INFORMATION ENGAGEMENT: HOW SOCIAL SCIENCE DOCTORAL

STUDENTS SEEK, FILTER, ACCESS, AND ORGANIZE INFORMATION

By

STEPHANIE MIKITISH

A dissertation submitted to the

Graduate School – New Brunswick

Rutgers, The State University of New Jersey

In partial fulfillment of the requirements

For the degree of

Doctor of Philosophy

Graduate Program in Communication, Information and Library Studies

Written under the direction of

Marie L. Radford, Ph.D.

And approved by

_____

_____

_____

_____

New Brunswick, New Jersey

May 2017

ABSTRACT OF THE DISSERTATION

Information Engagement: How Social Science Doctoral Students

Seek, Filter, Access, and Organize Information

By STEPHANIE MIKITISH

Dissertation Director:

Marie L. Radford, Ph.D.

The government and society are increasingly questioning the value of libraries and higher education institutions (HEIs). While there is no one agreed upon standard of value or a way to measure it, both Library and Information Science (LIS) and Education research have suggested that library and educational resources and services should demonstrate their impact on individual student outcomes. Engagement studies in both areas suggest that by increasing student engagement, institutions can positively and significantly affect student outcomes. Although little work has been done in the area of information engagement (IE), engagement is a useful framework that can be defined and measured on behavioral, emotional, motivational, and cognitive dimensions.

In order to explore, define, and measure IE, this dissertation study examines how social science doctoral students find, filter, access, and organize information. Doctoral students are an understudied population, despite their need for scholarly and often difficult to obtain information. Because little is known about doctoral student IE, samples from this population were drawn in a three part mixed methods study, which consisted of

focus group interviews, individual interviews, and an online survey. Overall, 158 doctoral students from the United States participated in all three phases of this research.

Based on the analysis of qualitative data from the focus group and individual interviews, three factors emerged and were used to measure IE related behaviors in the online survey. The first factor was personality, and according to the quantitative analysis, participants who scored higher on an index based on this factor were more open to asking for help/clarification; less unhappy if they retrieved a large quantity of information, even if it was unexpected; and would be more likely to consider changing their research based on what they found. The second factor was confidence, and participants who scored higher on an index based on this factor believed that they had better searching abilities and felt less challenged by commonly encountered obstacles to finding information. The third factor was interest in library instruction, and participants who scored higher on an index based on this factor were more likely to prefer an instruction session over face-to-face help when they needed it, and think that library instruction would be beneficial to others in their program.

The index scores for these factors had statistically significant relationships to each other and information related behaviors, which included how much participants would pay for a book that they needed for their research and where they would start a search on an unfamiliar topic. The strength of these relationships increased for students in the dissertation writing stage of their program and for students who lived more than an hour away from campus. In addition to being the first study to identify these relationships, this dissertation's major contributions include identifying the critical factors that affect IE,

doctoral student outcomes that information and libraries can support, and suggestions for

educating this population on information related topics.

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

This chapter outlines the problem statement, context, statement of purpose, and rationale and significance for this dissertation. The dissertation study consisted of three phases of mixed methods data collection and analysis, which involved qualitative focus group and individual interviews and a quantitative survey. This research took place in the context of assessment in higher education. Assessment has grown in importance due to governmental and societal demands for accountability. At the same time, assessment of most colleges and universities is complicated by competition from online and other non-traditional colleges and universities. This dissertation's purpose is to consider the valuation of academic libraries with respect to assessment in higher education. The valuation of academic libraries is specifically explored via the conceptualization of information engagement (IE) and its role in promoting positive student-centered outcomes for social science doctoral students, an understudied population that has a high potential to use and value information from the academic library.

Context: Assessment in higher education

Research has demonstrated that earning a college degree benefits both college graduates and society since it is reported that graduates are more likely to have "larger earnings over a lifetime, lower unemployment rates, better health, higher marriage rates, and greater civic involvement" (Rose, 2013) than non-graduates. Consequently, the demand for a college education to earn this demonstrably valuable degree typically remains high. However, the value of the individual higher education institutes (HEI) that provide those degrees is less clear. Both society and the government have increased their

demands for HEIs to account for the rising cost of tuition and of tax dollars spent on

education. These demands are complicated due to competition among HEIs and the

introduction of new methods of instruction for which there are no standard ways of

assessment.

HEIs are primarily funded through student tuition and government assistance

(Heller, 2003). Of the two, tuition is the primary source of revenue into HEIs. In addition

to demands for accountability from those who pay student tuition, HEIs must also justify

their use of governmental funding. Public land grant institutions must be funded at a

certain level through their respective state governments, but although federal funding has

increased it is being distributed to more institutions than ever before, which has resulted

in fewer amounts per institution (Campos, 2015), and even less for underperforming

institutions (Nelson, 2003). Federal, state, and local governments also award money to

other types of institutions, and this has always been competitively allocated. Faced with

calls for accountability from various stakeholders in government and society, HEIs must

develop ways to conceptualize and measure their value, usually quantitatively. In

addition to demonstrating how they are improving their value to their students, they are

increasingly being pressured to develop ways to compare themselves with other

institutions.

In addition to the calls for accountability from those outside higher education,

many colleges and universities face competition from other HEIs, including the more

established traditional colleges and universities, and also from the relatively recently

established for profit educational institutions (Stevens & Kirst, 2015). Enabled in part by

technological advances, the latter do not require the instructors or students to meet in the

same building for class. In addition to reducing the overhead necessary to run physical facilities, online colleges and universities also have the ability to attract and instruct large numbers of students in a largely unregulated manner (Contreras, 2007; Stevens & Kirst, 2015). Although some believe that the accreditation system ensures that only institutions providing quality educations are in operation, one study by Contreras (2007) found that roughly 20 percent of legal HEIs are running unaccredited in the 34 states surveyed.

Statement of purpose: The need for deeper understanding and better metrics

Despite the critical need to demonstrate their value, many HEIs are having trouble doing so. Astin's (1993) two models of higher education are useful in describing why the value of higher education is difficult to quantify. The industrial model view of higher education values accountability and efficiency because it assumes that students receive the same benefits from attending an institution, and the only variable is how much the education costs, which ultimately lies in the effectiveness of the institution (Astin, 1993, p. 17). The medical model compares the initial conditions of the student, which is analogous to a patient's initial prognosis, to their condition after attending college, which is analogous to the treatment (Astin, 1993, p. 18). In other words, the opportunities provided at an HEI will have different results, which depend on the student as well as the institution. Prior to the 1980s, most assessments of HEI value were undertaken with the industrial model in mind, but increasing evidence indicates that the medical model is more appropriate. Astin (2004) has stated that a student's chances of graduating can be predicted 67% of the time based on incoming demographics alone.

Another complication with identifying the value of a college education is that the benefits of earning a degree, such as higher earnings are not realized immediately upon graduation (Rose, 2013). In other words, a degreed person's success will rely on other conditions encountered after graduation. Moreover, the differences in institution mission, student population, and funding make it difficult to evaluate or compare HEIs. Changes in accreditation standards over the last couple of decades reflect the ongoing struggle of defining and measuring value. As HEIs look to conceptualize how their environments and activities contribute to their value as an institution, they have exerted pressure on their individual units to research and demonstrate their value or face budget reductions and even elimination (Banta, Busby, Hahn, Black& Johnson, 2007). An important indicator of value is the unit's contribution to or facilitation of individual and institutional outcomes. The different groups in HEI, such as faculty, staff, and students, have different outcomes, which necessarily require different ways to measure them. Each individual unit has different opportunities to affect these outcomes, even established units, such as academic libraries.

Although one of the earliest support units to develop in HEIs (Hamlin, 1981) and considered to be the heart of the university (Frade & Washburn, 2006) because of their role as the major repository and gatekeeper of scholarly information, most academic libraries can no longer assume that their value is self-evident (Poll & Payne, 2006). Developing new ways to assess academic libraries also will benefit other types of libraries and information centers. As Pritchard (1996) stated:

> Few libraries exist in a vacuum, accountable only to themselves. There is 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 (p. 573).

In other words, research in assessing academic library value informs and is in turn informed by research studying the value of other library and information centers that are facing similar demands from their parent institutions to demonstrate their value. A major barrier to assessing library value stems from disagreements over valid indicators of what to value, particularly relating to student learning. One concept that has been gaining acceptance has been engagement because of its role in increasing individually measured student outcomes that are institutionally identified priorities, such as retention, graduation, and learning.

Rationale and significance of study

A developing value metric in higher education is student engagement, which is synonymous with student involvement. Based on work pioneered by Astin in the 1960s, students that are more involved in certain aspects of college and university life are more likely to have successful academic outcomes, which include retention, graduation, and higher GPAs. Engagement has been defined as having several dimensions, including cognitive, behavioral, conative, and affective (Corno & Mandinach, 1983; Fredericks, Blumenfeld, & Paris, 2004). Although student engagement has been studied in a variety of contexts, most engagement studies are monolithic, tending to only consider one dimension of engagement.

One type of engagement that has not been well studied is IE. O'Brien and Toms (2008) have created a theory of user engagement, but only as it applies to technology and an online environment, so it was not used in this study, as explained in Chapter 2. In the educational environment and with regard to information, the few scholars that do address

engagement only consider the behavioral dimension of IE, with the exception of an article by Green and Macauly (2007) who measured student motivation, behavior, and learning. Traditionally, library usage statistics are the most commonly used engagement and value metric, but it can potentially be dangerous for academic libraries to equate library use with value if the use of major library services, such as circulation of materials, gate counts, and reference sessions, decreases (Behr & Hayward, 2008; Miller, 2014).

In order to best demonstrate academic library value, it is important to identify a study population that would require scholarly information in order to reach their individual and institutional goals. Ideally, this information would not be easily accessed outside of academic library sources. Outcomes that require this sort of information include theses, scholarly publications, grants, and patents. These types of resources would be of interest to faculty and graduate students rather than undergraduates. Library and Information Science (LIS) research suggests that doctoral students are a useful group to study because as they transition from students to scholars (Fleming-May & Yuro, 2009), they are likely to change how they search for and evaluate information (Catalano, 2013; Spezi, 2016). The interdisciplinary nature of social science work puts these doctoral students in a unique position to benefit from library instruction. However, doctoral students are also an under-studied population (Fleming-May & Yuro, 2009; Du & Evans, 2011; Switzer & Perdue, 2011). The few extant studies indicate that academic library resources are losing visibility among this group (Nicholas, Watkinson, Abdullah, Boukacem-Zeghmouri, Bravo, Świgoń, Xu, & Herman, 2016), which is alarming because future HEI faculty and administrators will come from this population (Mikitish & Radford, 2013).

This dissertation contributes to the study of academic library value by exploring doctoral students' engagement with information. It will seek to identify the most critical individual factors that affect IE. By identifying these IE related factors and behaviors, academic libraries can work toward more efficiently targeting their resources and services. The next chapter reviews the higher education and LIS literature on academic library value, student engagement, and doctoral student interactions with information.

CHAPTER 2: LITERATURE REVIEW

This chapter contains an overview of value and engagement studies in higher education with a focus on the academic library context. Because an exhaustive review of the literature found no information engagement theories (IE) currently being used in an academic context, the chapter discusses four extant engagement theories, models, and approaches, including one from higher education literature and three that deal with IE in other fields. It concludes with studies of IE in library contexts and on the information behavior of doctoral students, the population of interest for this study.

Definitions of value

The *Oxford English Dictionary* (OED, 2017) defines value as:

1. The material or monetary worth of something; the amount at which something may be estimated in terms of a medium of exchange, as money or goods, or some other similar standard.
2. Worth based on esteem; quality viewed in terms of importance, usefulness, desirability, etc.

When exploring value in the educational and academic library context, one must consider what is considered valuable and how that value should be measured. Arum and Roksa (2012) describe these as the normative and technical aspects, respectively. Dunn (2010) provides a useful definition of two types of value, the intrinsic and the extrinsic. She defines the former as "the essence of something; the value of something in and of itself" (2010, p. 13), while the latter has observable and measurable qualities that "implies a hierarchy of choices" (2010, p. 10) that allow for comparison or ranking (2010, p. 12). Because intrinsic value is innate, one may not always be able to evaluate it, because the OED (2017) defines "evaluate" as: "to 'reckon up', ascertain the amount of; to express in

terms of something already known." However, one can still judge a thing to have intrinsic value, even if they cannot evaluate it. On the other hand, extrinsic value must be evaluable.

The criteria for evaluating intrinsic and extrinsic value are identified through two entirely different processes. Dunn (2010) describes the process of determining intrinsic value as deciding that such value does exist "through reflection on the world, human behavior and the human condition" (p. 15), and then producing "a list of values without reference to source or methodology" (p. 14). Dunn (2010) continues to say that although intrinsic values are often seen as an area mainly of interest for philosophers, scientists have epistemic values, which are associated with "the learning, knowing and discovery of science" (p. 2; Rooney, 1992). When discussing the value of graduate education, Stimpson (2012) notes that German universities, one of the two foundations of the American university, "lauded advanced, specialized learning as important in itself and as a crucial key to modernity and progress" (p. 135). Although she did not frame it as such, learning, modernity, and progress could arguably be considered intrinsic values in the field of education.

In comparison, extrinsic value by definition must be observable and measurable. Saracevic and Kantor (1997) identify two types of extrinsic value: value-in-exchange and value-in-use. The former is measurable in more economic terms, such as the price or cost of a good or service. By using a standard unit to evaluate the good or service, such as the amount of money an item costs, one can rank items in terms of cost. Items with higher costs are more valuable than ones with lower costs. It is also possible to compute return on investment (ROI). For instance, a vendor can compare the cost of buying an item to

the amount of money he can sell it for before deciding whether it is worth procuring.

Different variables may also be combined in an evaluation, so the vendor can compare

the cost of buying an item and the amount of time it takes to receive the item to the

amount of money that he can sell it for. Lagerman and Lewis (2012) note that the value

of higher education tends to reflect economic logic, mainly "the collective effect of

individual returns" (p. 9) in which higher education leads to "a skilled population and the

inventions and ideas that make them productive" (p. 20). In the field of Library and

Information Science (LIS), Saracevic and Kantor (1997) note that the economic

evaluations of value-in-exchange may not be appropriate for information services,

especially because "there is no market involving prices and monetary exchanges" (p.

530). Instead, they argue that libraries are more fairly evaluated by value-in-use, which

can be measured explicitly using statements, or implicitly using behavior. These

evaluations can then be combined with more economic ones.

  As explained in Chapter 1, it has become increasingly important for higher

education institutions (HEIs) to demonstrate their value. Individual HEIs have passed this

imperative down to their individual departments, including their libraries. Unfortunately,

the lack of a universally agreed upon definition of HEI value has led to many definitions

of value and even more ways of evaluating it. The numerous and sometimes conflicting

definitions of value suggest that no one definition can encompass all of the concept's

related facets. In fact, one could say that there are certain questions that one must answer

before deciding how to conceptualize value. The answers to these questions, which must

be decided before one defines value and then decides how to evaluate it, suggests an

organizational framework for categorizing different definitions of value.

Organizational framework for classifying value definitions

The following questions must be answered before one can define and evaluate value.

1. Who is the audience for the evaluation, and for what purpose is the evaluation taking place?
2. How context dependent is the evaluation? In other words, will the variables being evaluated be more objective, meaning that they depend less on context or other variables, or are they more subjective, meaning that they depend more on context or other variables?
3. What will be evaluated?
4. How will it be evaluated?

Although one may suggest other intermediate questions, the answers to these questions in higher education and Library and Information Science (LIS) literature help explain why the evaluation of HEI and academic library value has changed over time.

Institutional faculty and staff – Objective: The value of ownership

In the *Value of Academic Libraries* report, Oakleaf (2010) stated that the earliest definitions of value were intended for institutional employees, which includes the faculty and staff at the HEI. These definitions of value tended to be more objective in that physical objects were used as variables, and there was little room for individual interpretation of what was being measured. Value was assessed by counting the number of resources, and institutions that owned a particular number or type of resource were considered more valuable than those that had fewer resources. In the academic library context, value usually referred to collection size, for which there were standards for the amount of books a good or valuable library should have (Nelson, 2009).

From their inception during the colonial times before 1790 (Hamlin, 1981) until the 1980s academic libraries demonstrated their value by adhering to professional and

accreditation standards for amount of resources, mainly collection size. Early academic libraries were much smaller both in size and in scope than the libraries of today because the institutions that they supported were smaller. Many libraries came into existence through the donation of books, and many only were able to continue operation and book purchasing thanks to nominal fees from the students rather than as a fixed percentage of their parent institution's annual budget (Hamlin, 1981, p. 19).

The Morrill Act of 1862 endowed institutions to teach the agriculture and mechanical arts, and the donations of industry barons to higher education put pressure on HEIs to add classes in the hard and social sciences. As scientific research expanded, the information needs of those in higher education also increased. Hamlin (1981) claims that this was when the academic library collections became essential to disseminating and continuing this research, which strengthened the library's status as the "heart of the university" (p. 48) and consequently deserving of more budgetary support (p. 58). The increased funds and interest in higher education lead to HEIs opening between the 1850s and the 1900s at a faster rate than ever (Parsons, 2003). Because of societal and governmental concerns of institutional quality, in 1885 the first of six regional accrediting institutions formed in New England. Associations for the Middle States, Southern, North Central, Northwest, and Western regions would form in 1887, 1895, 1895, 1917, and 1923, respectively (Nelson, 2009).

Although regional accreditation always has been voluntary, the impact of accreditation on HEIs cannot be understated. As Coleman and Jarred (1994) explain, "almost every relationship a college has with an external party…is contingent on accreditation" (p. 274). Unlike other countries, the American government or a

government-sponsored entity does not take part in HEI "review, oversight, [or] quality control" (Parsons, 2003, p. 31). This makes accreditation the standard indicator of quality among American colleges and universities, and it is a major force behind any change in the assessment conducted within these institutions (Oakleaf, 2010).

One such side effect of higher education's expansion was increased public and governmental scrutiny of HEIs. The increased enrollment and governmental spending was financially beneficial to the growth of HEIs, but the increased public and governmental interest towards these institutions continued even after the funding levels decreased. Concerned that academic libraries would not have the resources to build collections to serve their institutions, the Association of College and Research Libraries (ACRL) issued their first set of standards for college libraries in 1959 as "a blueprint for the decade of the 1960s" (Nelson, 2009, p. 3451). Though quality was emphasized, especially the requirements for "a high-caliber staff and a rich and current collection of materials" (Nelson, 2009, p. 3451), the standards also listed quantitative measurements for areas such as collection size. Librarians could use these recommended benchmark numbers to make a case for requesting funding from their institutions, and it is arguable that this was the intended purpose of the standards.

Quantitative standards were useful for librarians if they led to increased budgets, but the regional accrediting associations, who had begun to include libraries in their evaluations in 1900, never adopted these standards as part of their criteria (Coleman & Jarred, 1994). Certain academic libraries may also have lobbied against the adoption of the standards for accreditation because their institutions could not or would not give them the funds to reach the standards. It would be disastrous for the library staff if their

department caused the institution to not get accreditation. ACRL also noted the difference between 2 year colleges, 4 year colleges, and universities. Consequently, until 2004 ACRL published different standards for each of these types of institutions. While a review of the regional accreditation association standards can indicate broad reasons for changes in library valuation and assessment, the changes in the ACRL standards are more detailed in regard to libraries and better illustrate what changes affected academic library evaluation models. The most significant change in the standards history occurred in 2004 when ACRL published its first standards for all college and university libraries. The 4 year college standards were the ones published in 1959, however they were not seen as adequate for 2 year and junior colleges and universities for economic and cultural reasons, respectively.

Using the standards for funding purposes was not feasible for 2 year colleges due to their diversity, changing roles, increasing enrollment, and insufficient finances (Nelson, 2009, p. 3453), which led to separate standards for them published in 1960. In the 1960s enrollment in these types of HEIs increased five-fold from 200,000 in 1960 to one million in 1971 (Rose, 13, p. 25). The dynamic changes in these types of institutions, and possibly the political divisiveness among these ACRL constituents, are evident in their being the only ones out of the three sets of standards to require guidelines for applying the standards in addition to the most revisions. The standards themselves were revised twice in 1972 and 1982, and the guidelines were first published in 1971 and revised in 1979. The standards and guidelines were combined in 1990 and revised in 1994. In comparison, the college standards were revised four times in 1975, 1986, 1995, and 2000, while the university standards were revised only one time in 1989.

In contrast to the dynamic and divided 2 year college ACRL members, those in the university were relatively slow to act and change. Although they formed a committee to determine criteria and norms for the standards in 1968 they did not publish them until 1979. In addition to the conservative nature of the universities, which continues to this day due to their histories and size, there had been arguments about the quantitative nature of the standards for years. In 1965, Clapp and Jordan argued that collection size should depend on institutional characteristics, such as the number of programs, not an arbitrary and un-researched number from a professional society.

Cognizant of the difficulties in setting and reaching the two and four year college standards, the research university standards task force began with testing formulas for valid quantitative standards, which led to peer grouping and regressions based on each area of the standards, namely "resources, personnel, space, finances, public survey, and administration" (Nelson, 2009, p. 3456). Such a method led to the inevitable result of smaller institutions supporting the numbers, which were higher than their existing resources, and larger institutions not supporting the numbers because they feared that their institutions would cut their funding because they already met or exceeded the standard (Nelson, 2009, p. 3456). Because they had difficulties compromising, university libraries were the first group of the three to emphasize library performance rather than standards (Nelson, 2009).

Diversity, whether due to institution history, mission, and size, was not the only factor in the abandonment of standards and move to a performance model. Studies by Carpenter (1981a, 1981b) and Crawford and White (1999) consistently found that most libraries were not meeting the standards, so the standards were quantitatively failing as

tools to increase library funding. In the 1970s HEIs also began to adopt a more "managerial orientation" (Oakleaf, 2010, p. 6) toward their units, including academic libraries. The failure to increase funding, the demand for further justification for funding, and a national educational movement towards identifying and evaluating the institution's contribution to student outcomes caused academic libraries to abandon the three institution-specific standards and adopt a single set of standards for all ACRL institutions that focused more on demonstrating the library's impact on student learning outcomes and institutional effectiveness (ACRL, 2004).

Compared to the ACRL standards, the regional standards set by the accrediting associations have been increasingly vague as to how libraries and other learning resources can demonstrate their quality (Nelson, 2009, p. 3450). However, librarians still are interested in them according to Iannuzzi and Brown's (2010) survey of academic library directors' on the 2004 ARCL Standards in which they found that a majority of the respondents wanted the ACRL Standards to reflect the regional accreditation standards.

Institutional faculty and staff – Subjective: The value of efficiency and use

The next type of definitions of value were still intended for HEI faculty and staff, but the definitions tended to allow for more subjective definitions and interpretations of value. Rather than comparing resource amounts with other academic libraries, librarians could focus measuring and evaluating the resources and services most important to their institution. While owning a certain number or type of resources still could contribute to the institution's value, the expenditures to purchase and maintain those resources had to be compared with their usage. Value came to be assessed by comparing counts of

resources, and more valuable institutions were the ones that were most effective, meaning that the usage of their resources had higher relative values than the costs of those resources.

Most of the studies that equate efficiency with value take a more financial view by focusing on cost effectiveness (e.g., Aabø, 2009; King & Tenopir, 2013). They also usually feature a return on investment (ROI) or cost-benefit calculation. Aabø (2009) performed a meta-analysis of ROI studies in several, mainly public, libraries. In the 38 studies analyzed, Aabø (2009) found that the average return on investment was between four to five dollars of resources obtained or services performed per one dollar allocated to the library. Many ROI studies compare use of a resource or service to the cost in providing the resource, but many do not have a stated goal so the ROI is just a number that is difficult to interpret or use as a benchmark.

