassessment.org/MoreThanYouThink.htm>
- Kuh, G. D., Kunze, J., Schuh, J.H., Whitt, E. and associates (2005). *Student Success in College: Creating Conditions that Matter*. Washington, DC: Jossey Bass.
- Kuh, G.D., Pace, C., & Vesper, N. (1997). The development of process indicators to estimate student gains associated with good practices in undergraduate education. *Research in Higher Education*, 38(4) 435-454.
- Kuhlthau, C.C. (2004). *Seeking Meaning: A Process Approach to Library and Information Services*. Westport, CT: Libraries Unlimited.
- Kuhlthau, C. C. (1991). Inside the search process: Information seeking from the user's perspective. *Journal of the American Society for Information Science*, 42(5), 361-371.
- Kuhlthau, C. C. (1988a). Longitudinal case studies of the information search process of users in libraries. *Library and Information Science Research* 10, 257-304.
- Kuhlthau, C. C. (1988b). Perceptions of the information search process in libraries: A study of changes from high school through college. *Information Processing and Management* 24, 419-427.
- Kuhlthau, C. C., Turock, B. J., George, M. W., & Belvin, R. J. (1990). Validating a model of the search process: A comparison of academic, public and school library users. *Library and Information Science Research*, 12(1), 5-31.

- Kutner, M., Greenberg, E., Jin, Y., Boyle, B., Hsu, Y., & Dunleavy, E. (2006). *Literacy in Everyday Life: Results from the 2003 National Assessment of Adult Literacy*. Washington, D.C.: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Report number NCES 2007-480. Retrieved on 4/20/2012 from <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2007480>
- Kyrillidou, M. (2002). Research library spending on electronic scholarly information is on the rise. *Journal of Library Administration*, 35(4), 89.
- Leckie, G. J., Pettigrew, K. E., Sylvain, C. (1996). Modeling the Information Seeking of Professionals: A General Model Derived from Research on Engineers, Health Care Professionals, and Lawyers. *Library Quarterly* 66(2) 161-193.
- Lehman, D.R. & Nisbett, R.E. (1990). A longitudinal study of the effects of undergraduate training on reasoning. *Developmental Psychology*, 26(6) 952-960.
- Lewis, D. W. (2007). A strategy for academic libraries in the first quarter of the 21<sup>st</sup> Century. *College and Research Libraries*, September, 418-434.
- Lippincott, J.K. (2005) Net Generation Students and Libraries. Educause Review. Retrieved on 4/20/2012 from <http://www.educause.edu/NetGenerationStudentsandLibraries/6067>
- Lumina Foundation (2011a). The Degree Qualifications Profile. Retrieved on 4/20/2012 from [http://www.luminafoundation.org/publications/The\\_Degree\\_Qualifications\\_Profile.pdf](http://www.luminafoundation.org/publications/The_Degree_Qualifications_Profile.pdf)
- Lumina Foundation (2011b). "Our Goal." Retrieved on 4/20/2012 from [http://www.luminafoundation.org/our\\_work/our\\_goal.html](http://www.luminafoundation.org/our_work/our_goal.html)
- Lumina Foundation (2009). TuningUSA. Retrieved on 4/20/2012 from [http://www.luminafoundation.org/newsroom/news\\_releases/2009-04-08-tuning.html](http://www.luminafoundation.org/newsroom/news_releases/2009-04-08-tuning.html)
- Lynch, B. P., Murray-Rust, C., Parker, S. E., Turner, D., Walker, D. P., Wilkinson, F. C., et al. (2007). Attitudes of presidents and provosts on the university library. *College & Research Libraries*, 68(3) 213-227.
- MacMullin, S. E., & Taylor, R. S. (1984). Problem dimensions and information traits. *The Information Society*, 3(1), 91-111.
- MacWhinnie, L.A. (2003) The Information Commons: The academic library of the future. *Portal* 3(2) 241-257.
- Mann, T. (1993). *Library research models: a guide to classification, cataloging, and computers*. Oxford: Oxford University Press, 91-102.
- Maron, N.L. & Smith, K.K. (2008). *Current Models of Digital Scholarly Communication: Results of an Investigation Conducted by Ithaka for the Association of Research Libraries*. Washington, DC: Association of Research Libraries. Retrieved on 4/20/2012 from <http://www.arl.org/bm~doc/current-models-report.pdf>
- Marshall, J.G. (1992). The impact of the hospital library on clinical decision making: the Rochester study. *Bulletin of the Medical Library Association* 80(2):169-78.

- Martell, C. (2008). The absent user: Physical use of academic library collections and services continues to decline 1995–2006. *The Journal of Academic Librarianship*, 34(5), 400-407.
- McDonald, J.A. & Micikas, L.B. (1994). *Academic Libraries: The Dimensions of Their Effectiveness*. Westport, CT: Greenwood Press.
- McInerney, D.J. (2010). "Rubrics for history courses: lessons from one campus." *Perspectives on History* 48(7) 31-33. Retrieved on 4/20/2012 from <http://historians.org/Perspectives/issues/2010/1010/1010tea1.cfm>
- Measuring up 2008: The national report card on higher education* (2008). San Jose, CA: National Center for Public Policy and Higher Education. Retrieved on 4/20/2012 from <http://measuringup2008.highereducation.org/>
- Mellon, C. A. (1986). Library anxiety: A grounded theory and its development. *College and Research Libraries*, 47(2), 160-165.
- Mezick, Elizabeth M. (2007). "Return on Investment: Libraries and Student Retention." *Journal of Academic Librarianship* 33, no. 5 561-566
- Midwest Higher Education Commission (2012). Disciplinary Tuning. Retrieved on 4/20/2012 from <http://www.mhec.org/ProgrammaticInitiatives>
- Miles, M.B. & Huberman, A.M. (1994). *Qualitative data analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage
- Miller, M.A. (2008). The Voluntary System of Accountability: Origins and purposes, An interview with George Mehaffy and David Schulenberg. *Change* July/August 2008 8-13
- Montgomery C.H. & King, D. (2000a). Comparing library and user related costs of print and electronic journal collections. *D-Lib Magazine* 8(10). Retrieved on 4/20/2012 from <http://www.dlib.org/dlib/october02/montgomery/10montgomery.html>
- Montgomery C.H. & King, D. (2000b). After migration to an electronic journal collection: impact on faculty and doctoral students. *D-Lib Magazine* 8(12). Retrieved on 4/20/2012 from <http://www.dlib.org/dlib/december02/king/12king.html>
- Morris, Ruth C. T. (1994). Toward a User-Centered Information Service. *The Journal of the American Society for Information Science* 45(1) 20
- Munn, R. F. (1989). The bottomless pit; or, the academic library as viewed from the administration building. *College & Research Libraries*, 50, 635-637.
- National Association of State Universities and Land-Grant Colleges (NASLGC) (2010). *The Voluntary System of Accountability: Overview of College Portrait*. Retrieved on 4/20/2012 from <http://www.voluntarysystem.org/docs/cp/CollegePortraitOverview.pdf>
- National Survey of Student Engagement (2012). *The college report*. Trustees of the University of Indiana Bloomington. Retrieved on 4/20/2012 from <http://nsse.iub.edu/index.cfm>

- National Survey of Student Engagement (2010a). *Benchmarks of Effective Educational Practice*. Trustees of Indiana University. Retrieved on 4/20/2012 from [http://nsse.iub.edu/pdf/nsse\\_benchmarks.pdf](http://nsse.iub.edu/pdf/nsse_benchmarks.pdf)
- National Survey of Student Engagement (2010b). *Annual results*. Trustees of Indiana University. Retrieved on 4/20/2012 from [http://nsse.iub.edu/html/annual\\_results.cfm](http://nsse.iub.edu/html/annual_results.cfm)
- National Survey of Student Engagement. (2008). Promoting Engagement for All Students: The Imperative to Look Within, 2008 Results. Trustees of the University of Indiana Bloomington. Retrieved on 4/20/2012 from [http://nsse.iub.edu/NSSE\\_2008\\_Results/docs/withhold/NSSE2008\\_Results\\_revised\\_11-14-2008.pdf](http://nsse.iub.edu/NSSE_2008_Results/docs/withhold/NSSE2008_Results_revised_11-14-2008.pdf)
- Nelson Laird, T. F. , Schwartz, M. J., Shoup, R., Kuh, G. D., & Schwartz, M.J. (2008). Disciplinary differences in faculty members' emphasis on deep approaches to learning. *Research in Higher Education* 49 469–494.
- Nelson Laird, Shoup,R., and Kuh, G.D. (2006). “Deep Learning and College Outcomes: Do Fields of Study Differ?” Paper presented at the Annual Meeting of the Association for Institutional Research, May 29 – June 1, 2005 San Diego, CA.
- Nelson Laird, T. F., Niskodé-Dossett, A. S., & Kuh, G. D. (2009). What general education courses contribute to essential learning outcomes. *Journal of General Education*, 58(2) 65–84.
- Nelson Laird, T. F., Shoup, R., & Kuh, G. D. (2006). *Measuring deep approaches to learning using the National Survey of Student Engagement*. Paper presented at the Annual Forum of the Association for Institutional Research, Chicago, IL.
- Nelson Laird, T.F. & Garver, A. (2010). The Effect of Teaching General Education Courses on Deep Approaches to Learning: How Disciplinary Context Matters. *Research in Higher Education*, 51(3) 248-265.
- Noyes, J., & Garland, K. (2005). Students' attitudes toward books and computers. *Computers in Human Behavior*, 21(2), 233-241.