One time studies (e.g., Wong & Cmor, 2011) are not very useful because there is no way to compare how a change in input measures affected output measures (see Appendix A for definitions), but comparing one institution's efficiency at one time to that of similar institutions using benchmarks can serve as an indicator of relative value. A study by Gatten (2004) compared user satisfaction survey results between libraries in OhioLINK, an academic library consortium, and libraries that were not in OhioLINK. The OhioLINK libraries had significantly higher satisfaction scores, and Gatten (2004) further concluded that benchmarking libraries within the same consortium was useful because these libraries were comparable in terms of mission, location, and access policies.

Students and those outside the institution – Objective & Subjective: The value of contributing to outcomes

The most recent definitions of value are framed by how the HEI benefits students (Oakleaf, 2010). These definitions are increasingly subjective as academic library value is evaluated by and presented to those outside of the library. This parallels the increasing acceptance and adoption of outcomes-based education, in which institutions are considered more valuable if they facilitate more positive outcomes for their students (Spady, 2002).

The most recent studies of academic library value utilize the balanced scorecard model or outcomes based models. The balanced scorecard model balances multiple perspectives, while outcomes-based models measure how different factors affect student-centered outcomes. Developed by Kaplan and Norton (1992), Matthews' (2006) library balanced scorecard often is cited, and it demonstrates how the financial perspective affects the organizational readiness perspective, which in turn affects both the information resources perspective and the internal process perspective, which both in turn influence the customer perspective. Kyrillidou (2010) detailed the start of an Associatio of Research Libraries (ARL) pilot project using the balanced scorecard, and Lewis, Hiller, Mengel, and Tolson (2013) reported the results of the one year project.

Lewis et al. (2013) offer a useful history and analysis of the balanced scorecard in their four institutions. The balanced scorecard is noted as one of the first tools used by libraries to set goals. Lewis et al. (2013) also identified its nature as a change agent, its origin in the business world, and the fact that it forced libraries out of their traditional silos (p. 196) as being the three main problems with its implementation. Bielavitz (2010)

also noted that it is well set up to demonstrate and communicate accountability. Lewis et al. (2013) considered the pilot to be a success and also hinted that benchmarks could be made, which would give more external validity to a study done using this method.

An earlier study by Mengel and Lewis (2012) reported efforts to create a common set of measures (p. 362) to allow for benchmarking. This was because their survey of the measures at the four institutions found that out of a total of 94 measures there was only a 9.5 percent overlap with the numbers collected for the annual Association of Research Libraries (ARL) statistics. More recently, Town and Kyrillidou (2013) have announced the start of a values-based scorecard that can be used in conjunction with a balanced scorecard with dimensions of relational capital, library capital, library virtue, and library momentum.

In comparison to the balanced scorecard model, an outcomes-based evaluation model is an evaluation plan that includes several planned assessments and how different aspects of the library contribute to the outcomes. However no published studies were found that have explicitly used this model. The lack of recent studies that use balanced scorecard or outcomes based models reiterates the fact that there is no one size fits all model for demonstrating value. The discussion so far has suggested that HEI units need to provide valid indicators of their efforts to support the institution's goals. For academic libraries, this goal has been the provision of information through resources and services.

A difficulty in assessing the value of the information provided by academic libraries is that the faculty, staff, and students at an HEI can get their information from other sources. However, some groups need more specialized information that cannot be gained cheaply or conveniently without the academic library. Faculty, graduate students,

and researchers at an HEI are groups whose outcomes, such as publications, grants, patents, and careers, fulfill the HEI institutional goal of excellence in scholarship. These groups are also likely to depend on information from the academic library, which arguably makes them one of the best populations for LIS researchers to study. However, before investigating how these groups interact with information, it is important to note the different lenses through which LIS scholars view these interactions.

Interactions with information

A key topic of interest in LIS is "how people deal with information" (Savolainen, 2007, p. 126). The literature on this topic may be broken up into three groups: information behavior, information practice, and information experience. Information behavior is the most established of the three groups, meaning that it is the oldest and encompasses the largest share of literature in the field (Fulton & Henefer, 2009; Savolainen, 2007). Due to information behavior's primacy in LIS (Fulton & Henefer, 2009), the other two groups have attempted to distinguish themselves from information behavior. Unfortunately, there is some confusion as to what these terms mean, so there can at times be some overlap between the groups. However, there is a general consensus on the following areas, which will be described briefly below: founding discipline, meta-theoretical and theoretical perspective, basic components, behaviors covered, and stance on information-seeking.

Information behavior's roots are in Psychology (Fulton & Henefer, 2009), although certain researchers writing from the information experience group, such as Heinström (2014), also base their work in Psychology. In contrast, information practice

researchers tend to claim roots in Sociology or Anthropology (Cox, 2012), which affects the groups meta-theoretical and theoretical/methodological perspectives. There does not seem to be a strict consensus on the founding discipline for information experience work, so Psychology, Sociology, and Anthropology offer perspectives that all seem applicable (Heinström, 2014; Partridge & Yates, 2014).

Virtually all researchers in the information behavior group have a constructivist meta-theoretical perspective (Ford, 2015; Savolainen, 2007; Fulton & Henefer, 2009), which means that they are interested in how individuals perceive and make sense of their world. Consequently, their theoretical perspectives tend to be cognitive (Cox, 2012). Information practice researchers tend to be social constructivist, which is also known as collectivist, or social constructionists (Fulton & Henefer, 2009). However, their theoretical perspective is strongly anti-cognitivist (Fulton & Henefer, 2009), turning them away from "rational decision making and linear, purposeful behavior – and equally away from explaining things through abstract social structures, such as class and gender" (Cox, 2012, p. 177). Information experience researchers tend to hold social constructionist meta-theoretical perspectives, but they are not necessarily anti-cognitivist (Heinström, 2014).

Information behavior research starts with an information need, and although the concept of an information need has evolved over the years, information behavior researchers tend to clearly define a cognitive trigger that precedes interaction with information (Ford, 2015). Once the participant begins to interact with information, there are a number of internal and external factors, which are explained in the next section, and which may affect the individual's behaviors with information. Due to the cognitive

theoretical stance, the participant is often asked to articulate what they perceive these factors to be and how they are affected by them (Savolainen, 2007; Ford, 2015). Participants are generally also able to recall and explain their observable behaviors with information. While certain factors may be unknown to the participant themselves, researchers claim that they are able to measure and explain them (Bates, 2009). Information practice researchers tend to claim that factors are decontextualized (Fulton & Henefer, 2009), which means that factors are isolated or objectified so that the researcher can measure how the factors affect the participant. While practice researchers may see this as "too reductive or dehumanizing" (Cox, 2012, p. 183), information behavior researchers need to identify and isolate these factors in order to measure their effects.

Information practice and information experience researchers are clear that there need not be a specific need that initiates a participant's interaction with information (Savolainen, 2007; Cox, 2012). Information practice researchers are interested in how participants interact with information in a social or dialogical manner (Savolainen, 2007). In other words, the people that participants interact with and the language that they use to describe information communicated are not mere factors as in an information behavior perspective, but instead important carriers of meaning (Talja, Tuominen & Savolainen, 2005). People create "communities of justification" (Savolainen, 2007, p. 125), while language explicitly or implicitly lays out the rules or criteria needed to participate in the community (Cox, 2012). In other words, in order for an information practice researcher to understand a participant's interaction with information, they must understand the context within which the participant acts. Only then can the researcher ask the participant to

describe their interactions or observe their interactions with information and fully understand their responses or observations.

Information experience is differentiated from information behavior and information practice mainly because, as the name implies, it investigates events or episodes in which the participant interacts with information (Partridge & Yates, 2014). However, unlike researchers in the other two groups, information experience researchers are only interested in the factors that the participant relates to the experience, which may or may not include information (Partridge & Yates, 2014). Based on the participant's response, the information experience researcher will use a combination of behavioral, phenomenological, and sociocultural methods (Bruce, Davis, Hughes, Partridge & Stoodley, 2014) to discover what information related factors mattered as part of the experience. In comparison, an information behavior researcher will specifically ask questions about an incident where a person interacted with information, even without a deep understanding of the context surrounding the incident. An information practice researcher would be interested in deeply understanding the context surrounding an incident, or they might not even ask about a specific incident and just see how participants in a group communicate information. When viewed as a research domain, information experience researchers are more interested in the experiential data given by participants, not participants' opinions or explanations of their thoughts, feelings, or behaviors (Partridge & Yates, 2014).

All researchers in each group are interested in participant behaviors, although they have different ways of interpreting them. As the largest and most mature research domain, information behavior researchers have identified and studied the largest range of

behaviors. Pettigrew, Fidel, and Bruce (2001) broadly group behaviors into ways that participants "need, seek, give, and use information" (p. 44), while Ford (2015) groups them into ways that participants "need, find, process, use, and organize information" (p. 7). From a practice perspective, these categories also apply, except for need (Savolainen, 2007). Information experience researchers would be on the lookout for any of the behaviors studied by information behavior researchers, but they would not necessarily ask participants about them.

Of the many behaviors researched, a majority of LIS research has been on how participants seek information. In fact, up until the 1990s information behavior research was actually called information seeking (Bates, 2009). Information behavior research is concerned with how individual ideas or motives drive the information seeking experience, which lends itself to a defined beginning and end state (Bates, 2009; Savolainen, 2007; Ford, 2015). Critics of the approach, particularly those from the information practice group claim that information behavior research implies a correct manner of information seeking that is defined and evaluated by the researcher (Cox, 2012). Information practice research is more concerned with how information seeking continues or habitualizes (Savolainen, 2007) the practices being researched. As a social practice, information seeking would be part of an institutionalized activity, which implies that there are (in)formal rules that regulate it (Savolainen, 2007), acceptable goals, and even "appropriate emotional states" (Cox, 2012, p. 178), which means that information seeking can be a more or less continuous experience as long as the participant remains in the practice community. Information experience research does not necessarily look for

information seeking in and of itself, but once again ties it to the particular experience that

the participant is asked about or is observed inside (Partridge & Yates, 2014).

Of the three research areas that concern themselves with how participants interact

with information, IE mostly falls within the information behavior umbrella. Engagement

itself stems from psychology, and most engagement studies deal with specific incidents

of engagement. This is usually conceptualized as an individual participant's engagement

during a specific incident. Although social factors, such as other people that the

participant interacts with or forms understandings with, matter their importance comes

from how the individual perceives and explains their influence on their own thoughts and

actions, which implies that the researcher has a more cognitivist stance.

Ford (2015) identifies information seeking as key components of information

behavior, and lists the following as significant factors influencing one's information

behavior:

1. Gender
2. Age
3. Self-efficacy (one's belief in their ability to succeed)
4. Cognitive style (most significant were verbal/visual and wholistic/analytic)
5. Personality (e.g. Heinström's (2014) deep/surface/strategic search styles)
6. Emotion (especially (un)reserved optimism or pessimism)
7. Work-related/organizational
8. Social/community

Based on the philosophical and practical literature on value, both for HEIs and academic

libraries, and the existing literature on information behavior, a major gap exists between

the two literatures. Both literatures provide suggestions for the normative question of

value, which is how academic libraries are valuable, and the information behavior

literature provides suggestions of what participant behaviors, feelings, and perceptions

may be measured, but there is no defined way to correlate these measurable factors to academic library value. With roots in psychology, engagement may offer insight into the academic library's contributions to HEI value.

Definitions and applications of engagement

Like value, there are numerous definitions for engagement. The National Survey of Student Engagement (2014) defines engagement most simply as being "amount of time and energy devoted to educationally purposeful activities." Fredericks et al. (2004) and Corno and Mandinach (1983) view it as a meta-construct with several facets (see Table 1, below).

Dimensions	Metric
Cognitive	Concentration, focus
Behavior	Time, persistence
Conative	Motivation
Affective	Enjoyment

Table 1: Dimensions of engagement (Fredericks et al., 2004; Corno & Mandinach, 1983)

Shernoff (2013) defines engagement as consisting of concentration, enjoyment, and interest, but adds that it may be viewed beyond the individual level through interactive ecological processes involving activities and relationships. In addition to these definitions, engagement is influenced by ownership towards learning material (Sandeen, 2003); time, challenge, and interest (Light, 2001); skill, control, activity level, relevance, and goal directedness (Furrer & Skinner, 2003). However, these more specific aspects of engagement can fit into one of the four dimensions listed in Table 1.

Engagement may have an observed or substantive effect (Shernoff, 2013). It is related to learning development, academic achievement, and other positive academic outcomes such as retention and graduation. Finally, it can be viewed in the contexts of

the public versus the personal (Cambridge, 2006); the learning process or object of study versus the practical context versus how it applies universally to the human condition (Bowen, 2005); the social and the physical (Furrer & Skinner, 2003); and at the unit of analysis of the individual, the group, or the institution.

Student engagement has been studied much more in the field of education than in LIS. These studies can be grouped into broad categories. One area encompasses the development and testing of engagement models for certain types of students, such as low-income students (Snyder, 2008). Another area consists of engagement in certain environments. Of these, those that deal with technology, such as motivational engagement in online courses (Artino & Stephens, 2009) or engagement based on technological affordances in computer-supported learning environments (Sinha, 2013) are most closely related to IE. Like the academic library-related studies, past research has demonstrated that it is possible and useful to measure engagement from different facets.

Engagement studies

A major trend in LIS studies of student engagement has been to align their data and instruments with those from higher education. For instance, Mark and Boruff-Jones (2003) published one of the earliest articles on how academic libraries could engage students. They did this by describing the NSSE (Trustees of Indiana University, 2014) and how its results could be fit into the Literacy Competency Standards for Higher Education. The current NSSE measures ten engagement indicators on four themes as shown in Table 2 below.

Theme	Engagement Indicator
Academic challenge	Higher-order learning
	Reflective & integrative learning
	Learning strategies
	Quantitative reasoning
Learning with peers	Collaborative learning
	Discussions with diverse others
Experiences with faculty	Student-faculty interaction
	Effective teaching practices
Campus environment	Quality of interactions
	Supportive environment

Table 2: NSSE themes and engagement indicators (Trustees of Indiana University, 2014)

Although ACRL currently is working to integrate more academic library related questions on the NSSE, it is uncertain whether these questions will be strictly confined to the academic library's sources and activities or will incorporate more of the students' information environment. More importantly, relying on higher education instruments and standards can be counter-productive for academic libraries, because they are not usually a priority in higher education, as evidenced by their diminishing representation or complete absence in accreditation standards (Gratch-Lindauer, 2002). For instance, the newest accreditations standards for the Middle States regional accreditation do not mention libraries (Middle States Commission on Higher Education, 2015).

Green and Macauley (2007) studied doctoral students' engagement with information by conducting in-depth interviews with doctoral students in the United States and Australia. They found their participants were intentional learners who not only used information frequently, but also had high levels of information literacy. These findings indicated that their participants had high levels of engagement in the conative, behavioral, and cognitive dimensions, respectively. Later studies by other scholars tend to focus on one or two dimensions of engagement.

Most library-related IE studies focus on the behavioral facet of engagement. Webb, Lu, and Black (2008) primarily focused on the behavioral dimension of engagement by investigating the time and intensity spent on a collaborative learning task with multimedia technologies. In addition to identifying new ways that libraries could engage students with these technologies, they also found that students were more likely to be engaged if they felt that they had autonomy in their activities, which suggests an affective dimension to engagement. Haddow (2013) also focused on behavioral engagement by comparing withdrawn and retained students use of library resources as measured by number of log-ins to authenticated library sources and items borrowed.

More recently, library studies of engagement have looked at other facets of engagement. Shreeve and Chelin (2014) studied the impact and value of four information literacy teaching interventions and conceptualized engagement as motivation, which is in the conative dimension. Matteson (2014) considered the effect of several student attributes on information literacy scores. These attributes included emotional intelligence and motivation, which are part of the affective and conative dimensions, and of all the attributes emotional intelligence had the greatest effect on information literacy. These studies suggest that research into IE should look at theories and models of engagement from outside the LIS discipline, especially those that consist of more than the behavioral dimension. Rather than using a more generalized definition of engagement, this dissertation defines IE as a the individual, situational, and institutional factors that affect behaviors related to seeking, filtering, accessing, and organizing information (see Appendix A). The next section offers engagement theories, models, and approaches from the fields of higher education, health communication, and business.

IE theories, models, and approaches

Ideally, an IE model would allow the academic library to demonstrate its effects on faculty, staff, and student outcomes that would demonstrate its value to the HEI. Unfortunately, given the varying definitions of and ways to measure value and engagement, no such LIS model exists. This section outlines IE models from higher education, technology, and health communication. Related LIS and higher education studies are discussed where appropriate.

Astin's theory of student involvement

Astin (1993) was one of the first higher education researchers to correlate increased engagement, which he referred to as involvement, with positive student outcomes. He developed student involvement theory based on the results of a study that he conducted from the late 1960s to the early 1970s that determined which student input and college environmental factors had the greatest effects on student outcomes. Astin (1993) was interested in what impact college had on students because the higher education literature on college impact did not account for what the outcomes would have been if a student had attended a different college or had not attended college at all, and no studies examined the rate at which variables affected the change. To close this gap in the research, his study considered the effects of college in terms of exposure time and intensity, maturation, and social change on students. His outcomes were cognitive and non-cognitive, and assessed via tests and surveys, respectively (Astin, 1993). He developed the input-environment-outcome (I-E-O) model (Figure 9, Appendix B) to test his variables. A major finding was Astin 's (1993) identification of the student's peer

group as "the single most potent source of influence on growth and development during the undergraduate years" (p. 398). He also found that students who were most involved in college had the greatest positive outcomes.

This identification of involvement's importance led him to create the theory of student involvement, which has five basic postulates (Astin, 1999):

1. Involvement refers to the investment of physical and psychological energy in various objects. The objects may be highly generalized (the student experience) or highly specific (preparing for a chemistry examination).
2. Regardless of its object, involvement occurs along a continuum; that is, different students manifest different degrees of involvement in a given object, and the same student manifests different degrees of involvement in different objects at different times.
3. Involvement has both quantitative and qualitative features. The extent of a student's involvement in academic work, for instance, can be measured quantitatively (how many hours the student spends studying) and qualitatively (whether the student reviews and comprehends reading assignments or simply stares at the textbook and daydreams).
4. The amount of student learning and personal development associated with any educational program is directly proportional to the quality and quantity of student involvement in that program.
5. The effectiveness of any educational policy of practice is directly related to the capacity of that policy or practice to increase student involvement, (p. 519).

In the higher education literature, the I-E-O model has been used in a variety of methods and circumstances. While some studies have used it for the standard outcomes of persistence, retention, graduation, and academic achievement (Kelly, 1996; Forman, 2009; Edmunds, 2010; DiRamio & Jarvis, 2011; Kjelgaard & Guarino, 2012), others have used it to study other types of outcomes such as levels of involvement or activism (Stein, 2007; Page, 2010; Sprow, 2011). The model also has worked in conjunction with other theoretical constructs such as Pace's Quality of Student Effort theory. Unfortunately, Whitmire's (2002) search of the higher-education literature only found a few older studies that examined the relationship between academic library resources and

undergraduate student outcomes. These studies either found a weak or no relationship between the two (Whitmire, 2002).

Although an increasing number of LIS studies are focusing on how libraries impact student outcomes (for example Lindauer, 1998; Matthews, 2012; Soria, Fransen & Nackerund, 2013), few have cited Astin's work. Kuh and Gonyea (2003) cited student involvement theory work by Astin (1993) and Pascarella and Terenzini (1991) in their study of how the academic library promoted student engagement in learning. Based on data from more than 300,000 students from 1984-2002 from the College Student Experiences Questionnaire (CSEQ) Kuh and Gonyea (2003) were able to control for demographic input variables of students and institutions. They also developed three outcome measures for gains in information literacy, overall gains in college, and satisfaction with the college experience. Although their study did not find that any library experiences directly contributed to any of the outcomes they explained that this was probably because the questions on the CSEQ are not meant to measure information literacy.

In LIS literature, Whitmire (1998) was the only researcher found to utilize Astin's I-E-O model, which along with Pace's Quality of Effort theory formed the theoretical framework for her study. The study found that student background characteristics (such as grades and class year); library experience (such as focused library activities); experiences with faculty (such as informal interactions); course learning experiences (such as active course learning); and writing experiences (such as conscientious writing) were the most influential on student's critical thinking (Whitmire, 1998). The specification of focused library activities versus more routine library activities gave

insight into earlier research which seemed to be contradictory (Kuh &Gonyea, 2003, p. 258). One study by Ory and Braskamp (1988) found a positive relationship between library activities and critical thinking, but another study by Terenzini, Springer, Pascarella, and Nora (1995) had found a negative relationship. The former study involved library activities that required a higher level of involvement, while the latter involved library activities that required a lower level of involvement.

Although Astin's theory and I-E-O model could be used as a theoretical framework for the dissertation, it may not be appropriate for studying IE specifically. Because such little work has been done on defining IE that it seems premature to study its effects on student outcomes, especially if those effects are as indirect as previous research seems to indicate. Another difficulty of studying IE in an academic library context is that students do not have to access physical or digital resources or services very frequently. Formal information sources, such as academic libraries, have reported a decrease in the amount of information accessed, which was corroborated in the Digital Visitors & Residents (V&R) project, a recent IE study by Connaway, Lanclos, and Hood (2013).

The Digital Visitors and Residents (*V&R) project*

One project that has investigated how individuals engage with and acquire information, as well as the reason for decisions in these processes, is the Digital V&R project, which is a collaboration between the Joint Information Systems Committee (JISC) and the Online Computer Library Center, Inc. (OCLC). From 2011 through 2013 the research team conducted semi-structured interviews, collected diary entries from participants about their IE, and conducted a survey. The study participants have been

students and faculty in the United Kingdom and the United States. The study broke

participants into four groups, based on their educational stage. The groups included late

stage secondary school and first year undergraduate students, second and third year

undergraduate students, postgraduate and Ph.D. students, and post doctorate scholars. By

monitoring how participants' information practices change over time via the diary entries,

the study findings call for further research on the impact of IE rather than the impact of

academic library use on student success.

      One of the project's findings was that participants were least likely to contact a

librarian when looking for information (Connaway et al., 2013). This was true of each of

the four participant groups. Participants were more likely to ask their teachers or

professors for help finding information, then their peers, and other experts and

professionals (Connaway et al., 2013). While reference and other librarian consultations

are just one of the services that libraries provide, it is clear that although academic

libraries are providers of the monographs and serials necessary for research, they are not

necessarily where students and faculty go for information. By broadening the concept of

information to include that found outside of the academic library, it may be possible to

find new ways that the library can impact IE, although little work has been published on

this topic.

O'Brien and Toms' user engagement framework

      O'Brien and Toms (2008) conceptualize user engagement as a "quality of users'

experience with technology" (p. 950). Their study analyzed the applicability of flow,

aesthetic, play, and information interaction theories on users' experience with technology

to what they called engagement attributes. These attributes included aesthetics, affective appeal, attention, challenge, feedback, goal-directedness, meaningfulness, motivation, perceived control, and sensory appeal. Engagement attributes were then woven into sensual, emotional, and spatiotemporal threads of experience, that progressed through a model of engagement that began with a point of engagement, proceeded to engagement, and eventually ended in disengagement, with the possibility of re-engagement. Although O'Brien and Toms' (2008) framework and model drew on a variety of engagement related theories, and included "physical, cognitive, and affective components of user experiences" (p. 938), their explicit differentiation of their framework and model as a quality of an experience, rather than a process or product makes it difficult to compare with higher education models. Most importantly, the end goal for this conceptualization of engagement was the experience itself, rather than outcomes that existed outside the technological system such as graduation, which was why it was not found to be a suitable model for this dissertation.

From distant admirers to library lovers - and beyond: A typology of public library engagement in America

Although relating outcomes to engagement behaviors was outside the scope of this dissertation, the next step in this line of research would ideally relate IE behaviors to positive student outcomes. Outcomes of IE for this population could vary, and the variance could perhaps be predicted by categorizing academic library users and non-users. One way to categorize users and non-users is by creating IE typologies. The Pew Research Institute (Zickuhr, Purcell, & Rainie, 2014) created a typology of public library

user engagement for library users and potential users based on a combination of user

centered factors. These factors included participants' library usages, attitudes toward their

library, and modes of accessing library resources. In addition to explaining why users in

each group exhibited different types of behaviors, the study also indicated user-related

outcomes from their use of the library. By creating these groups, those working in public

libraries can better market their services to underserved users, according to Zickuhr et al.

(2014). Librarians also may bring non-users or users with low levels of engagement to

higher levels of engagement and library use. The Zickhur et al. (2014) study informs this

dissertation in that it identified user-centered concepts of engagement and ways to

differentiate users. However, it did not offer a suitable IE theory or model for this

dissertation.

Michie, Van Stralen, and West's COM-B model

The theories, models, and frameworks described in this section did not provide a

suitable theory or model for IE. A general model that examines the engagement factors

that affect engagement behaviors was found in the field of health communication.

Michie, Van Stralen, and West (2011) suggested that a patient's capabilities (C),

opportunities (O), and motivation (M) influence their IE behavior (B) with regard to

information on their treatment or other health care (see Figure 10, Appendix B). These

factors define a patient's capabilities as their previous knowledge and information-

seeking abilities. Opportunities are provided by the social and physical environments of

the patient. Motivation refers to the patient's view of their agency and confidence in

finding the information.

The COM-B model forms the background for the initial approach to this study (see Figure 11, Appendix B). The participant's capabilities refer to their knowledge of information sources, including what they have and have not used in the past. Their opportunities for finding information will depend on what their institution offers in the form of staff, which includes the services they provide, collections, space, and documents. However, their information environment also includes non-institutional sources of information, which the V&R study (Connaway et al., 2013) suggests may make up the bulk of their information sources. Their motivation will depend on how they feel about the assignment and their chances of finding information during a single critical incident, as defined by Flanagan (1954). The behaviors suggested by the literature come from Davenport and Prusak's hierarchy of IE behaviors (Figure 12, Appendix C).

Doctoral students' IE

Based on the limited work done on IE in an academic context, the ideal study population would need to exhibit high levels of information use and work towards outcomes that were closely related to information. In order to demonstrate academic library value, the information required for this ideal study population would not easily be accessed through other information sources. Earlier in the chapter, it was suggested that faculty, graduate students, and researchers would be useful groups to study because their outcomes, including theses, grants, patents, and publications required high amounts of specialized information that would be expensive and/or inconvenient to access outside the library's resources and services. The V&R project is one of the few studies that has compared the information behaviors of education levels from late high school (pre-

college) through faculty member (Connaway et al., 2013). One of the findings of this project suggests that post-graduate and doctoral students are the group most likely to get information from the academic library, while the faculty and life-long learners were the least likely to mention the academic library (Connaway et al, 2013).

LIS research suggests that doctoral students, a sub-group of graduate students, are a useful group to study because at the start of their program, they exhibit many of the same behaviors as undergraduate or even other graduate student groups. As they transition from students to scholars (Fleming-May & Yuro, 2009), they eventually begin to resemble faculty members and more experienced researchers, especially in how they search for and evaluate information (Catalano, 2013; Spezi, 2016), which puts them in a unique position to benefit from library instruction. However, doctoral students are also an under-studied population (Fleming-May & Yuro, 2009; Du & Evans, 2011; Switzer & Perdue, 2011). IE among this population is even less studied. Aside from the work of Green and Macauley (2007), no other studies have been found that have explored doctoral students' IE. This is also an important population to reach because recent studies of junior scholars, which include doctoral students, post-docs, and junior faculty, have reported that the library is losing visibility from this population in that many do not realize that the resources that they use for their research are provided by the library (Nicholas et al., 2016). While some studies suggest that graduate students, including doctoral students, are less likely to start looking for information using the library (Calhoun, Cantrell, Gallagher, & Hawk, 2009; Inger & Gardener, 2013), others suggest that roughly the same amount will begin a search using library resources as an Internet search engine (Niu, Hemminger, Lown, Adams, Brown, Level, McLure, Powers,

Tennant, & Cataldo, 2010). Blumer, Watulak, and Kenton (2012) found that library resources are also more likely to make them confused and anxious, regardless of whether or not they received instruction.

Most LIS studies of doctoral students focus on their information-seeking behaviors. A meta-analysis by Spezi (2016) reports on doctoral student information searching behavior from 2010 to 2015. While convenience was found to be a major factor in finding information, as it is for most academic library users (Connaway et al., 2013), Spezi (2016) confirms that most studies found information quality, such as whether it was published in a peer-reviewed journal, was the most important factor in finding information for this group. Spezi (2016) describes the difficulty in comparing findings across studies as the literature tends to divide user groups by educational level, discipline, and sub-discipline. The main objective of Spezi's (2016) meta-analysis though was to see if information search behavior had changed in the last five years. She concluded that the most significant change was in the use of social media in finding information, but that if anything, doctoral students across the disciplines were more likely to search for information in similar ways than in differing ones.

An earlier meta-analysis by Catalano (2013) found that information search patterns varied among graduate students. Catalano (2013) defined information-seeking as behaviors pertaining to information selection and use, and noted that the research questions could be grouped as the following:

1. Who do graduate students go to for research help?
2. How do students use library resources and more informal sources?
3. What are the disciplinary differences in information behaviors?
4. What types of search strategies do students engage in?
5. How do students cope with information overload? (p. 253)

While there were only 11 out of 48 studies from 1997-2012 that only investigated

doctoral student information behavior, an additional 15 studies investigated doctoral and

Masters students and compared the differences between the two groups. A major issue

with the studies of doctoral and post-doctoral students was that "all of the studies were

qualitative in design and investigated a small sample within one discipline" (Catalano,

2013, p. 259). The studies that focused on doctoral and post-doctoral students were

mainly concerned with "researching and writing a literature review, or information source

preferences, in order to improve library services…[and the] role of research supervisors"

(p. 259). In terms of starting points for research, faculty members, namely the student's

advisor, was the first person consulted and the Internet was the main starting point (p.

259-260). Other findings include the diverse ways in which students use libraries, and

two important factors that influenced information seeking were the student's discipline

and whether or not they were an international student (Catalano, 2013).

The British Library and the Joint Information Systems Committee (BL/JISC)

recently published the most comprehensive study on doctoral student research behavior

to date (Carpenter, Wetheridge, & Tanner, 2012). This study consisted of 60 longitudinal

interviews and 13,593 total surveys submitted annually over a three year period in 72

HEIs in the United Kingdom. However, doctoral studies in the United Kingdom and the

United States differ in structure, which means that student needs and academic library

intervention opportunities differ.

Doctoral programs in the United States require students to have highly focused

and rigorous information needs as compared to other academic library user groups.

Programs usually begin with two years of coursework, which are followed by the

preparation of a reading list for qualifying or comprehensive exams, and culminate in research for the literature review and other work on a dissertation. Consequently, doctoral students have more demanding research requirements than undergraduates (Green & Macauley, 2007; Fleming-May & Yuro, 2009) and even other graduate students (Harris, 2011), such as those in professional Masters programs. Doctoral students also may differ from faculty members and other post-Ph.D. scholars in their information-seeking habits. A study by Mikitish and Radford (2013) found that the information acquired during a student's doctoral program forms the foundation for their future scholarship, and some students stated that they need less assistance in finding information as they advance in their studies because they have collected what is most relevant to them and they are aware of how to find more information in their area. Other researchers have suggested that post-Ph.D. scholars go elsewhere besides the academic library for information, and may not be open to learning different ways of engaging with the library information services or resources (Ondrusek, 2008; Anthony, 2010; Searing & Greenlee, 2011).

Doctoral students also have a unique perspective attributed to the length and depth of their studies compared to undergraduates. Many doctoral students have attended different institutions for their undergraduate and other degrees (Monroe-Gulick & Petr, 2012). Experiences with different academic libraries can give them a perspective that allows them to better use and assess their current one (Cook & Heath, 2001; Yu, Hong, Gu & Wang, 2008). However, assessing that experience can be difficult. Monroe-Gulick and Petr (2012) interviewed 15 incoming doctoral students in the social sciences to assess how their information literacy skills measured up to the ACRL Information Literacy Competency Standards for Higher Education (ACRL, 2010). However, the researchers

realized that their own bias and the difficulty of translating students' descriptions of their information literacy skills to match the standards caused them to initially assess the students as not meeting many of the standards, when in actuality many of the students were close to or did meet the standards (Monroe-Gulick & Petr, 2012).

Regardless of doctoral students' information literacy skills at the beginning of their program, most research highlights researching information for and writing the doctoral dissertation as being a time when academic library interventions can have the most impact (Libutti & Kopala, 1995; Fleming-May & Yuro, 2009; Du & Evans, 2011; Harris, 2011). Suggested interventions have ranged from offering dissertation research and writing seminars (Switzer & Perdue, 2011), to workshops on specific research and writing topics (Fleming-May & Yuro, 2009), to explicitly pairing students with librarians (Harris, 2011). However, offering the most effective type of intervention may depend on the program of study (Fleming-May & Yuro, 2009).

Doctoral programs are generally separated into four areas of study: the humanities, social sciences,the sciences, and professional schools. Research into scholars' information behavior, both pre- and post-Ph.D., tends to only focus on the first three areas, and indicates that practices differ between areas (Ellis, 1993; Folster, 1995; Line, 2000; Fleming-May & Yuro, 2009; Carpenter et al., 2012). Of these three areas, social science work tends to be the most interdisciplinary in nature (Catalano, 2013), social science students are more likely than students in the sciences to pick their topics of study (Horlings & Gurney, 2013), and are more likely than students in the humanities to favor journal articles than books or other texts. These factors arguably make social science doctoral students more likely to benefit from library instruction on information

seeking, and most studies that focus specifically on doctoral students in one of the three areas have recruited participants from the social sciences (Fleming-May & Yuro, 2009; Monroe-Gulick & Petr, 2012; Mikitish & Radford, 2013). Due to the differences between doctoral students and other academic library user groups, and the differences between doctoral students in the social sciences compared to those in the humanities and the sciences, the dissertation drew its participants from doctoral students in the social sciences.

Summary of IE literature

The literature reviewed in this chapter identifies a set of four core claims regarding IE. These core claims are:

1. IE is a framework that can, but does not have to, support behavioral, emotional, motivational, and cognitive dimensions.

2. IE may be measured and analyzed using qualitative methods, quantitative methods, or a combination.

3. IE can increase the likelihood of information users', in this case doctoral students', attainment of short and/or long term outcomes.

4. The IE outcomes can be measured at the individual and/or the institutional level.

The four core claims listed above indicate that IE is a flexible framework, which is important because information resources and use vary by individual and situation. However, when considering the state of IE research in light of these four core claims, it is clear that there are gaps in LIS research. One gap is that usually only one dimension of IE is investigated at a time, and this is the behavioral dimension that outlines what students

and others in higher education do. Another gap is that much of the research seems to imply that library resources and services are primary providers of information, which a few studies, such as the V&R Project (Connaway et al., 2013), suggest narrows the potential IE research area.

As explained in the literature review above, most of the IE and information behavior literature focuses on seeking and accessing information, rather than organizing or using it, even though information behavior is defined as encompassing these behaviors (Pettigrew, Fidel, & Bruce, 2001; Ford, 2015). In practice, and based on studies by academic librarians, most library instruction classes, especially one-shot classes, focus on seeking and accessing information through the library. The very name of "library instruction class" suggests that the session will include instruction about the library, instead of instruction by librarians on information classes, as opposed to a designation such as "information literacy." However, even information literacy classes tend to focus on finding and accessing information, despite academic library mission statements commonly stating that the library would help discover and create knowledge (Kerr, 2010). While Kerr (2010) acknowledges that librarians might not be trying to actively deceive those in their institution, her work suggests that in order to truly emphasize information literacy rather than the library's resources and services, librarians should tailor their instruction to individuals' particular situations and needs rather than employing a one size fits all instruction.

The two major gaps in IE literature that this dissertation addresses are prevalence of only considering one dimension of IE and focusing on the library rather than the individuals who use, or could use, the library and other sources of information. To

address these gaps, the dissertation study data collection questions asked participants to

relate why they pursued information from a certain source or in a certain manner in order

to see whether emotional, motivational, or cognitive aspects could be used to discuss IE

for social studies doctoral students. Although most of the questions related to seeking and

accessing information, participants were also asked how they filtered and organized it.

Finally, the questions asked the participant to discuss information rather than the library

resources and services that provided the information. In this dissertation, a variety of

mixed methods are used to collect and analyze qualitative and quantitative data. The

research questions and methodology used follows in the next chapter.

CHAPTER 3: METHODS

Research questions

This chapter outlines the methodology used in the dissertation to answer the

research questions (RQs), which were based on the higher education and Library and

Information Science (LIS) literature reviewed in Chapter 2, and are as follows:

RQ1: What are the critical factors that characterize information engagement (IE) for
doctoral students in the social
      sciences?
RQ2: What IE types exist for doctoral students?
RQ3: How is IE related to the value of academic libraries?
RQ4: How can academic libraries promote increased IE of doctoral students?

Problem statement

In the context of higher education assessment, the research in higher education

and LIS suggest that there is a need for deeper understanding of what to assess and better

metrics to assess the institutional departments and units that contribute to the institution's

goals, especially with regard to student centered outcomes. The LIS studies in Chapter 2

illustrate the difficulty in assessment because information related behavior varies widely,

and library resources and services have so far been found to have an indirect effect at best

on the student success outcomes that are commonly studied, such as graduate, retention,

and recruitment (Whitmire, 2002; Kuh & Gonyea, 2003). However, studies that tie

library resources and services to information specific outcomes, such as critical thinking

(Ory & Braskamp, 1988) and focused library activities (Whitmire, 1998), found that the

academic library had a greater impact on student success outcomes. Engagement studies

offer academic libraries blueprints for how to appropriately define different types of

engagement factors, which include cognitive, motivational, and emotional factors that can affect behavior in a variety of fields.

The few studies on IE and the relative dearth of studies on doctoral students compared to other academic library users and potential users indicate that a study of IE for doctoral students may provide new insight on academic library value. However, the lack of research also suggests that such a study explore, conceptualize, and to some extent test the effect of IE on doctoral student behavior. Qualitative methods allow the researcher to collect rich data that explores the cognitive, motivational, and emotional factors that could affect IE behavior. Quantitative methods allow the researcher to test the effect of those factors on behavior. A mixed methods approach combines these two methods.

An explanation of why and how mixed methods were incorporated in this dissertation study follows in the Research design section that follows. A table that summarizes the methods used in each phase prefaces the following section. A more in-depth justification of the rationale behind the use of each method, the data collection procedures, and the analysis procedures follow for each of the three phases of the dissertation study. The data collection and analysis procedures for the three phases of the study are described below. The data collection descriptions include details about participant recruitment, and data collection instruments. The data analysis procedures descriptions include the criteria used to add, modify, or remove items from the data collection instruments or analyses used in subsequent phases.

Research design

The study utilized a mixed methods explanatory sequential design, as described by Creswell and Clark (2011), and the Rutgers University Arts and Sciences Institutional Review Board approved the methodology for each phase prior to data collection (see Appendix D for approval notices). According to Creswell & Clark (2011), exploratory sequential design consists of the following steps: a) qualitative data being collected and analyzed, b) quantitative data being collected and analyzed, and c) the qualitative and quantitative results interpreted (p. 88). Qualitative data collection and analysis methods were used in Phase 1 and Phase 2 of this study. The qualitative data collection method for Phase 1 was a focus group interview, and for Phase 2 the data was collected using individual interviews. Both Phase 1 and 2 used the constant comparative method (Charmaz, 2014) to analyze written verbal transcripts of the data. Phase 3 utilized a survey to collect quantitative and qualitative data, which were analyzed using quantitative and qualitative methods, respectively.

The use of qualitative and quantitative collection and analysis methods can be difficult considering the differing epistemological paradigms that underlie the two methodologies. Qualitative methodology utilizes an interpretivist paradigm, which is based on the "individual's cognitive viewpoint" (Bates, 2005, Part 2, para. 20), and quantitative methodology utilizes a postpositivist paradigm, that embraces "ontological reality" (Budd, Hill, & Shannon, 2010). The former requires an inductive approach, and the latter, a deductive one. For this reason, Creswell and Clark (2011) outline six mixed methods designs. A majority of the designs keep the qualitative and quantitative data collection and analysis methods separate, and often one methodology is prioritized over

the other. Despite these guidelines, mixed methods research can be difficult, and few LIS doctoral dissertations utilize it (e.g., Senteio, 2015; Das, 2013).

On the other hand, the exploratory sequential design can be useful when there are no available measures or instruments to study a phenomenon and no single guiding framework or theory exists to inform qualitative or quantitative data collection instruments, such as interviews or surveys (Creswell & Clark, 2011). One affordance of this study design is that the qualitative phase consists of a narrower selection of participants, who can provide a broader range of rich and detailed information about the phenomenon studied. After analyzing the qualitative data for key themes, a quantitative phase can then recruit a broader selection of participants to give feedback on a narrower range of topics. This study emphasizes theory development because the quantitative survey aspect is then able to generalize the qualitative findings to a wider population (Creswell & Clark, 2011). The different sampling, data collection, and analysis techniques complemented each other when performed in sequence while also mitigating the inherent weaknesses of each method, which is described in more detail in each phase of the dissertation study below.

Due to these affordances and the lack of LIS research on IE and on doctoral students, mixed methods allowed for a triangulation of the data that multiple qualitative or multiple quantitative methods did not allow. Explanatory sequential design was another mixed methods design that was also considered for this dissertation study, and is very similar except that the quantitative aspect precedes the qualitative aspect. Furthermore, in explanatory sequential design, the quantitative methodology is also

prioritized above the qualitative, but given the lack of scholarship in this area, an

inductive rather than a deductive approach seemed more appropriate.

Summary of phases

	Purpose	Time period	Sample size	Data collection	Link to RQ
Phase 1	Identify IE factors and behaviors in order to refine Phase 2 interview questions	Spring 2016	N = 20	3 focus group interviews	RQ 1: identified IE factors RQ 2: identified possible IE types RQ 3: identified possible IE behaviors RQ 4: suggested IE topics for library instruction
Phase 2	Explore IE factors and behaviors identified in Phase 1 in order to refine Phase 3 survey questions	Summer 2016	N = 15 (5 from each stage of program)	Individual interviews	RQ 1: identified critical IE factors RQ 2: suggested use of IE factors rather than IE types RQ 3: refined behaviors to measure RQ 4: refined IE topics for library instruction
Phase 3	Measured the effect of factors on behaviors explored in Phase 2 in a larger sample	Winter 2017	123 doctoral students	Online survey	RQ 1: measured effect of IE factors RQ 2: categorized IE factors RQ 3: tested IE factors on behavior RQ 4: measured interest in IE topics for library instruction

Table 3: Overview of dissertation phases

Table 3, above, outlines the dissertation study by phase. It includes the purpose,

time period, sample size, data collection method, and link to each RQ that the data

collection and analysis supported. This information is explained in greater detail below,

by phase.

Phase 1: Exploring information engagement (IE) – Focus group interviews

Because little research has been found on IE, as discussed in Chapter 2, this study included two phases of qualitative data collection and analysis. Phase 1, the pilot study, consisted of focus group interviews, that drew participants from a small population pool and covered a wide range of topics. The main objective of Phase 1 was to collect data that would inform the research questions, as well as refine the interview and survey questions, for the subsequent phases. As noted by Connaway and Powell (2010), focus group interviews are used frequently to identify the perceptions and attitudes of a target population. As explained in Chapter 2, doctoral students were the target population of this study due to their expected exhibition of high levels of information related engagement. Connaway and Radford (2017) identify this data collection technique as being useful, especially in the early stages of qualitative or quantitative research. This is because by observing several interactions between participants in a relatively short amount of time, the researchers are able to orient themselves quickly to the topic, develop new ideas from what is present in the existing literature on the topic, and develop or refine data collection instruments. The Fleming-May and Yuro (2009) and Carpenter et al. (2012) studies also utilized focus groups, and this technique is preferable to observational or experimental research designs because little is known about how to frame the topic of IE.

Despite the many advantages of focus group interviews, there are several inherent limitations to this approach. Participants are not necessarily representative of the population that the researcher wishes to study, and the researcher only will be able to cover four or five themes in each session (Connaway & Radford, 2017). Connaway and

Radford (2017) also caution that researcher or participant bias may affect participant response, especially if individual participants feel intimidated or pushed to conform to the group's consensus. The data obtained from focus group interviews are also subjective, which may make it difficult to analyze, summarize, interpret, and apply to the larger population (Connaway & Radford, 2017).

The study sought to mitigate these Phase 1 limitations by using a mixed methods approach that included individual interviews and a survey in Phases 2 and 3, respectively. More specifically, participant responses in the focus group interviews of this phase primarily informed RQ1 and RQ2, the individual interview questions asked in Phase 2, and the survey questions in Phase 3. Analysis of the Phase 1 focus group data suggested preliminary conceptualizations of IE, and identified short-term outcomes related to IE, which will be discussed in Chapters 4 and 5.

Phase 1 data collection

Participants for Phase 1 of the dissertation were drawn from students in social science doctoral programs at one large public research university in the northeastern region of the United States. They were recruited using three methods. First, a recruitment email was sent to the institution's graduate student events listserv and posted on February 8, 2016. The listserv is opt-in and delivered weekly. It includes information for graduate students on services, events, and invitations to participate in studies that other students are running. Second, the departmental administrative assistants working in the selected social science departments were requested to forward a recruitment e-mail to their doctoral student listservs. This second recruitment method was suggested by Monroe-

Gulick and Petr (2012). Fourteen departments were contacted, including Anthropology; Communication and Media Studies; Economics; Education; Geography; Industrial Relations and Human Resources; Linguistics; Planning and Public Policy; Public Health; Political Science; Psychology; Social Work; Sociology; and Women's and Gender Studies. Three administrators confirmed that they had posted the notice, and of these three only students from two expressed interest in participating in the study. Third, recruitment fliers were placed on campus in the Graduate Student Lounge and the Graduate Student Reading Room in one of the university's libraries.

Potential participants were screened to ensure that they were enrolled in social science programs, excluding LIS. As described in the previous chapter, studies of social science doctoral students have included participants from Anthropology, Political Science, Psychology, and Communication (Fleming-May & Yuro, 2009; Monroe-Gulick & Petr, 2012; Mikitish & Radford, 2013). However, the definition of "social science" is quite broad as it includes any fields that "study human society and social relationships" (OED, 2017). The Rutgers University Libraries (RUL, 2017) include the following areas in the social sciences: African Studies; Anthropology; Childhood Studies; Communication; Criminal Justice; East Asian Studies; Economics; Education; Environmental Studies; General Social Science; Geography; Labor and Employment Studies; Latin American, Caribbean, Spanish and Portuguese Studies; Latino Studies; LIS; Linguistics; Planning and Public Policy; Political Science; Psychology/Behavioral Sciences; Public Administration; Social Work; Sociology; South Asian Studies; and Urban Studies (2017). LIS doctoral students were specifically not recruited or accepted to participate in this study even though LIS is a social science. This is because LIS students

have information behaviors that are thought to be different from those in other disciplines (Tracy & Searing, 2014), and their responses may skew the data.