- Noyes, J., & Garland, K. (2006). Explaining students' attitudes toward books and computers. *Computers in Human Behavior*, 22(3), 351-363.
- Oakleaf, M. (2011). "Are They Learning? Are We? Learning and the Academic Library." *Library Quarterly*. 81(1), 61-82.
- Oakleaf, M. (2010). The Value of Academic Libraries: A comprehensive research review and report for the Association of College and Research Libraries (ACRL). Chicago: ALA.
- Oakleaf, M. (2008). Dangers and Opportunities: A Conceptual Map of Information Literacy Assessment Tools. *portal: Libraries and the Academy*, 8(3) 233-253.
- Oakleaf, M., & Kaske, N. (2009). "Guiding Questions for Assessing Information Literacy in Higher Education." *portal: Libraries and the Academy*, 9 273-286.

- Oblinger, D. (2002). Boomers, Gen-Xers, and Millennials: Understanding the new students. *Educause Review*, July 2002, 37-47.
- OCLC (2002). OCLC White Paper on the Information Habits of College Students. Dublin, Ohio: OCLC. Retrieved on 4/20/2012 from <http://www.oclc.org/research/news/2002-06-24.htm>
- OCLC (2006a). College Students' Perceptions of Libraries and Information Resources: A Report to the OCLC Membership. Dublin, Ohio. Retrieved on 4/20/2012 from <http://www.oclc.org/reports/pdfs/studentperceptions.pdf>
- OCLC (2006b). Sense-making the information confluence: The whys and hows of college and university user satisficing of information needs. Retrieved on 4/20/2012 from <http://www.oclc.org/research/projects/imls/default.htm>
- OECD (2011). Education at a glance 2011: OECD Indicators, Chart A1.1, p. 30.
- Onwuegbuzie, A.J., Qun, G. J., & Bostick, S.L. (2004). *Library Anxiety: Theory, Research, and Applications*. Lanham, Md.: Scarecrow Press.
- Orr, R.H. (1973). Measuring the goodness of library services: A general framework for considering quantitative measures. *Journal of Documentation* 29(3). 3 15-332
- Ouimet, J.A., Bunnage, J.C., Carini, R. M. , Kuh, G. D., & Kennedy, J. (2004). Using focus groups, expert advice, and cognitive interviews to establish the validity of a college student survey. *Research in Higher Education*, 45(3) May 2004, 233-249.
- Pace, C.R. (1990). *The undergraduates: A report of their activities and progress in college in the 1980's* Los Angeles, CA: Center for the Study of Evaluation, University of California, Los Angeles, c1990.
- Pace, C.R. (1984a). *Measuring the quality of college student experiences: An account of the development and use of the college student experiences questionnaire*. Los Angeles: Higher Education Research Institute, Graduate School of Education, University of California. ERIC Document ED 255099.
- Pace, C.R. (1984b). *Achievement and the quality of student effort* Paper presented at a Meeting of the National Commission on Excellence in Education, May 25, 1982. Washington, DC: U.S. Department of Education.
- Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1985). A Conceptual Model of Service Quality and its Implications for Future Research. *Journal of Marketing*, 49(Fall 1985), 41-50.
- Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of research*. San Francisco: Jossey-Bass.
- Pascarella, E. T., & Terenzini, P. T. (1991). *How college affects students: Findings and insights from twenty years of research*. San Francisco: Jossey-Bass Publishers, 1991.
- Pascarella, E. T., Pierson, C. T., Wolniak, G. C., & Terenzini, P. T. (2004). First-generation college students: Additional evidence on college experiences and outcomes. *Journal of Higher Education*, 75(3), 249 – 284.

- Pascarella, E.T., Seifert, T.A., & Blaich, C. (2009). *Validation of the NSSE benchmarks and deep approaches to learning against liberal arts outcomes*. Crawfordsville, Indiana: Center for Inquiry, Wabash College. Retrieved on 4/20/2012 from [http://www.liberalarts.wabash.edu/storage/ValidationofNSSEBenchmarks\\_PascarellaEtAl\\_ASHE08Linked.pdf](http://www.liberalarts.wabash.edu/storage/ValidationofNSSEBenchmarks_PascarellaEtAl_ASHE08Linked.pdf)
- Pettigrew, K. E. (1996). Nurse's perceptions of their needs for community information: Results of an exploratory study in Southwestern Ontario. *Journal of Education for Library and Information Science*, 37(4) 361-360.
- Phan, T., Hardesty, L., Hug, J., and Sheckells, C. (2011). Academic Libraries: 2010 (NCES 2012-365). U.S. Department of Education, Washington, DC: National Center for Education Statistics. Retrieved 4/20/2012 from <http://nces.ed.gov/pubs2012/2012365.pdf>
- Pike, G. R. (2006a). Assessment Measures: Value-Added Models and the Collegiate Learning Assessment. *Assessment Update*, 18(4) 5-8.