Given these broad definitions of social science, any student, who was enrolled in a program listed by the RUL (2017) list above, except for LIS, was invited to participate. Any participant who was not enrolled in programs from these departments was asked if they felt their work fell into the realm of social sciences, even if their program would usually be classified in the arts and humanities or the sciences, and those who claimed that theirs did were included in the study.

The focus groups occurred between February 19, 2016 and February 25, 2016. Prior to each focus group interview, the participants were asked to sign an informed consent form and complete a short demographic profile. Focus group interview questions consisted of open questions regarding different aspects of IE and outcomes. The specific focus group interview questions are listed in Appendix E1. During each of the three sessions, one or two other graduate students enrolled in the university assisted the researcher in moderating and note taking. An audio recording of each focus group was made and transcribed verbatim by the researcher. The participants were each compensated with a $20 gift card and light refreshments.

Phase 1 data analysis

The verbatim transcripts of the interviews were analyzed using the constant comparative method (Charmaz, 2014) to elicit major themes relating to the research questions. Transcripts were read in an iterative fashion to identify themes and sub-themes, and a coding scheme was developed during this process. Each focus group

interview transcript first was read through in its entirety before noting themes and patterns. Subsequent readings involved careful attention to patterns and emergent themes and subthemes. These themes and subthemes were captured as codes and recorded in NVivo (see NVivo, 2017), along with any "juicy quotes," which are statements that best encapsulate or illustrate the emerging themes/categories. Another graduate student trained in the constant comparative method coded 20 percent of the responses to check the validity of the codes. Any discrepancy in coding was discussed to resolve differences, as needed. A list of preliminary themes is in Appendix F. A final codebook that lists the final categories, their definitions, examples from the transcripts, and the number of times that they appear is in Appendix G. The quotations in Appendix G give examples of the code, while the examples given in Chapter 5 use participant responses to further illustrate the discussion topics.

One contribution of the Phase 1 focus group interviews was the creation of a preliminary codebook (Appendix F) that would be later refined in Phase 2. Therefore, the criteria for code inclusion was less rigorous than in Phase 2. All of the focus group data were collected before analysis began, so the researcher was unable to modify the questions or follow-up questions based on the themes and sub-themes that emerged interview by interview. However, the researcher did ask the group for consensus on IE related outcomes and the effect of flow on IE, because these had not been reported in the existing literature. The researcher also asked the group for feedback on the focus group interview questions and the demographic survey. Based on the feedback, the question order was modified in Phase 2. Although participants also offered feedback on the demographic survey, the researcher did not incorporate this feedback into the next phase

of the study because the feedback mainly suggested removing questions that the literature suggested might affect IE.

In summary, Phase 1:

- Identified preliminary qualitative themes (see Appendix F)

- Refined Phase 2 individual interview questions (see Appendix E1 for Phase 1 interview questions and Appendix E2 for Phase 2 interview questions)

Phase 2: Creating IE typologies – Individual interviews

The focus group interviews in Phase 1 recruited from one institution, and the doctoral students participating were questioned about broad aspects of their IE. The individual interviews in Phase 2 built upon these findings and broadened the pool of potential respondents, while narrowing the area of inquiry based on the analysis of key themes from the focus group interviews. The main objective of this phase was to narrow the area of inquiry still further and inform the questions asked on the quantitative survey instrument deployed to a wider range of potential participants in terms of disciplines and institutions. Because the quantitative part of an exploratory design generalizes qualitative findings for larger populations (Creswell & Clark, 2011), the participant's disciplines and institutions also helped determine which programs in which institutions were sent recruitment notices in the following quantitative survey, Phase 3.

For Phase 2, individual interviews were used instead of other qualitative methods because individual interviews provide more depth than focus groups and have been used in a majority of the qualitative studies of social science scholars (Ellis, 1993; Green & Macauley, 2007; Monroe-Gulick & Petr, 2012; Carpenter et al., 2012). A literature

review by Greifeneder (2014) found that individual interviews also are prevalent in LIS

literature, and were the most commonly used data collection technique in information

behavior research studies published in the *Journal of the Association for Information

Science and Technology* (*JASIST*), *Information Research*, the *Journal of Documentation*,

and iConference proceedings from 2012 to 2014. Connaway and Radford (2017) identify

the affordances of this method as having higher response rates than surveys, even if the

topic is complex or emotional for the participants. By interacting directly with the

participant, the researcher is able to be more flexible in pursuing more detailed

information and clarifying any potential misunderstandings (Connaway & Radford,

2017). Interviews can be used to study phenomena that are difficult to observe or that rely

on the participants' interpretations of events. One-on-one interviews are an especially

useful data collection technique for this study because each participant's motivations and

expected outcomes are hard to ascertain from their actions. Once these motivations,

expectations, and other unobservable facts are explicated, the researcher can validate and

verify findings in subsequent interviews (Connaway & Radford, 2017). Individual

interviews also have an advantage over focus group interviews in that they do not require

participants to be in the same physical or virtual space at the same time, which makes it

possible to recruit a more diverse set of participants.

The limitations of this technique are similar to those of the focus group interview.

Interviewer bias is still a major concern, and the one-on-one nature of the individual

interviews may make the participant more hesitant to give an honest opinion (Connaway

& Radford, 2017). The study used a semi-structured interview instrument in order to

lessen the possibility of participant intimidation. The other major limitation of interviews

is that it is more difficult to select participants who are a representative sample of the applicable population compared to a randomized sampling method, which usually is used in surveys. One way in which this study tried to recruit a diverse range of participants is by recruiting students from different stages in their Ph.D. programs. Mikitish and Radford (2013) suggested that program stage, which included a) coursework, b) pre-qualifying exam, and c) post-qualifying exam, may influence participant motivation, knowledge, and behavior. Additionally, using mixed methods across all three phases, are employed to mitigate these limitations (Creswell & Clark, 2011).

Phase 2 data collection

As mentioned previously, because Mikitish and Radford (2013) found that students in the three program stages had different information needs and expectations, an equal number of students from each of these stages were recruited using two different methods. First, a recruitment email was posted on July 12, 2016 to the same graduate student events listserv as in Phase 1. Two other opt-in listservs at the same institution also were contacted. No participants mentioned explicitly seeing the recruitment notice on those listservs, and it is unknown whether the notice was posted to them. The social science departments that were contacted in the Phase 1 were not contacted for Phase 2 in order to leave more interview slots available to students from other institutions. For the second recruitment method, a recruitment email was sent to the Communication, Research, and Theory Network (CRTNET) e-mail listserv managed by the National Communication Association. The notice was posted on July 6, 2016. This was the only national listserv used in recruitment for Phase 2 for three reasons. First, it was the only

national one suggested by focus group participants. Second, there were more focus group participants in Phase 1 from the Communication and Media Studies Departments than any other discipline. Third, it already had been used in a previous study of doctoral students (Mikitish & Radford, 2013) on a similar topic.

Once potential participants were verified as being enrolled in the appropriate programs identified in Phase 1 they were interviewed over Skype. As in the focus group interviews, participants were asked to sign an informed consent form and demographic profile, which also helped ensure that the desired minimum of three students from each program stage were recruited. The individual questions, which are listed in Appendix E2, utilized the critical incident technique (CIT) (Flanagan, 1954) and open questions regarding different aspects of IE and success. The CIT requires participants to recall the most critical factors influencing a specific incident, and they were modified with respect to feedback from the participants in Phase 1.

The CIT was the most appropriate data collection methodology for Phase 2 of the study because it allowed the researcher to ask more open questions about a topic of which little is known, and it allowed the participant to decide what is relevant to the topic of study (Flanagan, 1954; Fisher & Oulton, 1999; Radford, 2006). Compared to the fewer open ended questions that elicited a wide range of feedback in the focus group interviews, the CIT questions in this phase were more numerous, but had a narrower focus. A few noted areas of concern with using the technique is whether the participants can articulate their experience and opinion in a way conducive to answering the research questions and whether the participants are valid judges of what is critical. The first concern is addressed by selecting doctoral students, who are a group that the literature

suggests have the ability to articulate their thoughts on IE. The second concern is addressed by the interview questions and how they frame a critical incident.

There are two definitions of what makes an incident critical from LIS studies that use the CIT. The first interpretation, which is more in line with what Flanagan (1954) described, asks the interviewee to recall a significant experience, usually a positive or negative one (e.g. Gilstrap & Dupree, 2008; Connaway & Radford, 2010; Bickley & Corrall, 2011; Johnson & Simonsen, 2015). The second interpretation of CIT asks the interviewee to recall the last time they engaged in the topic or behavior of concern (e.g., Tenopir, King & Bush, 2004; Jamali & Asadi, 2010; Tenopir, 2013; King & Tenopir, 2013). The interview questions in the study reflect the first interpretation, and are listed in Appendix E2. Participants who completed the interview received a $20 gift card as compensation. The interviews were audio recorded and the researcher took notes in case the audio file was damaged or lost. The interviews took place between July 11, 2016 and July 22, 2016.

Phase 2 data analysis

As with the focus group interviews, verbatim transcripts of the interviews were created and analyzed using the constant comparative method (Charmaz, 2006), building on the code book that was developed in Phase 1, further eliciting and developing major themes relating to the research questions. The final qualitative codebook from Phase 2 is listed in Appendix G. Codes were tracked in NVivo, and the same graduate student who analyzed the focus group interviews analyzed 20 percent of the participants' responses to

check the validity of the codes. Any discrepancies in coding were discussed to resolve differences, as needed.

Unlike the focus group interviews, the individual interviews were transcribed using a transcription service, and then checked by the researcher against the audio recording for accuracy. Just like the focus group interviews, the data were not analyzed until all of it had been collected. However, because the interviews took place during an eleven-day period, instead of a six-day period, the researcher was able to reflect on previous individual interview participants' responses and probe later participants for more information on possible emerging themes or to clarify existing ones.

The CIT and format of the individual interviews made it possible to collect richer information of greater depth than the focus group interviews, which were more focused on identifying as wide a breadth of themes as possible. At the same time, the criteria for adding, removing, and modifying themes and subthemes was much stricter. In other words, if a single individual interview participant's response suggested a possible theme or subtheme, it usually had to be mentioned by at least a few other respondents before being added to the final codebook, whereas in the focus group interviews it might have been added as a theme or subtheme. Themes also were evaluated on whether they made conceptual sense. For this reason, affect was removed as a theme, and its subthemes were distributed to other theme or subtheme categories. A list of the themes and subthemes and an example of each from this analysis appears in Chapter 4. A final codebook that lists these categories, their definitions, examples from the transcripts, and the number of times that they appear is listed in Appendix G.

The resultant themes from Phase 2 helped structure the Phase 3 quantitative survey question collection instrument and analysis. The literature also suggested that confidence, or its opposite, library anxiety, might also modify the behaviors that participants enacted when seeking, filtering, or storing information. This was corroborated by participant responses in both qualitative Phases (1 and 2), so it was included. Overall, themes emerged that suggested five broad categories of variables: personal, confidence, behavior, outcome, and demographic. The demographic questions from the focus group and individual interviews were heavily modified for inclusion in the Phase 3 survey. Questions that requested participant information which were confusing to participants or did not seem to affect their IE were removed or changed. Specifically, participant ethnicity, prior post-secondary education history, including discipline and institution location, frequency of using the library's physical space to study, and whether the participant had attended a library information session at any point in their educational career were removed from the demographic portion of the survey. How these decisions affect how this study compares to previous research is covered in Chapter 5.

In addition to removing demographic questions, the responses to certain questions were simplified and other questions were added. The possible responses to questions about participant age and usage were grouped together based on participant feedback and similar surveys. Instead, demographic questions about whether participants lived an hour away from their institution's campus and whether they had access to resources at another institution were added. Questions about the other four categories besides demographic information were created based on the qualitative findings from this phase, and described in the section below.

In summary, Phase 2:

- Refined the preliminary codebook developed in Phase 1

- Indicated which concepts identified in the qualitative Phases (1 and 2) would be most effectively operationalized in the Phase 3 survey

Phase 3: Testing IE factors – Online survey

The final phase of data collection and analysis consisted of a quantitative survey administered online. The findings from the previous two phases gradually narrowed the topic of inquiry, and the potential applicant pool increased over the two phases. Phase 3 continued to narrow the topic of inquiry and increase the potential applicant pool in order to generalize the qualitative findings to a larger population.

In addition to being the most appropriate method for the overall study design, surveys are also one of the most commonly used data collection instruments for qualitative and quantitative studies in LIS research. A literature review by Julien, Pecoskie, and Reed (2011) found that from 1999-2008 surveys were the most commonly used method in studies indexed in the *Library Literature and Information Science Full-text* database. The two largest studies of doctoral students (Carpenter et al., 2012) and library engagement (Zickuhr et al., 2014) utilized surveys to corroborate their qualitative findings and to classify different types of engagement, respectively. The affordances of the survey include easier and more efficient administration compared to focus group interviews and individual interviews, which means that a larger, more diverse, and representative sample of the population being studied can participate. Because the survey questions are the same and many responses are limited (e.g., multiple choice or Likert

scale questions) it is possible to quantitatively compare survey responses (Connaway & Radford, 2017).

Despite the relative ease with which surveys can be disseminated and analyzed, this method also does have limitations. Researcher bias is the most significant potential area of concern with this method because it can lead to confusing questions or responses that do not encapsulate what a participant would want to respond to the question. Topics that have not been well studied, such as IE, are especially susceptible to researcher bias. The study mitigates researcher bias by using the focus group interview and individual interview data to inform the survey questions. Another area of potential concern is participant response rate, because surveys tend to have lower response rates than interviews (Connaway & Radford, 2017).

Bearing in mind the affordances and limitations of this method, the survey consisted mainly of Likert scale questions, a few open questions, and demographic questions. The questions are found in Appendix E3. The demographic and Likert scale questions were used to differentiate participants by their IE. The open questions allowed participants to give more detailed feedback on their IE. The survey instrument was hosted in Qualtrics (2017). Before deploying the survey, the questions were pre-tested by eight doctoral students in the researcher's interdisciplinary doctoral program, but not in the LIS area of concentration.

There is a debate as to the number of points a Likert scale should contain (Leung, 2011; Carifio & Perla, 2007). On one hand, "reliability measures, test-restest and internal consistency, were found to be independent of the number of scale points," according to Matell and Jacoby, (1971, p. 666), but they also acknowledged that this result agreed with

some findings of similar studies and contradicted others. Carifio and Perla (2007) reported that when responses to 457 Likert responses were correlated between scales of 5- and 7-points, the correlation was very close at .92 (p. 109). On the other hand, Leung (2011) argues that 11-point Likert scales seem to minimize skewness and kurtosis (how many responses are outliers), which makes the data collected "closer to internal level of scaling and normality" (p. 412). However, other dissertations that have used this model have often used 5-point scales (Senteio, 2015; Larson, 2010; Lin, 2009) or 7-point scales (Larson, 2010) depending on the content. In the pre-test, an 11-point scale was used, but the students previewing the instrument found the scale was too long and did not differentiate meaningfully between response levels. As a result of the survey instrument pre-test, in addition to modifying the questions based on their feedback and that of the researcher's dissertation committee members, the original 11- point Likert scale was changed to a 7-point Likert scale.

Phase 3 data collection

As in the previous two phases, the potential pool of applicants was chosen strategically based on the participants and findings from the earlier phases. In this case, the potential participant pool was based primarily on the disciplines and institutions of students who had already participated. The participants were recruited using three strategies. Once again, a recruitment notice was also sent to CRTNET and posted on January 17, 2017. Second, a recruitment email was posted on the graduate student events listserv used in the previous two phases. It was posted on January 23, 2017.

When these two methods failed to attract the minimum desired number of participants, the chairs and administrators of social science programs in the 10 institutions were emailed and asked to forward the recruitment email to their doctoral students. Participants in the earlier study phases had come from six of these institutions, and an additional four that were not attended by previous participants was added. These were selected randomly from a list of Doctoral Universities according to the Carnegie Classification of Institutions of Higher Education™ (2017), with one from each of the four Census regions of the United States (2017). These emails were sent on January 26, 2017. An additional four institutions selected randomly from the list of Doctoral Universities used before, with one from each of the four Census regions, also were solicited on January 29, 2017. The programs contacted in both e-mail requests included Anthropology; Communication; Education; Linguistics; Psychology/Behavioral Sciences; Social Work; Sociology; and related fields. Political Science programs also were also contacted, even though there had been no participants from this discipline in the earlier phases. The survey ran from January 26, 2017 through January 31, 2017, and participants were compensated with a $10 Amazon gift card.

Phase 3 data analysis

Two types of data analysis procedures were used in Phase 3. First, a descriptive analysis of the data was created. In this analysis, the mean value for each 7-point Likert scale question was computed. Second, an inferential model tested if participant responses to the five broad categories (personal, confidence, behavior, outcome, and demographic), suggested by the qualitative phases of the study, could significantly predict their

responses to how much they would pay for an article needed for research, how much they

would pay for a book needed for research, and whether the first place they would look for

information was a particular person or a resource. These last three variables, the amount

that the participant was willing to pay for a book and an article, and where they would go

first to look for information, became the dependent variables (DVs).

There were many possible methods considered for the inferential analysis. The

first was deciding what behavior to predict. As discussed in Chapter 2, library value can

and should not be solely based on monetary value. On the other hand, monetary value

arguably has the most face validity to those outside the academic library, and perhaps

even outside of academia (Melo & Pires, 2011; Kingma & McClure, 2015; Ko, Shim &

Pyo, 2016). Monetary value also can be related to the amount of effort a student or other

library user will expend to obtain a resource, either through the library or not. A multiple

regression model could show which variables have the most influence on how much a

student would pay for the article or book. Statistics about the goodness of fit,

approximate variance explained by the model, significance of the independent variables

(IVs), and effect size were computed (see results in Chapter 4).

In addition to predicting how much a participant would pay for a research related

article or book, the qualitative data suggested that some participants might be more

inclined to seek help from a person or a non-human resource. Knowing whether students

in this study population might have a predisposition to seeking information from a person

or a particular resource can help academic librarians tailor their services accordingly.

Although the survey asked students to choose one of seven human or non-human

resource, the analysis was simplified into either a human or non-human resource. Based

on the data, participants were also grouped by whether they would start a search on a topic that they were unfamiliar with using Google Scholar or a search engine, or another resource. This allowed the researcher to run a binary logistic regression, which tests the ability of the IVs to predict what option out of two a participant will choose. Compared to other possible models, such as analysis of variance (ANOVA), multiple ANOVA (MANOVA), or (linear) regression models, binary logistic regression is a robust test that does not place many limits on the IVs used in the analysis. In this analysis, the goodness of fit omnibus statistic, approximate variance explained by the model via the Nagelkerke statistic, significance of the IV(s), and effect size were computed (see results in Chapter 4).

Generating the IVs was a more involved process. There were two main types of methods utilized to create the IVs: statistical grouping and creating additive indexes. The first method involved grouping participants based on their responses and checking to see how well those groupings could predict the DV values or groups. The second involved adding together the Likert scale response values based on the question categories and comparing those with the DVs.

There were three statistical grouping methods considered, and only one was tested. Garson (2014) identifies three similar methods for grouping data, which include factor analysis, cluster analysis, and multi-dimensional scaling. The third one, multi-dimensional scaling, was not considered because group memberships are not saved automatically in SPSS and group labeling would need to be confirmed in a subsequent cluster analysis (Garson, 2014, p. 201). Cluster analysis was preferable to factor analysis because the latter is described by Garson (2014) as a type of fuzzy clustering where

"objects may be assigned membership in disjoint, hierarchical, or overlapping clusters on a probabilistic basis" (p. 16).When comparing factor analysis and cluster analysis, the latter is simpler to use as the number of factors is not influenced by the number of variables as in factor analysis, and SPSS automatically suggests which variables were most important in assigning participants to groups (Garson, 2014, p. 201). Finally, cluster analysis is more appropriate because it groups participants as individuals rather than factors that might underlie their responses.

The cluster analyses used k-means clustering algorithms. This algorithm assigns participants to clusters based on how close the participant's responses were to other participant's responses in the cluster. K-means clustering "is very sensitive to outliers" (Norusis, 2012, p. 390), so only 7-point Likert scales were included in the analyses. In order to test the validity of these clusters, they were then compared to other types of clusters using binary logistic regression. This tests whether one type of variable, in this case a group identified via cluster analysis, can predict a dichotomous outcome. This particular method was selected because it does not assume that the original responses follow a normal distribution, which was less likely since a 7-point Likert scale was used instead of an 11-point one. It also is more reliable than similar methods, such as regression, when there only are two possible outcomes (Garson, 2012, p. 126).

Participant responses to personality related questions, confidence related questions, and the behavior related questions were separately clustered. Outcome related data had too many missing responses to be included in this analysis. Demographic information was not collected on a 7-point Likert scale, and since many of the questions, such as gender, could not be fit onto a 7-point scale, they were not included in the cluster

analysis. Once an initial cluster was generated based on the related questions, they were

analyzed to see if questions should be removed from the clustering process or if more or

fewer clusters should be generated. There is no prescribed way to do this, but the most

common approach aims to have as many cases fall into as few clusters as possible and to

remove variables that do not strongly predict which cluster a case falls into (Norusis,

2012).

In this study, two clusters were generated for personality, confidence, and

behavior questions. The cluster centers, which indicated the response that a participant in

the cluster was most likely to put down for a question, was noted, as was the number of

cases in each cluster. The F tests that appear in the ANOVA table, as noted by SPSS

(2017), should not be interpreted as usual because the clusters were created by giving

more weight to questions where the responses between those in each cluster varied the

most. In other words, a variable that is non-significant in the table should not necessarily

be automatically removed from the model, but it does give some indication as to which

questions had the most difference between responses among the people in each cluster.

The questions used in each cluster were modified according to these guidelines, and the

final questions used to determine each cluster appear in Tables 23-25 in Chapter 4. The

results of this analysis are reported in Chapter 4, but since the overall analyses were weak

in predicting the DVs, the researcher also generated IVs by creating an additive index.

As mentioned above, an additive index is generated by adding up the Likert scale

responses to questions in each group. So the personality variable additive index was

created by adding up the responses to the questions categorized as personality. Additive

indexes are similar to scales, but are less rigorous in their construction. For this reason,

statistics used to estimate the strength of a scale, such as Cronbach's alpha, were not computed for these indices. The cluster analyses also suggested questions to not include in certain scales, so an initial index was created using all of the questions and then an alternate index was created using the questions suggested by the cluster analyses. The scale means for each IV on the DV are included in Chapter 4. The results of the multiple regression and binary logistic regression of these IVs on the DVs are also included in Chapter 4.

Methods conclusion

The dissertation study took place over three phases of data collection and analysis. The phases ran from February 19, 2016 marking the start of data collection in Phase 1, and January 31, 2017 marking the end of data collection in Phase 3. The results of each phase follow in the next chapter.

CHAPTER 4: RESULTS

This chapter presents the qualitative and quantitative results of the dissertation. It begins with a summary of the demographics of the participants in each phase. As described in the Methods Chapter, Phase 1 consisted of 3 focus group interviews with 20 participants, Phase 2 consisted of 15 individual interviews, and Phase 3 consisted of a survey completed by 123 participants. Results from the qualitative and quantitative data collected and analyzed are organized by research question (RQ) (see page 46 for a list of the RQs), in the three phases. Study participants include all participants in this dissertational study, unless they are specifically limited to a certain phase of the study.

Description of sample

The gender, age, doctoral program stage, discipline, and institutional location for participants from all stages of the dissertation are presented below. The ethnicity and educational history of participants from Phase 1 and Phase 2 of the study are also presented.

Gender

The demographic survey was based on the characteristics mentioned in the literature as possibly influencing information engagement, and built upon the demographic survey questions that were developed for another study of this population (Mikitish & Radford, 2013).

Gender	Female	Male	Other	Total per phase
Phase 1	14 (70%)	6 (30%)	0	20
Phase 2	10 (67%)	5 (33%)	0	15
Phase 3	86 (70%)	36 (29%)	1 (<1%)	123
Total	110 (70%)	47 (30%)	1 (<1%)	158

Table 4: Participants' responses to "My gender is"
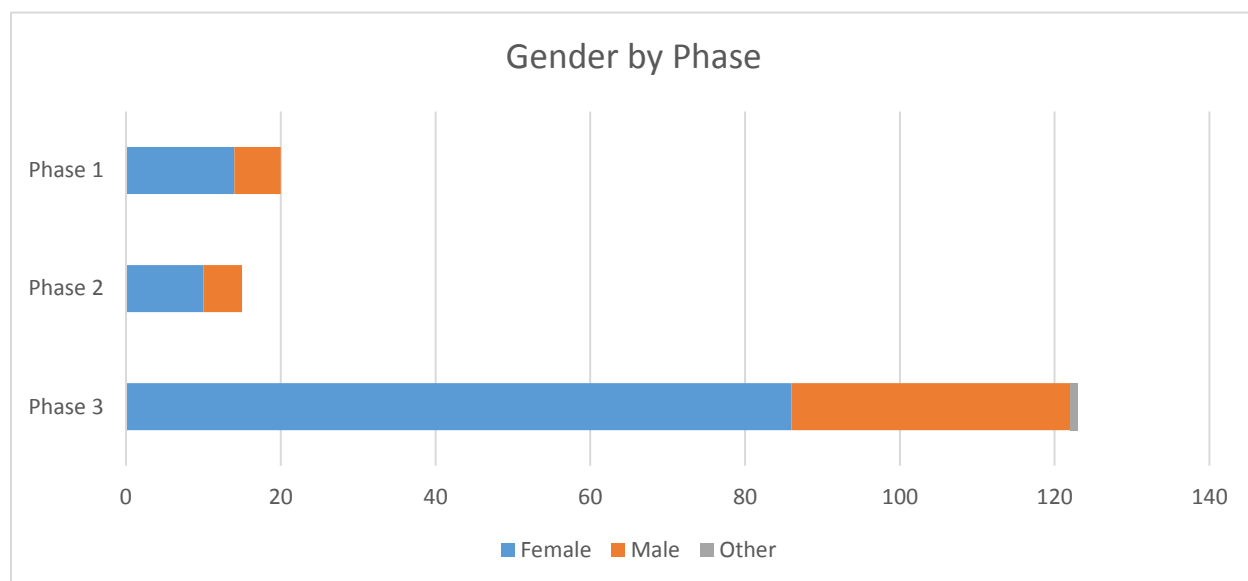
Figure 1: Gender by Phase

Table 4, above, lists the numbers of participants in each phase reporting as each gender, and Figure 1, above, illustrates the gender composition of each phase. According to the Council of Graduate Schools (CGS) and Graduate Records Examination (GRE) Program's Survey of Graduate Enrollment and Degrees, the percentage of women enrolled in United States doctoral programs and studying Education; Public Administration and Services; or Social and Behavioral Sciences in the Fall 2015 semester ranged from 60-68 percent (Okahana, Feaster, & Allum, 2016, p.37).

Age

Age Group	18-24	25-34	35-44	45-54	55+	No Response	Total per phase
Phase 1	1 (5%)	16 (80%)	1 (5%)	1 (5%)	1 (5%)	0	20
Phase 2	0	11 (73%)	3 (20%)	0	0	1 (7%)	15
Phase 3	13 (11%)	98 (80%)	11 (9%)	1 (<1%)	0	0	123
Total	14 (9%)	125 (79%)	15 (9%)	2 (1%)	1 (<1%)	1 (<1%)	

Table 4: Participants' responses to "My age falls into the following range"
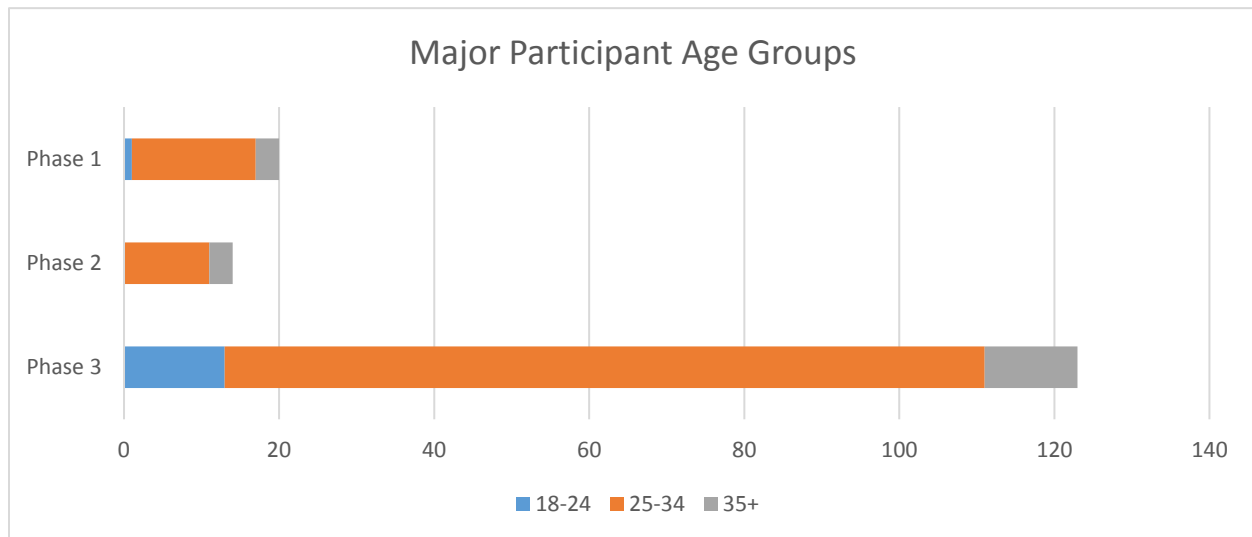
Figure 2: Major participant age groups

Table 5, above, groups the study participants by age, and Figure 2, above, simplifies the data into three main groups. Participants in Phase 1 and 2 were asked to share their exact age. The youngest participant in these phases was 24, and the oldest was 59. 78 percent of the participants in the study (across all phases, combined N = 158) fell into the 25-34 year old group. The data from the first two phases of the study suggested that age might affect information engagement in participants 35 and above, so the groups indicated on the Phase 3 survey used this age as the lower limit for the middle selection.

Ethnicity

Ethnicity	African American	Caucasian	East Asian	Latinx
Phase 1	4 (20%)	11 (55%)	0	2 (10%)
Phase 2	0	11 (73%)	1 (7%)	0
*Phase 3	n/a	n/a	n/a	n/a
Total	4 (11%)	22 (63%)	1 (3%)	2 (6%)

Ethnicity	Middle Eastern	South Asian	Mixed	Other	Total per phase
Phase 1	0	1 (5%)	1 (5%)	1 (5%)	20
Phase 2	1 (7%)	0	2 (13%)	0	15
*Phase 3	n/a	n/a	n/a	n/a	n/a
Total	1 (3%)	1 (3%)	3 (9%)	1 (3%)	

Table 6: Participants' responses to "My ethnicity is"
*Data not collected for this phase of the study
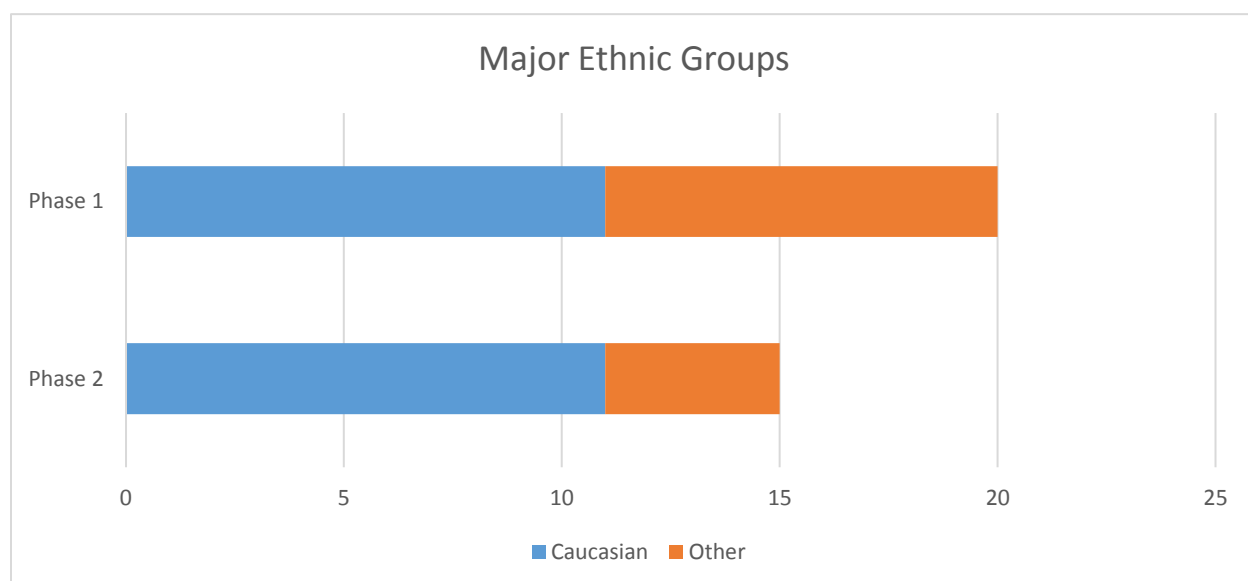
Figure 3: Major ethnic groups

Table 6, above, lists the ethnicity reported by the participants in the first two phases. The Okahana et al. survey (2016) found that 13 percent of all graduate students enrolled in social and behavioral science programs were Black/African American, 60 percent were White, 5 percent were Asian, 12 percent were Hispanic/Latino, and 4 percent were Two or More Races. A further breakdown of doctoral students versus other

graduate students was not available, so it is not possible to say that this study's

participants are representative of the ethnic breakdown of social science doctoral

students. Participants in Phase 3 were not asked to report their ethnicity because analysis

of the participant responses collected in Phases 1 and 2 did not indicate ethnicity to be a

critical factor in participant IE.

Stage

Stage	Before exams	Before proposal/prospectus defense	After proposal/prospectus defense	No response	Total per stage
Phase 1	8 (40%)	1 (5%)	11 (55%)	0	15
Phase 2	5 (33%)	5 (33%)	5 (33%)	0	20
Phase 3	60 (49%)	35 (28%)	27 (22%)	1 (<1%)	123
Total	73 (46%)	41 (26%)	43 (27%)	1 (<1%)	

Table 7: Participants' responses to "I am in the following stage of my program"
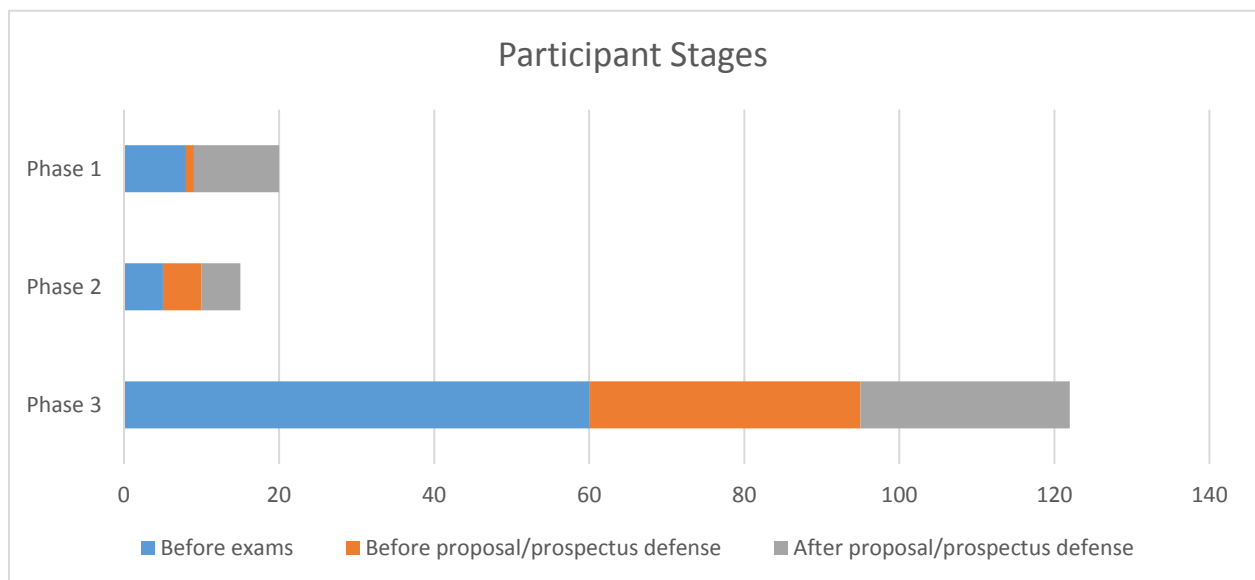
Figure 4: Participant stages

Table 7, above, lists the number of study participants in each doctoral program

stage. Study participants in the earliest stages of their programs, who had not passed their

qualifying/ comprehensive exams, accounted for 46 percent of the participants overall

(total N = 158). Participants who had passed their qualifying/ comprehensive exams but

not defended their dissertation proposal/prospectus, accounted for 26 percent of the

participants overall (N = 158). Participants who had defended their dissertation

proposal/prospectus, accounted for 27 percent of the participants overall (total N = 158).

Discipline

Discipline	Communication	Psychology	Sociology	Linguistics	Social Work
Phase 1	7 (35%)	1 (5%)	6 (30%)	1 (5%)	1 (5%)
Phase 2	13 (87%)	1 (7%)	0	0	0
Phase 3	56 (46%)	29 (25%)	15 (12%)	9 (7%)	8 (7%)
Total	76 (48%)	31 (20%)	21 (13%)	10 (6%)	9 (6%)

Discipline	Political Science	Ecology & Evolution	Anthropology	Education	Global Affairs	No response
Phase 1	0	1 (5%)	1 (5%)	1 (5%)	1 (5%)	0
Phase 2	0	1 (7%)	0	0	0	0
Phase 3	3 (2%)	0	0	0	0	3 (2%)
Total	3 (2%)	2 (1%)	1 (<1%)	1 (<1%)	1 (<1%)	3 (2%)

Table 8: Participants' responses to "I am in the following department/discipline
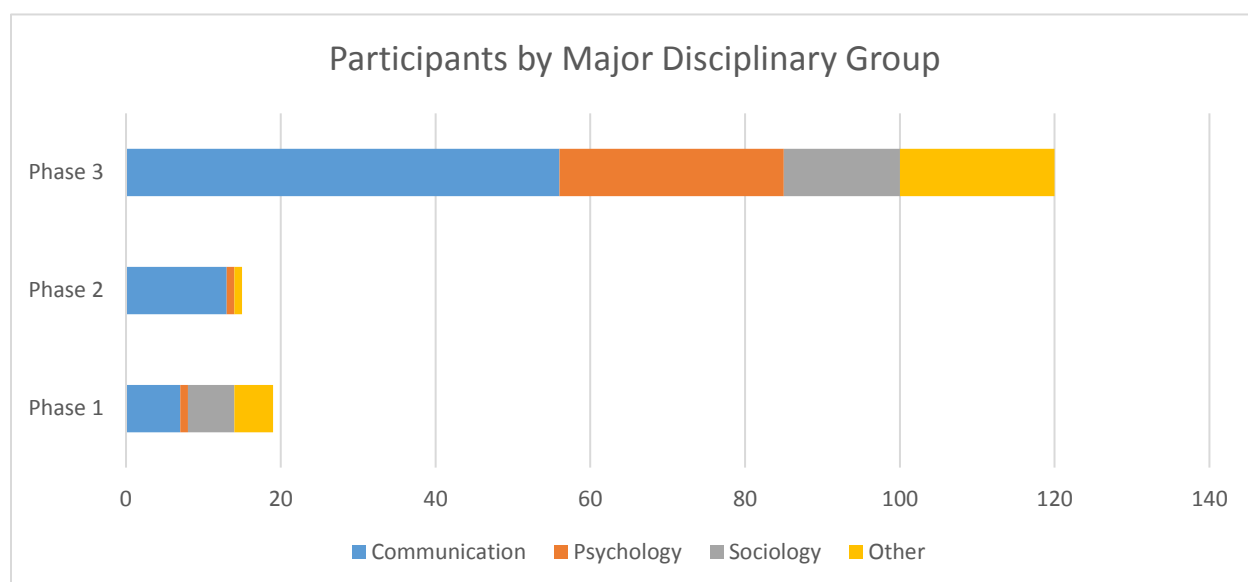
Figure 5: Participants by major disciplinary group

The table above (Table 8) reports number of study participants in each discipline.

Some study participants did not respond to the question, and the (n) values for each

resource are in the last column in the table. Participants in Communication and related

disciplines, such as Journalism and Media Studies, accounted for 48% (total N = 158) of

the study participants across all three phases. The next two disciplines, Psychology and

Sociology, accounted for 26% and 13% (total N = 158) of participants, respectively.

Although graduate program chairs and/or administrators were asked to forward

participation notices to students in Anthropology and Education doctoral programs, only

one participant per department was included in this study, and only in Phase 1.

Other Degrees

Bachelor's Discipline	Social Sciences	Sciences	Humanities	Other	Not applicable	Total degrees
Phase 1	13 (59%)	4 (18%)	5 (23%)	0	0	22
Phase 2	13 (72%)	1 (6%)	4 (22%)	0	0	18
*Phase 3	n/a	n/a	n/a	n/a	n/a	n/a
Total	26 (65%)	5 (13%)	9 (23%)	0	0	40

Table 9: Participant's bachelor's discipline
*Data not collected for this phase of the study

Master's Discipline	Social Sciences	Sciences	Humanities	Other	Not applicable	Total degrees
Phase 1	17 (94%)	0	1 (6%)	0	3	21
Phase 2	12 (75%)	4 (25%)	0	0	0	16
*Phase 3	n/a	n/a	n/a	n/a	n/a	n/a
Total	29 (78%)	4 (11%)	1 (3%)	0	3 (8%)	37

Table 10: Participant's master's discipline
*Data not collected for this phase of the study
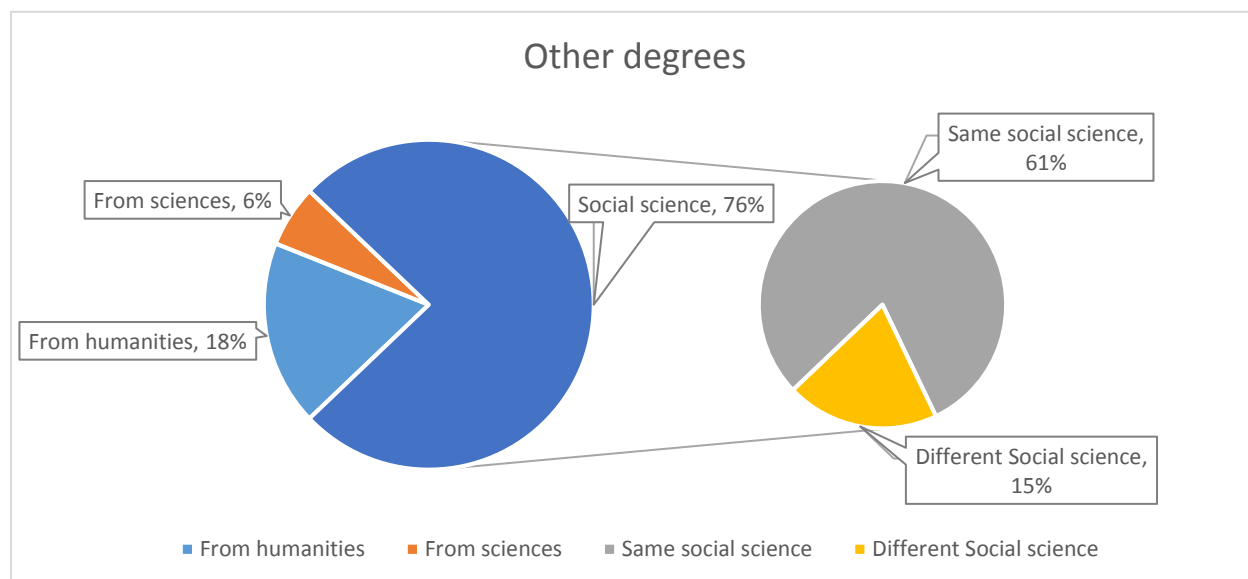
Figure 6: Breakdown of other degrees

Participants Phases 1 and 2 of the study were asked to list the disciplines and levels of any other postsecondary degrees that they earned (Tables 8and 9). There are more degrees listed than participants because some participants received their degrees in multiple areas. As depicted in Figure 6, above, most participants (25 out of 35 total, 71%) received all previous degrees in the social sciences. For those who started in the sciences or humanities, there was a gradual narrowing of disciplines as the participants progressed in their studies. Participants in Phases 1 and 2 combined reported receiving bachelor's degrees in the social sciences (total N = 26), sciences (total N = 5), and humanities (total N = 9). Participants in Phases 1 and 2 combined reported receiving master's degrees in the social sciences (total N = 29), sciences (total N = 4), and humanities (total N = 1).

Location

Institution	Midwest	Northeast	South	West	No response	Total per phase
Phase 1	0	20 (100%)	0	0	0	20
Phase 2	4 (27%)	5 (33%)	4 (27%)	2 (13%)	0	15
Phase 3	46 (37%)	16 (13%)	33 (27%)	27 (22%)	1 (<1%)	123
Total	50 (32%)	41 (26%)	37 (23%)	29 (18%)	1 (<1%)	158

Table 11: Participants' responses to "The school where I am getting my degree is located in the following region of the country"

The table above (Table 11) reports the number of participants from each census region of the United States. Despite recruiting solely in the Northeast for Phase 1 of the study, more students from the Midwest participated in this study than from any other region.