- Pike, G. R. (2006b). The Dependability of NSSE Scalelets for college and department level assessment. *Research in Higher Education* 47(2) March 2006 177-195.
- Pike, G. R. (1992). Lies, Damn Lies, and Statistics Revisited: A Comparison of Three Methods of representing change. *Research in Higher Education*, 33, 71-84.
- Poll, R. & Payne, P. (2006). Impact measures for libraries and information services. *Library Hi Tech*, 24(4) 547-562.
- Poll, R., Te Boekhorst, P., and Mundt, S. (2007). *Measuring quality: Performance measurement in libraries*. Munchen: K.G. Saur.
- Portmann, C. A., & Roush, A. J. (2004). Assessing the effects of library instruction. *The Journal of Academic Librarianship*, 30(6) 461-465.
- Posvar, W. W., Wallin, F. W., O'Neil, R. M., Ernst, R. J., MacVicar, R., Mathews, D., et al. (1977). The president views the campus library. *Journal of Academic Librarianship*, 3(4), 192-199.
- Powell, R. R. (1992). Impact assessment of university libraries: A consideration of issues and research methodologies. *Library and Information Science Research*, 14(3) 245-257.
- Prabha, C., Connaway, L.S., Olszewski, L. & Jenkins, L.R. (2007). "What is enough? Satisficing information needs." *Journal of Documentation*, 63(1) 74-89.
- Pritchard, S. M. (1996). Determining Quality in Academic Libraries. *Library Trends*, vol. 44 (3): 572 – 594.
- Provezis, S. (2010). *Regional Accreditation and Student Learning Outcomes: Mapping the Territory*. NILOA Occasional Paper No.6. Urbana, IL: University of Illinois and Indiana University, National Institute of Learning Outcomes Assessment. Retrieved on 4/20/2012 from <http://learningoutcomesassessment.org/documents/Provezis.pdf>
- Qualtrics (2011). Retrieved on 4/20/2012 from [www.qualtrics.com](http://www.qualtrics.com)



- Quinn, M. & Kim, J. 2007. *Scholarly Communications in the Biosciences Discipline: A Report Commissioned by JSTOR*. New York, NY: Ithaka. Retrieved on 4/20/2012 from <http://www.ithaka.org/publications/pdfs/JSTOR%20BioSci%20Study%20Report%20Public%20final1031.pdf>
- Radford, M.L. & Kern, K.M. (2006). A multiple-case study investigation of the discontinuation of nine chat reference services. *Library & Information Science Research* 28(4) 521-547.
- Radford, M.L. (2006). The Critical Incident Technique and the Qualitative Evaluation of the Connecting Libraries and Schools Project. *Library Trends*, 55(1) 46-64
- Radford, M.L. (1996). Communication Theory Applied to the Reference Encounter: An Analysis of Critical Incidents. *Library Journal*, 66(2), 123-137.
- Rausch, L.M. & Popp, M.P. (1997). *Assessment of information literacy: lessons from the higher education assessment movement*. Paper presented at the ACRL National Conference, Nashville, TN.
- Research Information Network (2009a). *E-journals: Their use, value and impact*. London: Research Information Network. Retrieved on 4/20/2012 from <http://www.rin.ac.uk/our-work/communicating-and-disseminating-research/ejournals-their-use-value-and-impact>
- Research Information Network (2009b). Evaluating the usage and impact of e-journals in the UK: Information usage and seeking behavior subject and institutional profiles, working paper # 4. Retrieved on 4/20/2012 from [http://www.rin.ac.uk/system/files/attachments/Information\\_usage\\_behaviour\\_CIBER\\_ejournals\\_working\\_paper.pdf](http://www.rin.ac.uk/system/files/attachments/Information_usage_behaviour_CIBER_ejournals_working_paper.pdf)
- Rhodes, T.L. (2008). VALUE: Valid Assessment of Learning in Undergraduate Education. *New Directions in Institutional Research*. Assessment supplement, 2007, 59-70.
- Rodriguez, D.A. (2012). "Answering questions about library impact on student learning." *In the Library with the Lead Pipe*, April 4, 2012. Retrieved on 4/20/2012 from <http://www.inthelibrarywiththeleadpipe.org/2012/answering-questions-about-library-impact-on-student-learning/>
- Rodriguez, D.A. (2007). *Investigating academic library contributions to undergraduate learning: A field trial of the 'Understanding Library Impacts' protocol*.
- Rodriguez, D.A. (2006). "How Digital Library Services Contribute to Undergraduate Learning: An Evaluation of the 'Understanding Library Impacts' Protocol". In Strauch, Katina, Steinle, Kim, Bernhardt, Beth R. and Daniels, Tim, Eds. *Proceedings 26th Annual Charleston Conference*, Charleston (US). Retrieved on 4/20/2012 from <http://eprints.rclis.org/archive/00008576/>
- Rosenbaum, H. (1996). Structure and action: Towards a new concept of the information use environment. In: Hardin, S. ed. *Proceedings of the 59th ASIS Annual Meeting, Vol. 33*. Medford, NJ: Learned Information.