Bachelor's Institution	Midwest	Northeast	South	West	Other	No response	Total institutions
Phase 1	2 (10%)	7 (35%)	8 (45%)	0	1 (5%)	2 (10%)	20
Phase 2	7 (47%)	4 (27%)	4 (27%)	0	0	0	15
*Phase 3	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total	9 (26%)	11 (31%)	12 (34%)	0	1 (3%)	2 (6%)	35

Table 12: Region of participants' bachelor's institutions
*Data not collected for this phase of the study

Master's Institution	Midwest	Northeast	South	West	Other	Total institutions
Phase 1	2 (11%)	10 (56%)	5 (28%)	0	1 (6%)	18
Phase 2	4 (25%)	6 (38%)	5 (31%)	1 (6%)	0	16
*Phase 3	n/a	n/a	n/a	n/a	n/a	n/a
Total	6 (18%)	16 (47%)	10 (29%)	1 (3%)	1 (3%)	34

Table 13: Region of participants' master's institutions
*Data not collected for this phase of the study

Participants in Phases 1 and 2 reported the other postsecondary institutions that they received degrees from in the past, which is listed in the two tables above (Table 12 and Table 13). The last column reports the number of institutions because some students received degrees of the same level at multiple institutions. In Tables 11-13, some

participants did not respond to the question, and the (n) values for each resource are in the second to last column in the table. Students earned the largest number of bachelor's and master's degrees in the Northeast (total N = 15), followed by the Midwest (total N = 15), South (total N = 22), and West (total N = 1).
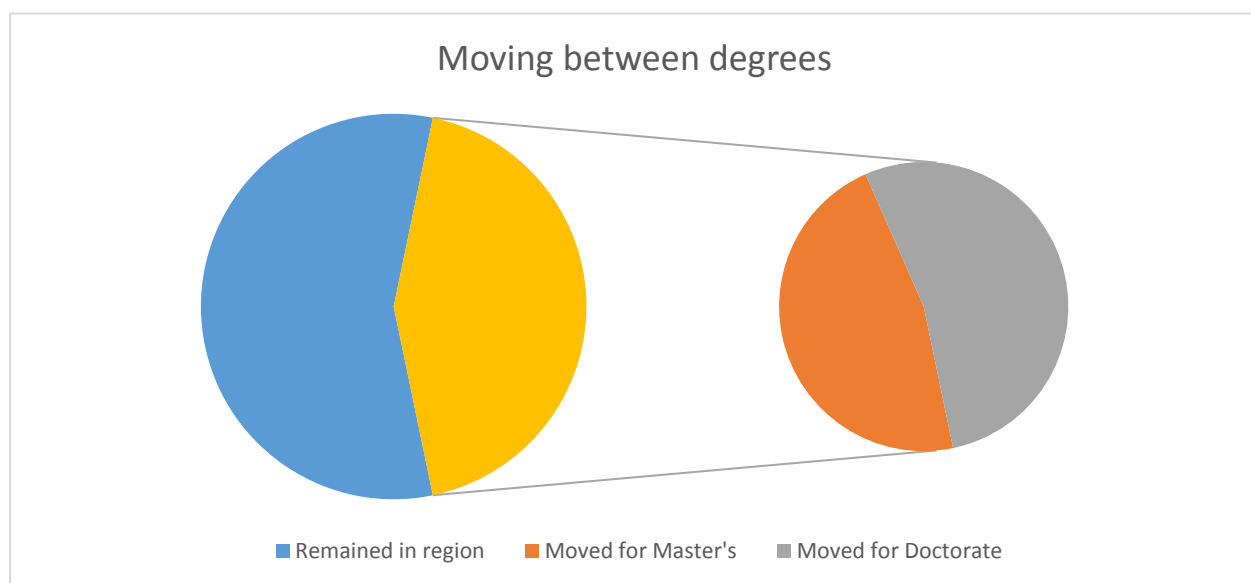
Figure 7: Moving between degrees

As Figure 7, above, depicts, most students received previous degrees in the same census region of the United States. Of those who moved to an institution in another region, slightly more were likely to move in order to pursue a Doctoral degree. Of these, three moved back to the same region where they had received their Bachelor's degree.

Based on the demographic information reported above, the results of this study best apply to Communication, Psychology, and Sociology students who are under 35 years old and Caucasian. Students in the final survey phase were not asked to report educational history because there were no strong relevant findings in those areas. The demographic results of the study are difficult to contextualize because there is no comprehensive survey of all doctoral students in the United States. The Okahana et al. study (2016) offers the comprehensive data on graduate students, but offer limited data

on only doctoral students. However, the findings outlined above indicate that although the convenience sampling methods differed by each phase, a similar proportion of participants fell into each of the demographic areas.

Summary of sample

- The *gender* breakdown of each phase was similar to what is reported nationally for social science doctoral students in the United States.
- Participants' *ages* were mostly below 35 years old, the most commonly reported *ethnicity* was Caucasian, and a majority of the participants were in the pre-qualifying/comprehensive exam *stage*. It is not clear whether this is representative of social science doctoral students in the United States.
- Study findings are most applicable to students in Communication; Psychology; and Sociology because a majority of the participants were in these *disciplines.*
- Participants in the first two phases tended to have received all of their *degree*s in social science fields, and the majority in the Phase 2 all received their degrees in the same discipline.
- Participants in the first two phases tended to stay in the same *region* of the United States when pursuing higher education degrees.

Qualitative and Quantitative Results by RQ

The qualitative and quantitative results are reported under their corresponding RQ. The first and fourth RQs only include qualitative results. The findings related to the first RQ identified factors that were tested quantitatively in order to answer other research questions. The findings related to the fourth RQ are based on the findings of the previous three RQs and qualitative data from Phases 1 and 2. The qualitative results are presented as counts in charts and in *thematic coding tables*. The quantitative results are described using charts and tables.

Interpreting thematic coding tables

Relevant qualitative themes for RQs are listed in tables, beginning with Table 14, below. The tables in this chapter may combine themes or sub-themes. For instance, in Table 14, below, the library barrier theme adds the counts for four sub-themes that are types of library policy barriers. A full listing of the themes, definitions of themes, citations for themes related to other work, participant responses that are examples of themes, and counts for each theme are in Appendix G. While the participant responses in Appendix G provide exemplars for the particular theme, the participant responses in this chapter and Chapter 5 will further illustrate the relevant findings as part of the discussion.

Each thematic coding table also includes two types of counts each for Phase 1 and Phase 2. For the focus group interviews in Phase 1, there is a count for how many groups out of the three total focus groups included at least one participant response that was coded into the theme and a count of the total number of times a participant response was coded for that theme across all groups. For the individual interviews, there is a number for how many individual interviews out of the 15 total interviews included at least one participant response coded into a theme and a total number of times a participant response was coded for that theme across all individual interviews.

Results for Research Question 1 (RQ 1): What are the critical factors that characterize information engagement (IE) for doctoral students in the social sciences?

The major results for RQ 1 follow in the bulleted list below, and Table 14, which follows afterwards, outlines the major qualitative themes identified from Phases 1 and 2.

- When considering the *Task*[1] (1.1)[2] that participants were working on when looking for information, the *Stage Based* (1.1.1) ones for where they were in their program were not found to be a critical factor of IE because participants were more likely to relate incidents where they found information that helped them *Situate [their] Work* (1.1.2) in a more general sense rather than on a search for a specific task. *Teaching* (1.1.3) was also not found to be a task that significantly affected IE.
- Based on participant responses, this study identified the following critical *Facilitators* (1.2) of IE:
  - a wide variety of *Searching* (1.2.1) and *Organizational* (1.2.2) strategies, which suggests that these critical factors are best measured at an individual rather than institutional level.
  - the *Convenience* (1.2.3) afforded by institutionally provided resources or services.
- The study also identified the following facilitators as not being critical to their IE:
  - *Flow* (1.2.4) experiences that occurred during participants' information seeking, writing, or some combination of the two.
  - *Library Instruction* (1.2.5), even if the student was an international student.
  - having access to resources at other institutions via *Multiple Institutional Logins* (1.2.6).
- Based on participant responses, this study identified the following as *Barriers* (1.3) to IE:
  - *Not Finding* (1.3.1) information, which was mostly attributed to not knowing the keywords used for their *Topic* (1.3.1.1) or what was used in the topic's *Field* (1.3.1.2).
  - frustration over *Not Knowing* (1.3.2) how to access materials through their institution's library or due to specific *Library Policy* (1.3.2.1), which was especially prevalent in the focus group interviews.
- The study also identified an item's *Cost* (1.3.3), a perception that there was a *Distance* (1.3.4) from the library or its resources, or the delivery *Time* (1.3.5) taking too long as barriers to IE, but not significant ones.
  The critical factors resulted from qualitative analysis of the interviews in Phase 1 and Phase 2. They were divided into facilitators, which helped improve participant IE, and barriers, which hindered participant IE as summarized below.
- The demographic factors described in the Description of the sample above did not seem to affect the Task, Facilitator, and Barrier qualitative themes applied to participant responses, except where noted.

---

[1] Qualitative themes are capitalized

[2] The first number indicates the research question, the second number indicates the sub-section that the theme appears in, and the third number indicates the number of the theme in the sub-section.

Facilitator and barrier themes coded as critically affecting IE

RQ1 Themes	Focus groups		Individual interviews	
	Group count	Times coded	Participant count	Times coded
• Tasks				
o Stage based				
▪ Coursework	3	11	8	20
▪ QualComp	3	11	5	21
▪ Proposal	2	2	4	10
▪ Dissertation	2	5	7	20
▪ Other	1	2	6	13
o Situate work	3	27	11	27
o Teaching	3	11	6	8
• Facilitators				
o Flow	3	44	15	39
o Searching strategies	3	41	13	104
o Organizational strategies	3	32	12	37
o Library instruction	2	3	11	21
o Convenience	3	19	6	14
o Multiple institutional logins	1	1	2	6
• Barriers				
o Not finding	3	26	7	18
o Not knowing	2	38	11	36
o Specificity				
▪ Topic	2	12	11	21
▪ Field	1	8	8	19
o Library policy (incl. embargo, request limits, ILL fee, recall)	3	37	6	15
o Cost	3	11	5	8
o Far distance	2	4	4	7
o Timeliness (incl. item delivery time and deadline)	2	7	4	7

Table 14: RQ1 qualitative themes identified in Phase 1 and 2

1.1 Tasks

     Tasks were defined as when the participant mentioned a specific assignment when

describing interactions with information. The focus group interview and individual

interview questions (see Appendix E1 and E2, respectively) asked participants to recall a time when they had to search for information related to their doctoral studies. The sub-themes for Task included Stage Based (1.1.2) activities, which were defined as when the participant described work in any of the following stages of doctoral study included: Coursework, defined as the time before qualifying/comprehensive exams" (example, "Well last semester I had to do a…project in one of my classes"(P7[3])); QualComp Exams, defined as the time spent researching, writing, or defending qualifying/comprehensive exams (example, "when I was doing my comps" (P4)); Proposal, defined as the time spent researching, writing, or defending dissertation proposal/prospectus (example, "I was looking for writing a proposal" (P10)); and Dissertation, defined as the time spent researching or writing their dissertation (example, "My experiences were different when I was in course work then they are now post coursework and dissertation torture" (P15)).

Some participants described major changes in their IE in different Stages of their doctoral program. As one participant who was finishing writing his dissertation explained:

> My experiences were different when I was in coursework than they are now post coursework and dissertation torture. In course work, when I was being given projects and questions…[and] some modes of inquiry that kind of thing… I found I would go to the library website and type in my topics...Before the primary hurdle was figuring out what's there, now it's getting it…And so often the hurdle I run into is I'll be able to track down the article that I need, go into the library system, find it, and…I can't [access] it in there…They don't have that journal or it's in an embargo period or what have you. Which you know isn't the library's

---

[3] Participants were assigned numbers in order to protect participant privacy and ensure anonymity. They will be referred to as Participant 6 or P6. Participant quotations are verbatim from transcripts of audio recordings, with only minor grammatical errors corrected.

[fault], that's not what you guys do. You're navigating a broader economic marketplace… (P15).

This statement suggests that other students in this Stage might face similar IE challenges, but the qualitative results indicated students faced similar IE challenges regardless of Stage and any of the demographic factors listed in the Description of the sample in the above section.

One explanation for the similar challenges at each PhD program Stage was that participants instead linked changes to specific tasks, which happened to occur at different stages of their program. For instance, Participant 4, who was writing her dissertation, said that the major change in her information searching occurred when she was preparing for her comprehensive exams because of the nature of the assignment. This participant described the change by saying, "Mostly in my daily life I do that sort of forward searching, 'This is what I want, how can I get it?' Where as [searching for my exams] was totally backwards" (P4). Forward searching refers to Known Item searching in LIS, and often occurred for participants in the earlier stages of their programs. Other doctoral students acknowledged that this was the easiest type of search for them to accomplish. As one participant recounted:

> In terms of specific research…I'm still in coursework and so I tend to, as I'm reading an article that I find interesting, [I make] notes of…the articles that they reference and then I'll just look for those. So it tends to be pretty straightforward because I know what I'm looking for and I know it exists. It's not like I'm searching for…a general keyword. I know the exact article, the author, all that information, so it, it doesn't tend to be too difficult right now for me to find the things that I'm looking for (P3).

In other words, the nature of the assignments in certain stages of the doctoral program might necessitate different searching skills. Although doctoral students might be more likely to have done the "backwards" (P4) searching by their qualifying exams, that does

not mean that students in their Coursework stage would not need that skill for a class assignment.

While Stage Based tasks were a major sub-theme in Tasks, Situate Work (1.1.2) and Teaching (1.1.3) were two others. The sub-theme Situate Work was applied to times when participants looked for information about the field of study without a specific task (e.g., a paper) in mind. While they may have applied the information to a stage related task or their research interests, this association came after they found the information. Participant 3 explains the process as "a lot of it is just me trying to work my way backwards so that I know I have a good understanding." The Situate Work subtheme was present in all of the focus groups and 73% (N = 11) of the individual interviews, respectively. In the individual interviews, the Situate Work theme was least coded in responses from participants in their Proposal stage (not coded in N = 3, 66% of N = 5 participants).

Engaging with information when doing Teaching (1.1.3) related activities, which were defined as preparing for class or teaching, such as "information that [a participant looked] for in order to help [their] students" (P2), was the third most common task found to be present in the data (all focus group and N = 6, 40% of the individual interviews, respectively). In the individual interviews, this theme was more likely to be found in interviews with female rather than male participants (N = 4, 27% versus N = 2, 13%), and among students who were writing their Dissertation (N = 4, 80% of the 5 total students in this stage).

1.2 Facilitators

Information engagement was assisted and hindered by various factors, which were coded as Facilitators and Barriers, respectively, as defined by Radford (1993). Data analysis found that participants' responses were coded as Facilitators more often than Barriers, and Facilitators were most often individual strategies or systems for Searching (1.2.1) or Organizing (1.2.2) information. Searching Strategies were defined as methods described by participants for finding information, and consisted of: Keyword, Pearl Growing, Known Item, and Exploratory. Keyword searches described instances when participants looked for information using specific terms (example: "within the journal, different keywords" (P1)). Keyword was the most commonly coded of the Searching Strategies (all focus group interviews and N = 12, 80% of individual interviews). Because so many participants used this strategy, there was no significant difference between participants with different demographic factors as identified in the Description of the sample.

Pearl Growing (Markey & Atherton, 1978), was a strategy in which participants used the list of references in documents to find other related documents. One participant described using this strategy by saying, "I was sort of like searching quick search for references to find, you know, authors that I'd heard of or topics that I found interesting, and I kind of used that to jump from article to article" (P9). It was the second most frequently coded Searching Strategy (all focus group interviews and N = 11, 73% of individual interviews). As with Keyword searching, there was little difference between the responses coded with this theme among participants with different demographic factors.

Pearl Growing could be considered a type of Known Item search. Known Item searches referred to instances where participants looked for a specific item, or when they could say, "This is what I want, how can I get it" (P4). However, Pearl Growing and Known Item searches differed because in the former, a document provided several possible related documents to find, while in Known Item searches, the participant was only looking for one document. Known Item searches were coded less frequently than Pearl Growing searches (all focus group interviews and N = 7, 47% of individual interviews versus all focus group interviews and N = 11, 73% of individual interviews, respectively), and were the least commonly coded Searching Strategy. The individual interview participants were more likely to use this Searching Strategy as they progressed in their programs as none of the students in Coursework or QualComp Exams mentioned using Pearl Growing, however there did not seem to be any differences based on demographic factors.

Finally, Exploratory searches were ones in which participants researched a specific topic, and described as "just exploring what's important to me" (P18). They were coded frequently (N = 2 focus group interviews and N = 10, 66% of individual interviews). Unlike the Known Item searches, participants in Coursework or QualComp Exams were more likely to have this code applied to their responses. Out of the five (33%) individual interview participants who did not have responses with this code, four were in their Proposal stage and one was writing her Dissertation. Demographic factors did not appear to influence the use of Exploratory Searching.

Organizational Strategies (1.2.2) were defined as methods by which participants saved information because as Participant 3 stated, "It's so helpful to have an organization

system for all the things that you have." The most commonly used Organizational Strategy was for Information outside of documents (N = 2 for focus group interviews and N = 13, 87% of individual interviews). One participant described using "big cardboards in different colors and Post-its" (P13) for this purpose. Participants across all demographic factors organized their Information, with no appreciable differences.

The next most commonly utilized Organizational Strategy were Folders, which were physical or electronic folders that organized documents. Some participants had elaborate organizational schemes for their folders. For example, one participant explained that "It's one list per folder. For different topics I just have a folder, or if I'm looking for this particular search on this particular day, I'll have a folder for that one day even" (P20). Folders were coded in participant responses less frequently than Information (N = 2 focus group interviews and N = 11, 73% of individual interviews). As with Information, participant demographics did not seem to affect their use of Folders.

Lists and Schedules were rarely mentioned in the focus group and the individual interviews. Lists consisted of items to be found or added to their collection (example: "I've definitely gone to the library, gotten a book I realized that I need to add it to my list" (P11), and were mentioned by most participants (N = 2 focus group interviews and N = 1, 7% of individual interviews). Schedules were plans with dates/times to read/work with information (N = 1 focus group interview and N = 2, 13% of individual interviews). One participant explained that, "I'll put together an action plan. I'll read this book and this article on this day" (P20). The two different individual interview participants who used the List and the Schedule were female, but other than that there were no differences among different demographic factors in participant use of Lists and Schedules.

Participants were more likely to identify searching strategies than organizational strategies. The diversity of strategies ties into a key finding for this research question because all of the participants in the focus group interviews, except for one (5%), attended the same institution, but the strategies that they used to find and organize information differed from person to person. Program stage rather than institution was part of the criteria for selecting participants in the Phase 2 individual interviews, but in that phase there were eight (53%) individual interview participants who attended the same institution, meaning that they had access to the same resources, as another participant. This finding suggested that institutional factors were less important than individual ones when identifying critical IE factors.

Analysis of participant responses from all focus group and individual interviews in Phase 1 and Phase 2, respectively, included instances of the Flow (1.2.4) theme because there was a specific question about it in each interview protocol (see Appendix E1 and E2). Flow is a state in which one experiences high levels of focus, attention, and enjoyment in an activity (Csikszentmihalyi, 1990). One participant described it as: "It's like it was there and I was in the moment" (P7). Participants' descriptions of Flow differed, with participants in all focus group interviews and three (20%) of individual interview participants describing it as a combination of Writing and Searching. One participant stated, "I guess well, how do you define the difference between searching and then actually starting to consume the information, because I generally don't associate being in the zone with just searching for stuff." (P2), and three (20%) individual participants describing it as occurring when Only Writing. A small number of participants did not experience flow while searching or writing (N = 7 codings of No

Flow over N = 2 focus group interviews and N = 1, 7% of individual interviews). One participant explained that "I'm not sure I've ever been in the zone, I'm not sure it's ever happened" (P5). Aside from only female participants associating Flow with Only Writing, reports of Flow or lack thereof did not differ significantly among participants based on demographic information.

When searching for information, participants' institutions provided systems or services that facilitated the process. Convenience (1.2.3) was a related concept to Flow, and was defined as applying to situations when finding and/or accessing info was fast and easy (Connaway, Dickey & Radford, 2011). One response coded as Convenience was: "Yeah I [search] electronically cuz I'm really lazy so I'll sit in front of my computer, and I'll go to special issues of journals in my field" (P15). The participants' institutional systems or resources facilitated Convenience and Flow, but this was not always the case. One student, who had nearly finished writing her dissertation, admitted that, "honestly, the library's the last place that [she would] go for articles" (P9) because it was less convenient than using Google Scholar. Analysis of the focus group participants' responses yielded more instances of the Convenience code than among the individual interview participants (coded in all focus group versus N = 6, 40% of individual interviews). There was no demographic difference in the responses coded with the Convenience theme.

Library Instruction (1.2.5) was defined as when an academic librarian provides formal (e.g., class based) or informal (e.g., one on one) instruction in finding/accessing info (example: "Yeah we definitely have an information session my first year with the

liaison" (P17)). Some participants had received library instruction multiple times, but the results of it were mixed. As Participant 21 recounted:

> It seemed every other class I took my freshman [and] sophomore years, we had a day devoted to going to the library…A librarian…or someone who worked in the library who specialized in this and research would give us a presentation on, 'Here are the different resources, here's how you access those resources, [and] here's how you do research.' Like kind of a basic research class and I found that very helpful…but that was a while ago (P21).

On the other hand, Participant 28 explained:

> I feel like I've had library introduction classes my whole life…In high school...pretty much every year we would go to the library for our English class and they would show us the databases, and I remember always…[thinking,] 'Alright you already showed this to us, I've seen it a million times.' (P28)

Of course, some students had not received Library Instruction, but that did not prevent them from knowing how to use several higher level search features, such as searching in multiple fields and using truncation, which one participant called "the asterisk feature" (P28), in keywords. Another participant who knew about the advanced search feature said she might have seen it at some point in her education, but she had "to figure it out on [her] own" (P33). Other advanced skills included narrowing the search results to a subject (P32) and using the controlled vocabulary subject terms that appeared in databases or the library catalog (P22), but it was not always clear where participants learned these skills. Demographic factors did not seem to have an effect on whether a participant described higher level search features in their responses.

Participants in the final stages of their program were more likely to agree that library instruction should occur earlier in the program rather than later, as encapsulated in the response below:

> I mean really they should have…scheduled one-on-one or something with librarians to force us to get into the habit of understanding how the library works

and what resources are available to us because at [institution]. It's an R1...and they are able to do so much with research… You don't even know what's possible. …Unless they make the time for it that first year, I think we're all kind of missing out actually on resources that are available to us and would make our lives so much easier and better, especially as researchers, but we don't have time by the time it comes down to it to really want to and be able to use it. It's kind of too late, we've already established less effective and efficient habits (P29).

Library Instruction was an institutionally provided service that was coded more frequently in the individual interview participants' responses (N = 21 times in N = 11, 73% of individual interviews) than the focus group participants' (N = 3 times in N = 2 focus group interviews). In order to learn more about factors that might influence how Library Instruction could be more often perceived as a facilitator to engagement, questions about Library Instruction were added to the quantitative survey in Phase 3. The Likert scale statements asked students the extent to which they agreed that certain topics or types of instruction would be helpful if provided by librarians. Results related to these questions appear in the findings for RQ 2 and 4, below.

Only three (9% of N = 35) interview participants in Phases 1 and 2 disclosed that they were international students, and their experience or lack of experience with library instruction suggested that their international student status could be a factor in their IE, so this was added as a demographic question in the survey and reported in Table 15, below.

International student? (N = 123)	No	Yes	Prefer not to answer
*Phase 1	n/a	n/a	n/a
*Phase 2	n/a	n/a	n/a
Phase 3	103 (84%)	18 (15%)	2 (1%)

Table 15: Participants' responses to "I am an international student"
*Data not collected for this phase of the study.

As reported in Table 15, above, 18 (15%) of the participants in Phase 3 were international students. Some participants chose the "Prefer not to answer" option, and the

n values for each resource are in the last column in the table. The Okahana et al. survey

(2016) found that a similar proportion of all graduate students in the social and behavioral

sciences were enrolled in the Fall 2015 semester, but did not offer a further breakdown of

doctoral versus other graduate students. Because fewer than 10 percent of the participants

in the entire study were international students, and it is not possible to compare this

number to the entire population of social science doctoral students in the United States,

whether a student is international was not found to be a critical factor of IE.