- Rosenbaum, H. (1993). Information use environments and structuration: towards an integration of Taylor and Giddens. In: Bonzi & Kazler & Kwasnik eds *Proceedings of the 56th ASIS Annual Meeting, Vol. 30*. Medford, NJ: Learned Information, 235-245.

- Rowley, J. & Urquhart, C. (2007). Understanding student information behavior in relation to electronic information services: lessons from longitudinal monitoring and evaluation, part 1. *Journal of the American Society for Information Science*, 58(8) 1162-1174.
- Rushing, D. & Poole, D. (2002). "The Role of the Library in Student Retention," in *Making the Grade: Academic Libraries and Student Success*, edited by Maurie Caitlin Kelly and Andrea Kross (Chicago: Association of College and Research Libraries, 2002), pp. 91–101.
- Rutner, J. (2012). Interim Report: Interviews with Research Support Professionals. Ithaka S+R Research Support Services for Scholars: History Project. Retrieved on 4/20/2012 from [http://www.researchsupportservices.net/wp-content/uploads/2012/02/IthakaSR\\_HistoryProject\\_InterimReport1.pdf](http://www.researchsupportservices.net/wp-content/uploads/2012/02/IthakaSR_HistoryProject_InterimReport1.pdf)
- Saracevic, T., & Kantor, P. B. (1997a). Studying the Value of Library and Information Services. Part I. Establishing a Theoretical Framework. *Journal of the American Society for Information Science*, 48(6), 527-542.
- Saracevic, T., & Kantor, P. B. (1997b). Studying the Value of Library and Information Services. Part II. Methodology and Taxonomy. *Journal of the American Society for Information Science*, 48(6), 543-563.
- Saunders, L. (2007). Regional accreditation organizations' treatment of information literacy: Definitions, collaboration, and assessment. *Journal of Academic Librarianship*, 33(3), 317-326.
- Savolainen, R. (2006). Information use as gap-bridging: the viewpoint of Sense-Making Methodology. *Journal of the American Society for Information Science and Technology*, 57(8) 1116-1125.
- Savolainen, R. & Kari, J. (2006). Facing and bridging gaps in web searching. *Information Processing and Management*, 42(2) 519-537.
- Scharf, D., Elliot, N., Huey, H. A., Briller, V., & Joshi, K. (2007). Direct assessment of information literacy using writing portfolios. *The Journal of Academic Librarianship*, 33(4), 462-477.
- Schonfeld, R.C. and Housewright R. (2010). *Faculty Survey 2009: Strategic Insights for Librarians, Publishers, and Societies* New York: Ithaka S+R Retrieved on 4/20/2012 from <http://www.ithaka.org/ithaka-s-r/research/faculty-surveys-2000-2009/Faculty%20Study%202009.pdf>
- Seifert, T.A., Pascarella, E.T., Colangelo, N., Assouline, S. (2007). The Effects of Honors Program Participation on Experiences of Good Practices and Learning Outcomes. *Journal of College Student Development*, 48(1) 57-74.
- Self, J. (1987). Reserve readings and student grades: analysis of a case study. *Library and Information Science Research*. v. 9 (1), 29-40.
- Shavelson, R. J. (2007). Assessing student learning responsibly: From history to an audacious proposal. *Change: The Magazine of Higher Learning*, 39(1), 26-33.



- Shavelson, R. J. & Huang, L. (2003). Responding responsibly: To the frenzy to assess learning in higher education *Change* 35(1) 10-19.
- Shavelson, R. J. & Huang, L. (n.d.). CLA Conceptual Framework. Retrieved on 4/20/2012 from <http://www.cae.org/content/pdf/CLA.ConceptualFramework.pdf>
- Shill, H.B. & Tonner, S. (2004). Does the building still matter? Usage patterns in new, expanded, and renovated libraries, 1995–2002, *College & Research Libraries* 65(2) 123-150.
- Shill, H.B. & Tonner, S. (2003). Creating a Better Place: Physical Improvements in Academic Libraries, 1995–2002, *College & Research Libraries* 64(6) 431–466.
- Smart, J. C., & Umbach, P. D. (2007). Faculty and academic environments: Using Holland's theory to explore differences in how faculty structure undergraduate courses. *Journal of College Student Development*, 48(2), 183-195.
- Smart, J. C., Feldman, K. A., & Ethington, C. A. (2000). *Academic disciplines: Holland's theory and the study of college students and faculty*. Nashville, TN: Vanderbilt University Press.