One infrequently coded but significant facilitator to IE was that a small number of

participants (N = 1, 5% of focus group participants and N = 2, 13% of individual

interview participants) were able to legally access other institution's collections. Legal

access was coded under Multiple Institutional Logins (1.2.6), and described situations

where the participant could personally access resources at other academic institutions

(example: "I also have access to [another institution's] databases)" (P5)). Illicit access to

collections described situations where participants acknowledged receiving information

through explicitly "highly illegal" [4] (P4) means, either by using someone else's

credentials or asking a person at that institution to send them a resource. Participants

were likely to preface these requests by stating that they understood that this was

something that "no one should ever do" (P24). Incidents with this Illicit access included

some "illicit sites that [one participant would] use…[when] looking for something [they

---

[4]While the participants explicitly agreed that certain behaviors, such as torrenting or copying an entire book, were illegal, there was an implicit morally gray area around other workarounds, which are described in the "Library policies" sub-section that follows. This reflects the findings of a meta-analysis by Williams et al. (2010), which suggests that ownership, sharing, and copying in the digital world is changing, and individuals are using social and situational factors rather than ethical and legal factors to guide their behavior.

couldn't] find" (P5). Multiple Institutional Logins appeared in the data 22 times in three

(100%) of focus group interviews compared to 15 times in four (27%) of individual

interviews. Illicit access to resources is a sensitive topic, and is less important in this

study than seeing how access to multiple institutions' resources played a factor in

facilitating IE.

At the same time, sometimes it was unclear whether such access was Illicit, even

when participants claimed to be "a hundred percent about PDF sharing" (P9). For

instance, one student explained:

> I'm taking a class at [another institution besides theirs], so I actually have access
> to their library and [second other institution], which includes [third other
> institution] and a couple other schools that are around there, and then [current
> institution] and [fourth other institution]…[It's] like I am the Pirate Bay. I'll figure
> out some way to just access all of them at once (P5).

Demographic factors did not seem to affect whether or not participants had Multiple

Institutional Logins or different perceptions of Illicit access to materials. In order to

investigate how many participants in a larger sample had this type of access, the

demographic question used in the Phase 3 survey did not specify if the access was legal

or illicit, and the results are reported in Table 16, below.

Additional logon? (N = 123)	Yes	No	Prefer not to answer or no response
*Phase 1	n/a	n/a	n/a
*Phase 2	n/a	n/a	n/a
Phase 3	50 (41%)	68 (55%)	5 (4%)

Table 16: Participants' responses to "I am able to log onto databases through other
schools besides where I am getting my degree"
*Data not collected for this phase of the study

As reported in Table 16, above, 50 (41%) of the participants were able to log onto

databases through other schools. Some participants chose the "Prefer not to answer"

option or did not respond to the question, and the n values for each phase are in the last

column in the table. A majority of those who could log onto other schools' databases (N = 28 out of 50, 56%) were in the first stage of their program, which was before their Qualifying/comprehensive exams. This was an important finding because nearly half of the survey participants are able to log into other institution's databases, but the literature does not discuss its effects on doctoral students' perceptions and expectations of the services and resources provided by their home institution. There is also a dearth of literature on library instruction for students taking classes at other institutions. A further discussion and the implications of this topic are in Chapter 5 and 6, respectively.

1.3 Barriers

Barriers (Radford, 1993) hindered participant IE. One major barrier to IE was Not Finding (1.3.1), which described situations where a participant was frustrated by not finding information that they believed should be easy to find. As one student in coursework explained:

> I think for me a lot of the frustration comes from, or it varies depending on the stakes I have…in whatever it is I need to find. So if…I need to write one of my random weekly things and I need the articles here on this reading list…if I don't find something I'm looking for I'll just look for anything else that fits that. But if there's something that really matters…[and] it weighs a lot more in terms of what I'm going to be doing in the future, I spend a lot more time making sure that I'm finding the things that I need to find, and if I don't find these things and I get stuck then…now I'm running out of time…That's where a lot of my frustration comes from because if I can't find it when I need to find it I'm extra pissed. I'm not even mad anymore I'm seething and…I'll just try something else (P3).

Another major barrier was Not Knowing (1.3.2), which described situations where a participant acknowledged that their lack of knowledge prevented them from finding information. Not Finding was more often coded than Not Knowing (all focus group interviews and N = 7, 47% of individual interviews versus N = 2 focus group interviews

and N = 11, 73% of individual interviews). Both Not Finding and Not Knowing were coded with similar frequencies over different demographic factors.

Participants described Not Knowing as being due to the Specificity (1.3.1.1) of the information that they were seeking. The Specificity code was applied to situations where the participant acknowledged that the information that they sought was esoteric, rare, old, or otherwise difficult to seek/access. These qualities were illustrated by the following quotation:

> Well it was old, so that's an important part of why it was hard to find. It's not a particularly popular article, nor is it a particularly popular journal, so it was very quickly reaching the adjective esoteric…I think the fact that it was old was the most important thing, particularly because it looked…when I got the article that somebody had physically gone to a hard copy and scanned in this article so it may not have ever been digitized before. I may be the first person in the history of the Internet to ask for this article to be digitized (P24).

The participants framed Specificity as either surrounding the Topic they were searching for or trying to access, or due to the way that their Field structured information. The Topic sub-theme was applied to situations where the participant was frustrated by a specific research topic. In one case, a participant explained that "for certain topics…if they're not in the research literature then I'll start on a regular search engine first and then go from there to try to find the terms that might be related" (P1). The Field sub-theme was applied to situations where the participant expressed frustration about the research in their discipline, often because of the terms that scholars used in their work. Participant 7 stated that:

> Part of my frustration sometimes just in Communication as itself is that everybody makes up their own names...So like, "We're all talking about the same thing, but you decided that you was going to coin this phrase that nobody else knows but you, so now all those articles are under this coined phrase and it took me eight days to find it (P7).

Field Specificity could also apply to the types of resources used in a field. For instance, Participant 4 explained that "there are people in my discipline who read books, but that doesn't serve me particularly well, partially because I work in a really small field and there aren't that many books about what I do." Participants were more likely to identify Topic related Barriers (N = 2 focus group interviews and N = 12, 80% of individual interviews) than Field related ones (N = 1 focus group interview and N = 8, 53% of individual interviews). There did not seem to be any differences between participant responses based on demographic factors.

Library Policies (1.3.2.1), which were defined as rules or practices created, followed, and enforced by an academic library, also presented significant Barriers to participant IE. Some policies were more general, such not being allowed to write in library books (P14), but there were four sub-themes of Library Policy that were especially significant barriers to IE. One was the Embargo, which referred to instances when the library did not have access to recent content within a certain timeframe. Participant 16 described this as "a moratorium, like when articles just come out and the library doesn't have access to them." Participants also stated that even when their frustration was more with the academic publishing procedure than the library, this frustration could become "a projection of the library" (P1). This was the most commonly cited sub-theme of Library Policy in the focus groups (coded N = 10 in N = 2 focus group interviews and N = 10), but it was not coded in any of the individual interviews. Demographic factors did not seem to affect whether a participant response was coded with the Embargo Barrier.

Participants were also hindered by Request Limits, which referred to times when the library could only request a certain number of items through interlibrary loan (ILL). One participant recounted a time when she "tried to request it via the interlibrary loan and then [she] got an email saying that…[the library] had already exceeded [their] limit for requesting articles" (P2) so they not fill her request. This was the least often coded Library Policy sub-theme (N = 2 focus group interviews, N = 1, 7% of individual interviews). Only participants who were female said that the Request Limit was a Barrier.

While Embargoes and Request Limits hindered participant IE, Library Policies that could cause them to have to pay money or relinquish access to information made them more emotionally distraught. Another ILL related Barrier was the ILL Fee, which were library charges to users to cover the shipping or licensing of ILL materials. One participant explained:

> One time I really needed this book chapter, [and] the library didn't have the book. I requested it through ILL, and then they got back to me…and I never had this happen before. It's not even a very big book, but they came back to me and said that they [could] get this from another library, but [I'd] have to pay $20 or something, and they'll pay a certain amount of money…I just said, 'Forget it, I'm not doing that,' and it was at [a nearby institution] so I got somebody to check it out from there and give it to me (P19).

In response to Participant 19's statement above, Participant 16 explained that "it's not that it's just twenty bucks, it's the principle. Why should you have to pay for it?" The ILL Fee was coded more often in the focus group interview data than the individual interview data (N = 6, 40%).

In a similar fashion to the ILL Fee, the library Recall policy, which required the participant to return an item earlier if another user requested it, also upset participants. When describing his frustration with the Recall policy, one participant stated, "I was

"was very upset about the recall process. Because when you're collecting stuff you want that stuff definitely, because I am selfish, I'm doing my research I want it, I need it, ain't none of your business how long I need it" (P14). The recall policy was such a Barrier to continuing access to information that some participants were even willing to pay money to the library in order to hold onto useful resources. One participant admitted that she was willing to pay the library a lost item fee in order to ensure permanent access to materials that she needed for her dissertation. As she recounted:

> There was a book written by [name] and she wrote about widow narratives and she is a key in my dissertation process. And [every]…3 months, I can renew [the book], but if somebody's requesting it, I always feel a little weird about giving up the gem that's gonna make my process easier and the book isn't available any longer for me to find online to buy (P32).

Participants also calculated the benefit of buying versus returning the item. Participant 23 stated that "it's cheaper to pay the library sometimes…for overdraft charges or for their copy of the book than for me to pay for a book from 1960 where there's only three copies and they're going for 170 dollars" (P32). Another participant, after explaining his anger at the Recall policy said, "if it's a book that I need to be on my bookshelf because it's key, or if it's only a few bucks, I'll just buy it" (P14). The individual interview data had the Recall code more often than the focus group interview data (N = 8, 53% and N = 1 respectively). Demographic factors did not seem to impact whether a participant response was coded with ILL Fee or Recall as a Barrier.

There were three participant identified barriers that did not seem to critically hinder IE. The Cost (1.3.3) of items was a barrier where information was expensive to find and/or access (example: "They're very expensive" (P14). While Cost was a barrier (N = 11 times identified in all focus group interviews and N = 5, 33% of individual

interviews), individual students seemed to differ on how it affected them, which was

often explained in terms of what they would be willing to pay for an item. Participants in

their Coursework, QualComp Exam, and Dissertation stages were less likely to mention

Cost as a Barrier. Other demographic factors did not seem to affect the presence of this

code in participant responses. The Timeliness (1.3.5) barrier applied to all time related

barriers, such as one instance where one participant said that, "Because of time, I've

decided this is not important anymore" (P17). While Timeliness could be perceived as a

critical barrier, it was coded infrequently (N = 2 focus group interviews and N = 1, 7% of

individual interviews). The low number of responses coded with Timeliness of a Barrier

indicated that this was not a Barrier whose presence, or lack thereof, significantly

affected participants.

One Barrier that was not coded frequently, but for some participants could

critically hinder their IE, was Distance (1.3.4) (N = 4 times identified in N = 2 focus

group interviews and N = 4, 27% of individual interviews). As one student explained,

"I'm always off campus, so I have to login through the firewall, and that process is too

much for me" (P19). Distance seemed to affect students that were in the dissertation

writing phases of their program, even if they had used the physical library and its

resources in the past. One participant explained that:

> I don't spend a lot of time in the library website or what-have-you because I live
> one hour away now and I'm doing all sorts of family-partner stuff and
> researching. Walking in isn't so…easy anymore [due to the distance], that's a
> hurdle for me. So I go to the website when I have a gap or I have a specific paper
> I'm looking for, and I always tick that box, the 'If you have the PDF,' because if
> you don't have the PDF my thinking is, 'Well that doesn't really help me,' right?
> (P15).

Distance could mean that the participant was physically far from campus, or they

perceived that they were too far to access library resources. Aside from their stage in the

program, other demographic factors did not seem to affect their perceptions of Distance.

Because Distance could hinder student IE, a question about how far a participant lived

from their institution's campus was added to the Phase 3 survey.

Distance student? (N = 123)	Yes	No
*Phase 1	n/a	n/a
*Phase 2	n/a	n/a
Phase 3	13 (11%)	110 (89%)

Table 17: Participants' responses to "I live more than an hour away from where the
school I am getting my degree at is located"
*Data not collected for Phase 3.

As reported in Table 17, above, a majority (89%, N = 110) of the participants in

Phase 3 lived within an hour from the campus where they were getting their doctoral

degree. Based on the results from each phase, few students lived either an hour away

from campus, or stated that they lived far enough from campus for it to hinder their IE.

Consequently, distance was identified as a barrier in this study, but not a critical one.

Summary of RQ 1 results

A common theme among the qualitative findings for RQ1 was that the critical

factors of IE were tied to individual rather than task or institution factors. Tasks were

factors in IE because participants did look for information for that fit into certain doctoral

program related assignments, such as looking for articles for their qualifying exams.

However, participants were more likely to relate critical incidents where they found

information for these tasks where they often sought to situate their work more generally.

Then these results were applied to a program related task rather than starting with a specific task in mind.

In regards to institutional factors that affect IE, participants at the same institution, with the same resources and services available, had different ways of perceiving and using them. The ability to legally or illicitly access other institution's resources and services also supported measuring individual rather than institutional factors of engagement. Barriers were difficult to describe in terms of task or institution related factors. Not finding information and not knowing how to access it hindered participants, but the specifics varied from individual to individual even if they were working on the same task type or at the same institution. Even the library policies that were critical factors for some participants were not necessarily critical barriers for students at the same institution. The next RQ findings also look at the individual factors that differentiate different IE types of social science doctoral students in the United States.

Results for Research Question 2 (RQ 2): What IE types exist for doctoral students?

The major results for RQ 2 follow in the bulleted list below, and Table 18, which follows afterwards, outlines the major qualitative themes identified from Phases 1 and 2.

- The qualitative results of the Phase 1 focus group interviews and Phase 2 individual interviews identified:
  - knowledge and personality related *Factors* (2.1) that could possibly differentiate between participant IE. Participants were highly likely to start searches on topics that they were unfamiliar with on Google Scholar or the references of an item with which they were familiar.
  - program stages and information searches where participants reported a *Change in Behavior* (2.2). The coursework stage and pre-qualifying exam stage were the program stages where participants reported the most change in their information seeking.
- Participant perceptions of information, IE, and institutional resources were further defined by the survey participants in Phase 3, with the following quantitative results:

- Participants responses to personality, confidence, and interest in library instruction could also be added together into an indices. However, index scores were not predictive of other index scores, except:
  - Confidence index scores could predict interest index scores for participants in the post-qualifying exam stage of their program.
  - Personality index and confidence index scores could separately predict interest index scores for participants who lived more than an hour from the institution where they were getting their degree.
- Participants could be clustered into groups based on personality ($N = 2$ clusters), confidence ($N = 2$ clusters), and interest in library instruction ($N = 3$ clusters). However, membership in these clusters could not strongly predict membership in other clusters, even when controlling for demographic variables or creating stronger clusters with participants whose responses were more similar than average.

The findings from RQ 1 identified critical factors that could affect participant IE. The findings from this RQ group Phase 3 participants based on the qualitative findings of Phases 1 and 2. These groups are based on participants' levels of agreement to IE related statements about information, searching for information, and their institutional resources.

Themes related to information engagement type

*RQ2 Themes	Focus groups		Individual interviews	
	Group count	Times coded	Participant count	Times coded
• Factors				
o Prior knowledge	3	9	15	55
o Tenacity	3	16	11	24
o Certainty	1	12	8	13
o Satisficing	3	8	5	8
o Hoarding	2	6	4	8
• Change in behavior	3	13	12	24

Table 18: RQ2 qualitative themes identified in Phase 1 and 2
* Please see *Interpreting thematic coding tables* on page 83 for how to interpret Table 18.

2.1 Factors and 2.2 Change in Behavior

The qualitative themes, identified in Table 18, above, investigate times when participants deviated from their normal IE behavior when engaging with information and

what Factors (2.1) could potentially differentiate participants. IE behavior includes any

actions that participants took when finding, filtering, accessing, or storing information.

Change in Behavior (2.2) was defined as anything that necessitated a temporary or

permanent change in information related behavior, such as Participant 4's comment that

"I would say that when I did my comps my searching strategy was vastly different."

Change in Behavior was identified as an important theme because participants tended to

engage with familiar information sources in familiar ways, unless they hit a barrier,

which was a set of themes included in the results of RQ 1. Change in Behavior was coded

13 times in all of the focus group interviews and 24 times in 12 (80% of $N = 15$) of the

individual interviews. Because so many participants described a change in their behavior,

demographic factors did not seem to affect this theme.

Despite the lack of qualitative difference among participants with different

demographic factors, the responses coded Change in Behavior indicated that participants

IE might change during certain stages of their doctoral program. To test this finding,

Phase 3 survey included a question about how they felt their information searching habits

changed at different parts of their program. The following three tables (Table 19, Table

20, and Table 21) report the participant perceptions of change in their information

searching habits in different doctoral program phases on a 7-point Likert scale ranging

from 7 being Very much and 1 being Very little. Responses from participants in the same

stage appear in the same table because it was unlikely for participants in an earlier stage

to report changes due to a later stage, but this was not always the case. Some participants

did not respond to the question, and the n values in the last column in the tables indicate

the number of participants who answered for this stage and the percentage of the total

number of participants in the stage that this number represents.

Searching habit change – Stage 1 (N = 60)	Mean	Standard deviation	n of responses
Before starting	2.91	1.98	57 (95%)
During coursework	4.16	1.85	58 (97%)
While preparing for my qualifying/comprehensive exams	4.46	1.70	26 (43%)
While preparing my proposal/prospectus	4.94	1.91	16 (27%)
While writing my dissertation	5.11	2.09	9 (15%)

Table 19: Stage 1 participants' responses to "In the following stages of my doctoral program, I would say that my habits searching for research-related information changed"

Participants in Stage 1, according to Table 19, above, had not yet passed their

qualifying/comprehensive exams, which is why a majority of them could not comment on

how much their IE related to searching changed from the qualifying/comprehensive exam

stage and beyond. However, on average they did report that their habits changed more

during coursework and while preparing for their exams than before starting their

program. The standard deviation for each mean was fairly large, which indicated that

participant responses varied quite a bit. An unexpected finding was that participants (N =

27, 45% of Stage 1 participants) reported how their searching habits changed in later

stages of their program. This finding possibly reinforces the RQ 1 finding that

participants situate their work without necessarily having a certain task in mind, but they

do apply it to certain program related tasks when they find it.

Searching habit change – Stage 2 (N = 35)	Mean	Standard deviation	n of responses
Before starting	3.22	2.27	32 (91%)
During coursework	3.91	1.67	35 (100%)
While preparing for my qualifying/comprehensive exams	3.80	2.00	35 (100%)
While preparing my proposal/prospectus	3.64	2.23	28 (80%)
While writing my dissertation	3.53	2.27	17

Table 20: Stage 2 participants' responses to "In the following stages of my doctoral program, I would say that my habits searching for research-related information changed"

Participants in Stage 2, whose results are reported in Table 20, above, had passed

their qualifying/comprehensive exams. The greatest amount of change was reported

during coursework and while preparing for their exams. They reported a greater change

in their searching habits than the previous group. Similar to the participants in Stage 1,

the standard deviations were nearly two, which means that participant responses varied

greatly. Nearly half (N = 17, 49% of Stage 2 participants) reported how much their

information searching habits changed in later stages of their doctoral program.

Searching habit change – Stage 3 (N = 27)	Mean	Standard deviation	n of responses
Before starting	3.16	2.27	25 (93%)
During coursework	4.70	1.92	27 (100%)
While preparing for my qualifying/comprehensive exams	5.15	1.69	26 (96%)
While preparing my proposal/prospectus	4.52	1.87	25 (93%)
While writing my dissertation	4.28	1.99	25 (93%)

Table 21: Stage 3 participants' responses to "In the following stages of my doctoral program, I would say that my habits searching for research-related information changed"

Participants in Stage 3, whose results are reported in Table 21, above, had passed

their proposal/prospectus and were writing their dissertations. Like the previous group,

they felt that their searching habits had changed the most during coursework and while

preparing for their qualifying/comprehensive exams. The standard deviation for each

mean was still approximately two points, which means that even in this final stage of

their studies, the participant responses varied greatly. Taken together, the responses from Tables 18, 19, and 20 suggest that participants did feel that their searching habits changed a little, but as a whole not very much. A more detailed analysis of this finding and the implications for how this might affect RQ 4, which asks how libraries can increase IE, are discussed in the next chapter.

In addition to providing insight as to when and to what extent participants felt that their information searching changed, the participant responses coded as changes in behavior also identified why participants changed their behavior. The factors that caused participant searching behavior to change included a variety of challenges that the participant perceived. Participants in the Phase 3 survey were asked to indicate how strongly they felt challenged by these factors, and their responses were included in the confidence variables discussed in the next section.

The findings from the Change in Behavior theme suggested that participants did not change searching, and potentially other IE behaviors as well. Participant responses in the focus group and individual interviews suggested five factors that caused differences in how participants searched for, filtered, and stored information. Other LIS scholars had previously identified two of these themes. Khosrowjerdi and Iranshahi (2011) defined the participant's prior knowledge as covering how often one used a resource, when one knew of a resource, and when one had used a particular resource in the past. In this study, the prior knowledge code was applied to statements where participants explicitly discussed knowing of or having used a particular resource more than once. Participant 22 described her Prior Knowledge as follows:

> I'll go into specific databases EBSCOhost, Comm Mass Media Complete, you know, MUSE, if I'm looking for something rhetorical sometimes I'll go to

specific journals, but I'm a 4th year doctoral student and I didn't always do that and I learned the hard way that it's really best to go to specific journals (P22).

Prior Knowledge was the most frequently coded theme in this category in the individual interviews (55 times coded in 15, 100% of individual interviews), and it was coded in all focus group interviews. Demographic factors did not seem to affect the presence or frequency of this code in participant responses, which is odd because the participants in the last stage of their programs should have accumulated more Prior Knowledge than participants in earlier stages of their program. However, this finding once again emphasizes that the participants were constantly looking for different types of information on different topics, so despite amassing Prior Knowledge on certain topics, they still ran into the same IE Barriers.

Satisficing, the other previously identified code, refers to the degree to which a person will accept alternatives to a known resource that they cannot find and/or access (Simon, 1955). As Participant 9 succinctly put it, "Yeah, I'll substitute." In this study, the degree to which a student satisficed was a factor in their IE. Satisficing was coded in all focus groups, but only five (33%) of the individual interviews. Only one male participant in the individual interviews Satisficed, and participants in the Dissertation stage were more likely than the other stages to Satisfice. Other than these differences, demographic factors did not seem to affect whether this code was applied to participant responses.