- Smith, K. R. (2002). New roles and responsibilities for the university library -- advancing student learning through outcomes assessment. *Journal of Library Administration*, 35(4), 29-38
- Snaveley, L. L., & Wright, C. A. (2003). Research portfolio use in undergraduate honors education: Assessment tool and model for future work. *The Journal of Academic Librarianship*, 29(5), 298-303.
- Solomon, P. (1997a). Discovering information behavior in sense making. I. time and timing. *Journal of the American Society for Information Science*, 48(12), 1097-1108.
- Solomon, P. (1997b). Discovering information behaviour in sense making. II. the social. *Journal of the American Society for Information Science*, 48(12), 1109-1126.
- Solomon, P. (1997c). Discovering information behavior in sense making. III. the person. *Journal of the American Society for Information Science*, 48(12), 1127-1138.
- Sonnenwald, D. (2005). Information Horizons. In: K.E. Fisher, S. Erdelez, & L.E.F. McKechnie, eds. *Theories of Information Behavior*. Medford, NJ: Information Today, 191-197.
- Sonnenwald, D. (1999). Evolving Perspectives of Human Information Behavior: Contexts, Situations, Social Networks and Information Horizons. In Wilson, T. & Allen, D. (Eds.) (1999). *Exploring the Contexts of Information Behaviour* (pp. 176-190.) London: Taylor Graham. Retrieved on 4/20/2012 from <http://arizona.openrepository.com/arizona/bitstream/10150/105189/1/isic98%2Bpaper.pdf>
- Sonnenwald, D.H., Wildemuth, B.M., & Harmon, G. (2001). A research method using the concept of information horizons: An example from a study of lower socio-economic students' information seeking behavior. *The New Review of Information Behavior Research*, 2, 65-86. Retrieved on 4/20/2012 from <http://arizona.openrepository.com/arizona/bitstream/10150/105932/1/2001-info-beh-sonnenwald.pdf>

- Spady, W. Dropouts from higher education: An interdisciplinary review and synthesis. *Interchange*, 1 64-85.
- Stone, Graham, Ramsden, Bryony and Pattern, David (2012) Library Impact Data Project. *Sconul Focus* (54).
- Stone, G., Ramsden, B. & Pattern, D. (2011). Looking for the link between library usage and student attainment. *Ariadne* (67).
- Suber, P. (2010). Open Access Overview. Retrieved on 4/20/2012 from <http://www.earlham.edu/~peters/fos/overview.htm>
- Sutton, L., Bazirjian, R., & Zerwas, S. (2009). Library service perceptions: A study of two universities. *College & Research Libraries*, 70(5), 474-495.
- Sutton, R.I. & Staw, B.M. (1995). What Theory is Not. *Administrative Science Quarterly*, 40(3) 371-384.
- Taylor, R.S. (1991). Information Use Environments, In B. Dervin & M.J. Voigt (Eds.) *Progress in communication sciences*. P. 217-255 Norwood, NJ: Ablex.
- Taylor, R.S. (1986). *Value-added Processes in Information Systems*. Norwood, N.J.: Ablex Pub. Corp.
- Taylor, R. S. (1973). Measuring the Immeasurable: Can we get there from here? In hershfield, A.F. & Boone, M.D. Eds. *Approaches to measuring library effectiveness: a symposium*. Syracuse, NY: School of Information and Library Science, pp. 31-39.
- Tenopir, C. (n.d.). Survey instruments and reports. Retrieved on 4/20/2012 from [http://web.utk.edu/~tenopir/research/survey\\_instruments.html](http://web.utk.edu/~tenopir/research/survey_instruments.html)
- Tenopir, C. (n.d.). UT Faculty Survey. Retrieved on 4/20/2012 from [http://web.utk.edu/~tenopir/research/UT/IMLSFacultySurvey\\_Paper\\_UTK0928.pdf](http://web.utk.edu/~tenopir/research/UT/IMLSFacultySurvey_Paper_UTK0928.pdf)
- Tenopir, C. & King, D.W. (2007). Perceptions of value and value beyond perceptions: measuring the quality and value of journal article readings. *Serials* 20(3) 199-207.
- Tenopir, C. & King, D.W. (2002). Reading behavior and electronic journals. *Learned Publishing* 15 259-265.
- Tenopir, C., King, D.W., & Bush, A. (2003). Medical faculty's use of print and electronic journals: Changes over time and in comparison with scientists. *Journal of the Medical Library Association*, 92(2) 233-241.
- Tenopir, C., King, D.W., Edwards, S. & Wu, L. (2009). Electronic journals and changes in scholarly article seeking and reading patterns. *Aslib Proceedings* 61(1) 5-32.
- Terenzini, P.T. & Reason, R.D. (2010). "Toward a more comprehensive understanding of college effects on student learning." Paper presented at the meeting of the Consortium of Higher Education Researchers, 10 June 2010, Oslo, Norway.

- Terenzini, P.T., Springer, L. Pascarella, E.T., & Nora, A. (1995). Influences affecting the development of students' critical thinking skills. *Research in Higher Education*, 36 (1) 23-39.
- Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition*. Chicago: University of Chicago Press.
- Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research*, 45(1), 89-125.
- Trustees of the University of Indiana Bloomington (2012a). College Student Experiences Questionnaire Program. Retrieved on 4/20/2012 from <http://cseq.iub.edu>
- Trustees of the University of Indiana Bloomington (2012b). Faculty Survey of Student Engagement Retrieved on 4/20/2012 from <http://fsse.iub.edu>
- Trustees of the University of Indiana Bloomington (1998). *College student experiences questionnaire. 4<sup>th</sup> edition*. Retrieved on 4/20/2012 from [http://cseq.iub.edu/pdf/cseq\\_whole.pdf](http://cseq.iub.edu/pdf/cseq_whole.pdf)
- Tuning (2004). *Summary of Outcomes: History*. Tuning Educational Structures in Europe. Retrieved 4/15/2012 from <http://www.unideusto.org/tuningeu/subject-areas/history/summary-of-outcomes.html>
- TuningUSA (2009). Tuning USA: Final report—Utah. Retrieved on 4/20/2012 from <http://www.quickanded.com/wordpress/wp-content/uploads/2010/06/Utah-Final-Tuning-USA-Report.pdf>
- University of North Carolina-Wilmington (n.d.) Department of History Learning Outcomes Scoring Rubric. Retrieved on 4/16/2012 from <http://uncw.edu/cas/documents/Elaboratedcompetencies3.pdf>
- Utah State University History Department (2009). Senior Capstone Learning Outcomes Rubric. Retrieved on 4/16/2012 from <http://www.usu.edu/history/abouthistory09/rubricforseniorcapstonecourse.pdf>
- U.S. Department of Education. National Center for Education Statistics. (2012). *College navigator*. Retrieved on 4/20/2012 from <http://nces.ed.gov/collegenavigator>
- U.S. Department of Education. National Center for Educational Statistics. Library Statistics Program. (2010a). Academic Libraries 2008: A first look. Washington, DC. Retrieved on 4/20/2012 from <http://nces.ed.gov/pubs2010/2010348.pdf>
- U.S. Department of Education. National Center for Educational Statistics. (2010b) Academic Library Survey Program. Washington, DC: NCES. Retrieved on 4/20/2012 from <http://nces.ed.gov/surveys/libraries/>
- U.S. Department of Education. National Center for Educational Statistics. Library Statistics Program. (2008b). *Academic Libraries: 2006*. Washington, DC. Retrieved on 4/20/2012 from <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2008337>

- U.S. Department of Education, (2006a). *A Test of Leadership: Charting the Future of U.S. Higher Education*. Washington, D.C. Retrieved on 4/20/2012 from <http://www.ed.gov/about/bdscomm/list/hiedfuture/reports/final-report.pdf>
- U.S. Department of Education. National Center for Educational Statistics. Library Statistics Program. (2006b). Academic Libraries: 2004. Washington, DC. Retrieved on 4/20/2012 from <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2007301>
- U.S. Department of Education, National Center for Education Statistics. (2002). *Nontraditional Undergraduates*, NCES 2002–012, prepared by Susan Choy. Washington, DC. Retrieved on 4/20/2012 from <http://nces.ed.gov/pubs2002/2002012.pdf>
- U.S. Department of Labor. Bureau of Labor Statistics (2009). *Consumer Price Index History Table* Retrieved on 4/20/2012 from <ftp://ftp.bls.gov/pub/special.requests/cpi/cpiiai.txt>
- U-CAN (2010). U-CAN Profiles. University and College Accountability Network. Retrieved on 4/20/2012 from <http://www.ucan-network.org/members.asp>
- Urquhart, C. & Hepworth, J.B. (1995). *The value to clinical decision making of information supplied by NHS library and information services*. British Library Research and Development Department.
- Urquhart, C. & Rowley, J. (2007). Understanding student information behavior in relation to electronic information services: lessons from longitudinal monitoring and evaluation, part 2. *Journal of the American Society for Information Science*, 58(8) 1188-1197.
- Urquhart, C., Light, A., Thomas, R., Barker, A., Yeoman, A., & Cooper, J. et al. (2003). Critical Incident Technique and explication interviewing in studies of information behavior. *Library and Information Science Research*, 25(1) 63-88.
- Van House, N. A. (1990). *Measuring academic library performance: a practical approach*. Chicago, IL: American Library Association.
- Van House, N. A., Weil, B. T., & McClure, C. R. (1990). *Measuring Academic Library Performance: A Practical Approach*. Chicago: American Library Association.
- Van Scoyoc, A., & Cason, C. (2006). The electronic academic library: Undergraduate research behavior in a library without books. *Portal, Libraries and the Academy*, 6(1), 47-58.
- VSA (2011). Voluntary System of Accountability. <http://www.voluntarysystem.org/>
- Wabash National Study (2009a) *Wabash National Study, 2006-2009*. Crawfordsville, Indiana: Center for Inquiry, Wabash College. Retrieved on 4/20/2012 from <http://www.liberalarts.wabash.edu>
- Wabash National Study (2009b). *Overview of Findings from the First Year of the Wabash National Study of Liberal Arts Education*. Crawfordsville, Indiana: Center for Inquiry, Wabash College. Retrieved on 4/20/2012 from [http://www.liberalarts.wabash.edu/storage/Overview\\_of\\_Findings\\_from\\_the\\_First\\_Year\\_web\\_07.17.09.pdf](http://www.liberalarts.wabash.edu/storage/Overview_of_Findings_from_the_First_Year_web_07.17.09.pdf)

- Wavell, C., Baxter, G., Johnson, I.M. and Williams, D.A. (2002) Impact evaluation of museums, archives and libraries: a review of available evidence. Final report for Resource: the Council for Museums, Archives and Libraries. Aberdeen: The Robert Gordon University for Resource: the Council for Museums, Archives and Libraries. Retrieved on 4/20/2012 from <https://www4.rgu.ac.uk/files/Impact%20evaluation%20of%20museums.pdf>
- Weidman, J. (1989). Undergraduate socialization: A conceptual approach. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. 5, pp. 289-322). New York: Agathon Press.
- White, L. N., & Blankenship, E. F. (2007). Aligning the assessment process in academic libraries for improved demonstration and reporting of organizational performance. *College & Undergraduate Libraries*, 14(3), 107-119.
- Whitmire, E. (2002a). Disciplinary differences and undergraduates' information-seeking behavior. *Journal of the American Society of Information Science*, 53(8) 631-638.
- Whitmire, E. (2002b). Academic library performance measures and undergraduates' library use and educational outcomes. *Library and Information Science Research*, 24, 107-128.
- Whitmire, E. (2001). The relationship between undergraduates' background characteristics and college experiences and their academic library use. *College and Research Libraries*, 62(6), 528-540.
- Whitmire, E. (1998). Development of critical thinking skills: an analysis of academic library experiences and other measures. *College and Research Libraries*, 59(3) 266-273.
- Wilder, S. (2005). Information literacy makes all the wrong assumptions, *Chronicle of Higher Education: The Chronicle Review* 51(18) B13. Retrieved on 4/20/2012 from <http://chronicle.com/article/Information-Literacy-Makes-All/21377/>
- Wilder, S. (1990). "Library Jobs and Student Retention," *College & Research Libraries News* 51(11) 1035-1038.
- Wilson, S.R., Starr-Schneidkraut, N., & Cooper, M. D. (1989). *Use of the Critical Incident Technique to evaluate the impact of MEDLINE* No. AIR-646000-9/89-FR, NLM/OPE-90/01). Palo Alto, CA: American Institute of Behavioral Sciences.
- Wilson, T. D. (1999). Models in information behaviour research. *Journal of Documentation*, 55(3), 249-270.
- Wilson, T. D. (1981). On user studies and information needs. *Journal of Documentation*, 37(1), 3-15.
- Wilson, T.D. and C. Walsh (1996). *Information behaviour: an interdisciplinary perspective*. Sheffield: University of Sheffield, Department of Information Studies.
- Wokeck, M. (2010). "Articulating learning outcomes in history: lessons learned in Indiana." *Perspectives on History*, 48(7), 34-35. Retrieved on 4/20/2012 from <http://historians.org/Perspectives/issues/2010/1010/1010tea2.cfm>

- Wong, W., Stelmaszewska, H., Bhimani, N., Barn, S. & Barn, B. (2009). *User behaviour in resource discovery: Final report*. Retrieved on 4/20/2012 from <http://www.jisc.ac.uk/publications/programmerelated/2010/ubirdfinalreport.aspx>
- Wong, Shun Han Rebekah and T.D. Webb. "Uncovering Meaningful Correlation between Student Academic Performance and Library Material Usage." *College and Research Libraries* 72(4) 361-370. Retrieved on 4/20/2012 from <http://crl.acrl.org/content/72/4/361.full.pdf>
- Zach, L. (2004). When is "enough" enough? Modeling the information-seeking and stopping behavior of senior arts administrators. *Journal of the American Society for Information Science and Technology*, 56(1) 23-35.
- Zeithaml, V. K. (1990). *Delivering Quality Service*. New York: Free Press.
- Zis, S., Boeke, M., & Ewell, P. (2010). *State policies on the assessment of student learning outcomes: Results of a fifty-state inventory*. Boulder, CO: National Center for Higher Education Management Systems (NCHEMS).
- Zweizig, D. (1977). Measuring library use. *Drexel Library Quarterly* 13(3), 3-15.