This study identified three factors that differentiated IE types among the participants. The first, was the participant's Tenacity, which was the degree to which a participant would pursue a known item. Participant 6 had a high degree of Tenacity because as he put it, "nothing stops me per se, I mean, if it's out there I'll find it." Tenacity was not limited to searching, as participant explained that she "would really

want to do most of the stuff [herself], but sometimes [she would] spend an hour or two hours trying to do something" (P16), even though she realized that this was often not the most efficient approach. Tenacity was the most often coded factor (N = 16 times) in all of the focus group interviews and the second most often coded factor in the individual interviews (24 times in N = 11, 73%). Responses coded with the Tenacity theme seemed to be in opposition to statements coded with the Satisficing theme. However, a participant's level of Tenacity was often dependent on the situation at hand. One participant, who was talking about a critical incident when her search for information was unsuccessful, concluded by saying:

> Maybe I didn't have the stubbornness to continue trying to find the article elsewhere… [but sometimes] you'll put in the request and…you don't immediately hear back. So by then I'm already working on other things, and so when I get that email I'm like, 'Aw man,' but then…unless…everything I needed to know depended on that article, I'm not gonna continue pursuing it. So I'll just…be like, 'OK, I need to find this information somewhere else,' and…I'll just find other articles. It's really hard to depend on one article…So…it wasn't the end of the world (P33).

The variability in the searching incidents described made it difficult to discern if Tenacity actually affected IE. Participant descriptions of their Tenacity did not seem to be affected by different demographic factors.

The second factor identified in this study, which was also related to finding information, was the participant's Certainty, which was defined as the degree to which a student felt comfortable in their subject area, was more often than not a desired state that participants aimed to achieve via their information seeking. For instance, Participant 8 explained that "I feel that I should first try to know everything that's out there." Certainty was only coded in eight (N = 53%) of the individual interviews, but in only one focus

group. The Certainty theme is conceptually related to Prior Knowledge, and likewise did not seem to be affected by demographic factors.

With regard to storing information, some participants also reported high degrees of Hoarding, which was the degree to which a student would collect items, even if they admitted that they did not always read what they had collected. One participant admitted that "I pick up an awful lot of books from [home institution] library that I don't end up opening, and I don't know, I guess it's good that I at least have them" (P17). The Hoarding theme was the most rarely coded (N = 6 in 2 focus group interviews and N = 8 in 4, 27% of individual interviews), and participants in the Coursework or QualComp Exam stage were less likely to have this code applied to their responses. No other demographic factors seemed to affect Hoarding, and because it did not relate to finding information there were no questions about it in the Phase 3 survey.

Dependent variables (DVs) and other results for IE type and change in IE

The quantitative results of the Phase 3 survey operationalized the qualitative themes identified in the study's earlier phases. Participants were asked what they normally do when engaging with information, what they had done in certain situations, what they would do in hypothetical situations, and what their preferences for certain information sources were. Participant responses to IE questions came from statements to which participants indicated their level of agreement on a 7-point Likert scale, multiple responses for various behaviors, and open ended questions about value. The 7-point Likert scale responses were used to differentiate between different IE types via cluster

analyses or additive indices. These clusters and indices were independent variables (IVs)

that were then used to predict various behaviors as dependent variables (DVs).

Descriptive statistics were generated in cases in which participants were most

likely to search for information when they were unfamiliar with a topic, and the results

are reported in Table 22, below. Some participants chose the "Prefer not to answer"

option or did not respond to the question, and the n values for each resource are in the last

column in the table.

Resource preferences (N = 123)	Mean	Standard deviation	Prefer not to answer or no response
Google Scholar	6.21	1.29	0
The references from an item that I am familiar with	6.12	1.03	1
A specific database/journal for that area	5.98	1.36	0
Google or another search engine	5.12	1.81	0
Someone who specializes in that area, even if I do not know them personally	4.02	1.71	0
Someone that I know, even if it is not their specialty	3.72	1.97	0
The library catalog to find a book in that area	3.67	2.14	0

Table 22: Participants' responses to "When I start a search on a research-related topic that I am unfamiliar with, I likely will consult the following people or resources as follows" (with 7 being highly likely and 1 being highly unlikely)

When looking for information on a research-related topic that they were not

familiar with, participants were most likely to start with Google Scholar, as indicated by

the high mean value for the respondents' rankings of this resource. They also preferred

starting with a familiar resource and looking at the references cited within. They were

also more willing than not (based on a score of 4 or more) to look at a specific

database/journal for that area, using a search engine, and speaking with someone who

specializes in the topic area, even if they do not know them. Participants were less likely

to ask someone they knew, and ranked the library catalog as the resource they were least

likely to consult. The standard deviations for Google or another search engine, another

person (known or specializing in the area), and the library catalog had standard deviations

of around 2, which means that although the averages for these resources were lower, they

varied more than the averages for the other resources. Overall these finding were not

surprising for this population, and similar findings from other studies are discussed in

Chapter 5.

In addition to asking how much participants preferred each resource, this survey

also asked participants to indicate the resource that they were most likely to consult when

starting a search on a topic that they were unfamiliar with, and the results are listed in

Table 23, below. Some participants chose the "Prefer not to answer" option or did not

respond to the question, and the n values for each resource are in the last column in the

table.

Resource most likely to consult (N = 123)	N = Participants who selected resource	% of total
Google Scholar	55	44.72
A specific database/journal for that area	28	22.76
The references from an item that I am familiar with	23	18.70
Google or another search engine	8	6.50
Someone who specializes in that area, even if I do not know them personally	5	4.07
Someone that I know, even if it is not their specialty	2	1.63
The library catalog to find a book in that area	1	0.81
No response	1	0.81

Table 23: Participants' responses to "When I start a search on a research-related topic that I am unfamiliar with, I am most likely to consult"

When asked to choose which source they were most likely to start with for an

unfamiliar topic, nearly half of the participants chose Google Scholar. Although

participants rated the references from an item that they were familiar with higher overall

than in the previous question, in this question the next most likely resource was a specific database/journal for that area. As in the previous question, a person that the participant knew and the library catalog to find a book in the topic area were the least likely resources that participants chose.

The results from this question were split into a dichotomous variable. This variable, GSE, labeled any participant who preferred Google Scholar or a search engine as a 0, and any participant who preferred another source as a 1. Splitting the results into another set of dichotomous variables was also considered. In this second variable, PS, any participant who was most likely to ask a person was labeled as a 0, and any participant who preferred to consult a non-person resource as a 1. However, because only seven (6% of N = 123) participants responded that they were most likely to ask a person, this second variable was not used as a DV.

Independent variables (IVs) and other results for IE type and change in IE

The IVs came from Likert scale responses to three question variable types: personality, confidence, and interest. These variables were aggregated via cluster analysis and into an additive index, which summed the responses into a single scale. These IVs were then used to predict the DVs described in the section above, with the interest IV also being used as a DV in some analyses. The results of these analyses follow in the next sub-sections.

The first variable was personality, and it came from data that suggested that some participants were more open to asking people for help then others. One participant stated that:

I'm actually not on site at the university where I am getting my PhD, so I'm living in a different state and working at a different institution than my PhD institution…[I] do feel kind of stuck between two worlds because on one side…I just started as an assistant professor at this community college and…I don't know how long I'll be there…But also, I'm not on site at the [institution] to walk in and see a librarian and maybe this just speaks to my age…I don't wanna ask random people to do stuff for me if I can't look at them in the eye (P29).

This participant was not the only one to say that due to her distance, but perhaps more importantly, her preference to not ask people for help if she could not see them, prevented her from reaching out to a librarian. Another participant stated that:

I haven't talked to a librarian about that particular topic, you know, about those method topics…Part of the reason I suppose might be that I'm writing my dissertation from Chicago while my PhD university is in Detroit, 5 hours away, so that may be one reason. But also when I was there I really didn't talk to librarians directly very often (P31).

Although the students had moved away from where they were getting their degree, it seems that Participant 29's preference for asking for help might have been affected by distance, but not Participant 31's. This suggests that openness to asking questions could be one way to differentiate between participants.

Openness could also apply to being open to altering searching behavior. Almost all 15 participants followed a "normal routine" (P31) similar to the one described below:

What I'll typically do is…I'll [brainstorm]…all the ways of studying [the topic] and that'll kind of give me an idea of where I need to narrow or focus or some keyword that I need to use. And then I'll go into Comm & Mass Media Complete, or even Comm Abstracts, and I'll…go through multiple databases to see what does each of them return. And then if that still isn't getting me very much that, well at that point I can usually snowball a little bit…Like I'll find one or two articles, I'll read those, I'll check the references and then…that will tell me which journals people have been talking about this in. But if I've done that…and I really haven't found anything that I think is the thing I'm looking for, then I would contact my professor…or someone in the field cuz I'm out of coursework now. But I would contact someone who specializes in that and say, you know, 'I'm looking for such and such I can't find it, which journal should I look in?' …But usually I get by just, you know, looking through the databases and snowballing with articles (P22).

However, sometimes participants ran into certain challenges. One challenging situation

was when a search returned too many results. As one participant related:

> The advantage of Summon is that you can...put in a term and then you get
> hundreds of thousands of results and then from there you can narrow it by date, by
> topic. So if I wanted Communication related articles or I only wanted articles in
> journals or newspapers, I can narrow it there. So it's a good way to get to sort of
> cast a very wide net. The difficulty with that is…if you don't know what you're
> looking for then casting that wide net gives you so many results that sometimes it
> can be overwhelming (P23).

Some participants were fine looking through several pages of results, like the participant

who was willing to sift through "five hundred to a thousand search hits to see, to find

things that…were pretty close to the area that [he] was trying to discover" (P25). On the

other hand, many participants were overwhelmed by the deluge of information that they

encountered in a search, or just the knowledge that there was so much information

available. One participant who was writing her dissertation described:

> Billions of articles…We swim in articles, there's so many articles, none of them
> seems important…there are just so many and so few that actually do something
> big or important…I know when I'm searching that there's stuff I'm missing, but I
> don't care because I can't possibly cover it all, right? I mean for my master's
> thesis there was so little that I actually did cover it all and that's the kind of thing
> that I like to work on but in course work that's usually not the kind of thing I
> could work on and for my dissertation it's not either. My dissertation is, it's
> narrow but it covers a ton of fields that all have their own really in depth, many,
> you know, hundreds of years of research on what I'm studying so, so I guess I just
> feel…if I miss something, big deal. I mean I can't possibly hit it all you know and
> how would I know if it's the best thing, what is the best thing? It depends on the
> angle you're taking (P22).

Whether participants felt overwhelmed by the number of resources returned seemed to

identify a useful facets of the participants' personalities. This factor was combined with

the whether the participant was willing to ask another person for help. Together, these

formed the personality factor, which hypothesized that the degree to which participants

were open to asking for help/clarification; not unhappy if they retrieved a lot of information, even if it was unexpected; and would consider changing their research based on what they found would affect their behavior. Participant personality was also hypothesized to be related to participant confidence and interest in library instruction. Phase 3 survey questions related to the personality factor are listed in Table 24, below. Responses marked with an * in Table 24 indicate responses that were reversed scaled because agreement with them indicated that the person was less open to asking for help/clarification; unhappy when they retrieved too much information; and would not consider changing their research based on what they found.

Personality variable statements (N = 123)	Code	Mean	Standard deviation	Prefer not to answer or no response
*I tend to stick to a routine when searching for research-related information	**Rout	5.79	1.29	0
If I were unable to access a particular article/study, I would feel comfortable asking someone for a copy	askCopy	5.78	1.54	0
If I had a question about a particular article/study, I would feel comfortable asking someone for clarification	askClar	5.69	1.48	0
I use Google Scholar because it casts the widest net	GSNet	5.11	1.82	2
*I would only ask someone for help finding or accessing information if I had exhausted all other options	askExh	5.11	1.91	0
I wouldn't mind changing a topic of research for a certain project based on what I found in a search	chgTop	4.98	1.50	2
*In the past, I have not asked for research help because there wasn't enough time	pstTime	4.94	1.77	7
*I only search until I find what I need	onlyNeed	4.19	1.54	2
*In the past, I have not asked for research help because I didn't want to bother anyone	pstNotBot	4.08	2.05	11
*In the past, I have not asked for research help because I didn't want to seem incompetent	pstIncomp	4.07	2.07	8
*If the library can't get it, I won't pursue it further, even if it seems incredibly useful	notPurs	3.71	2.05	1

Table 24: Personality variable responses ranked by mean response where 7 means completely agree and 1 means highly disagree
*Reverse scaled in clusters and additive indices, but actual responses are reported in this table
**Variable code names are used in body of text below

Table 24, above, ranks participant responses to the personality variable statements

by mean value descending. The three responses with the lowest mean values had the

largest standard deviations, which indicates that although on the average participants did

not agree with them the majority of the responses were actually spread out about two points above and below the mean. On a 7-point scale, this is a large amount of variance. Some participants chose the "Prefer not to answer" option or did not respond to the question, and the n values for each question are in the last column in the table. These questions operationalized the qualitative findings on the tenacity, satisficing, and certainty themes (see Appendix G for definitions and examples).

The participant responses in Table 24 indicate that participants were most likely to report sticking to a routine when searching (Rout, see Table 24 for corresponding question and for the data labels that follow) than any other statement. When searching for information, most participants strongly agreed that they used Google Scholar because it cast the widest net (GSNet), and on average disagreed that they only searched until they had found what they needed (onlyNeed). Based on what they found, more agreed that they would not mind changing their topic (chgTop) than disagreed.

With regard to accessing resources, participants were more willing than not to tenaciously pursue them, either by asking for a copy (askCopy) or for clarification (askClar) about them, than not. In fact, participants were most likely to disagree that they would not pursue a resource, even if the library could not get it, if it seemed incredibly useful (notPurs). However, they were more likely to agree that they would try and exhaust all of their options before asking for help (askExh) than not. When thinking of their past actions, they reported not being deterred from asking due to time constraints (pstTime), not wanting to bother anyone (pstNotBot), or seeming incompetent (pstIncomp). These variables related to finding and accessing information were clustered or added together into an index which were used as IVs in later analyses. The next set of

variables focused more on how participants felt when finding information rather than what they would do when finding or accessing it.

In a similar process to the personality question responses, the responses to questions that indicated participant confidence were grouped together and reported in Table 25, below.

Confidence variable statements (N = 123)	Code	Mean	Standard deviation	Prefer not to answer or no response
I am confident in my ability to find something GOOD ENOUGH for what I need	confGood	6.28	0.97	0
*It can be a challenge looking for information on an esoteric topic or other topic where there is not much information available	chlEso	5.71	1.14	4
*It can be a challenge having to find everything I need to know about a topic	chlEvery	5.66	1.48	1
*It can be a challenge not being to access what I need to when I need it	chlAccess	5.30	1.75	1
*It can be a challenge looking for information in older texts/research	chlOld	5.25	1.46	3
*It can be a challenge deciding what is important or will be important in my field in the near future	chlDecImp	5.24	1.45	0
*It can be a challenge looking for information that is not in scholarly resources	chlNonsch	5.00	1.64	10
I am confident in my ability to find EXACTLY what I need	confExact	4.93	1.26	1
*I frequently feel overwhelmed about the amount of information that is available	Overwh	4.86	1.72	0
*It can be a challenge knowing the correct words used by scholars in my field to define my ideas	chlTerm	4.66	1.72	0
*It can be a challenge having to switch between searching for newer research (to stay relevant in my field) and older research (to see where an area of research began), or vice versa	chlNewOld	4.56	1.68	3
*I feel that I am expected to know more than I actually do about searching for information	exptKnow	4.39	1.74	1

Table 25: Confidence variable responses ranked by mean response where 7 means completely agree and 1 means highly disagree
*Reverse scaled in clusters and additive indices, but actual responses are reported in this table

Table 25, above, ranks participant responses to the confidence variable statements by mean value descending. In their responses to this question, the participant responses had a small standard deviation for the question that asked if they felt confident in their ability to find information that was good enough. The high mean value and small standard deviation indicates that overall the participants had high confidence in their ability to find information that was good enough. Some participants chose the "Prefer not to answer" option or did not respond to the question, and the n values for each question are in the last column in the table. These questions operationalized the qualitative findings on the Certainty and Change in Behavior themes (see Appendix G for definitions and examples). These responses identified certain facets of the participants' confidence levels. They hypothesized that the degree to which participants were confident in finding information and felt less challenged by the obstacles identified in the Change in Behavior theme would cause participants to behave differently from participants who were less confident and felt more challenged. Participant confidence was also hypothesized to be affected by participant personality and to affect participant interest in library instruction. Responses marked with an asterisk (*) in Table 25 indicate responses that were reversed scaled because agreement with them indicated that the person felt less confident and more challenged by various obstacles to finding information.

Overall, participants were very confident in their ability to find something good enough for what they needed (confGood), but less confident in finding exactly what they needed (confExact). On a similar note, they were on average unlikely to feel overwhelmed about the amount of information available (Overwh) or that they were

expected to know more than they actually did about searching for information

(exptKnow).

The average response values for the statements that dealt with various challenges

in finding information were all greater than 4, which is the mid-point on the 7-point

Likert scale. This indicates that participants were more likely feel challenged when

finding information, due to the reasons above, than not. These variables were clustered

and added into indices, which were then analyzed as DVs or used as IVs.

Interest variable statements (N = 123)	Code	Mean	Standard deviation	Prefer not to answer or no response
*I would prefer to have face-to-face research help when I need it rather than a mandatory session on searching for research-related information	prefF2f	4.73	2.03	4
I think it would be helpful to require other students in my program to attend a research related workshop that includes library resources and services	helpIncl	4.08	1.84	0
I think it would be helpful to require other students in my program to attend a research related workshop that ONLY includes library resources and services	helpOnly	3.14	1.63	2

Table 26: Interest variable responses ranked by mean response where 7 means completely agree and 1 means highly disagree
*Reverse scaled in clusters and additive indices, but actual responses are reported in this table

Table 26, above, ranks participant responses to the interest in library instruction

variable statements by mean value descending. The relatively lower mean values for the

interest variables and high standard deviations, compared to those of the personality and

confidence variables, suggest that there was a larger degree of variance in the majority of

participant responses. Some participants chose the "Prefer not to answer" option or did

not respond to the question, and the n values for each question are in the last column in the table. These questions operationalized the qualitative findings on the instruction theme (see Appendix G for definitions and examples). These responses identified certain facets of participants' preference for library instruction over face-to-face research help when needed and whether they thought it would be helpful for other students in their program. They hypothesized that the degree to which participants were interested in library instruction would affect behavior. It was also hypothesized that participant interest in library instruction was affected by participant personality, confidence, or both. The responses marked with an asterisk (*) in Table 26 indicate responses that were reversed scaled because agreement with them indicated that the person was less interested in library instruction.

As reported in Table 26, above, students were slightly more likely to prefer face-to-face (prefF2F) research help when they needed it rather than a mandatory session. Participants were more likely to agree that other students in their program would find a research related workshop that included library resources and service as more helpful (helpIncl) than one that only included library resources and services (helpOnly). However, given that the mean response to the former was barely above the 4.00 midpoint on the scale, overall it did not seem that participants thought such a workshop would be very helpful. These variables were added into separate indices and clustered separately.

Additive indices

The three types of variables identified above, which included personality, confidence, and interest variables, were summed into additive indices. This was done by

adding up participants' Likert scale response values for each variable type. The results

are summarized in the table below (Table 27).

Index (participant N = 123)	Minimum Value	Maximum Value	Mean Value	Standard Deviation
Personality Index (pInd)	26/77	71/77	44.63	8.51
Confidence Index (cInd)	20/84	69/84	40.02	10.08
Interest Index (iInd)	2/21	21/21	10.33	3.90

Table 27: Index summary

The results in Table 27, above, indicate that the mean values for each variable were

approximately half of the total possible values for each index. The standard deviations

were somewhat low, which means that responses did not vary much from participant to

participant, unlike what might be suggested by the minimum and maximum values for

each index.

The additive indices were used to predict interest index values (iInd). The

combinations tested are listed in Table 28 below, and as reported there, no models were

significant.

Independent variable(s)	Dependent variable	Method	Was model significant?
pInd	iInd	SLR	No
cInd	iInd	SLR	No
pInd & cInd	iInd	MLR	No

Table 28: Linear regression prediction summary

Although participant scores on one index were not found to be related to their

scores on another index, further analysis indicated that they could be predictive when

controlling for certain demographic variables, specifically participants' stage in program

and distance from campus.

While there was no linear relationship between a participant's confidence index score or their interest index score when looking at all 123 Phase 3 participants, there were a few significant relationships between the index scores for certain sub-groups of participants. Simple linear regression reported that confidence index score ($M = 40.81$, $SD = 10.03$) significantly predicted interest index score ($M = 11.78$, $SD = 3.46$), $F(1, 25) = 9.67$, $p < .01$, adjusted $R^2 = .25$. According to Cohen (1988), this is a large effect size. When the confidence index score increases by one point, the interest index score decreases by 0.18 points. In other words, students who are more confident in their ability to find information are less likely to think that a library instruction course would be helpful for other students, but this was only for students in the final stage of their doctoral program.

A small subset (N = 13, 11%) of the total Phase 3 study population responded that they lived an hour or more away from the institution where they were getting their degree. For these participants their scores on the personality and confidences indices could separately and significantly predict their interest index score. Confidence index score ($M = 41.38$, $SD = 10.71$) significantly predicted interest index score ($M = 10.69$, $SD = 3.38$), $F(1, 11) = 10.26$, $p < .01$, adjusted $R^2 = .435$. According to Cohen (1988), this is a large effect size. When the confidence index score increases by one point, the interest index score decreases by 0.22 points. Personality index score ($M = 48.00$, $SD = 7.85$) significantly predicted confidence index score ($M = 41.38$, $SD = 10.71$), $F(1, 11) = 4.94$, $p < .05$, adjusted $R^2 = .25$. According to Cohen (1988), this is a large effect size. When the personality index score increases by one point, the confidence index score increases by 0.76 points. These findings indicate that living more than an hour away impacted

participant personality, confidence, and interest variables as defined in this study more

than any other demographic variable, such as gender, age, stage, or international student

status. In addition to predicting scores on other indices, participant scores on certain

additive indices were able to predict some participant behavior, which is reported in the

findings for RQ 3.

Cluster analyses

The cluster analyses for the personality, confidence, and interest variables (pvar,

cvar, and ivar, respectively) were clustered via k-means clustering into groups labeled

pClus, cClus, and iClus, respectively. The relevant results of the clustering analyses

follow.

Personality cluster (pClus) results (Participant N = 123)	pClus A center value (participant N = 57, 46% of N)	pClus B center value (participant N = 66, 54% of N)
*Rout	2	2
askCopy	5	6
askClar	5	6
GSNet	6	5
*askExh	♦2	3
chgTop	5	5
*pstTime	♦3	4
*onlyNeed	4	4
*pstNotBot	♦2	5
*pstIncomp	♦2	5
*notPurs	♦3	5

Table 29: pClus center values
* Reverse scaled in clusters and additive indices, and reversed responses are reported in this table
♦Participants in this cluster agreed more with this statement, but due to being reverse scaled the value for the cluster in this table is smaller than in the other cluster

Table 29, above, lists the average response values for the personality variables in

pClus A and pClus B. pClus A members were less likely to ask others for help for a

variety of reasons, and they were slightly more likely to agree that they used Google

Scholar. Those in pClus A were much more likely (3 pt difference) to not have asked for

help because they did not want to bother anyone (pstNotBot) and because they thought it

would make them look incompetent (pstIncomp). They were slightly more likely (2 pt

difference) to agree that they would not pursue something if the library could not get it,

even if it seemed very useful (notPurs). Participants in pClus A were only slightly more

likely (1 pt difference) to use Google Scholar because it cast the widest net (GSNet), not

ask for help until they had exhausted all other options (askExh), and not ask for help in

the past due to time constraints (pstTime). The higher values in Cluster B indicate that

participants in this cluster were slightly more likely (1 pt difference) to feel comfortable

asking for copies of items (askCopy) and asking for clarification (askClar). The strength

of these differences is compared in Table 30, below.

ANOVA						
	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
Rout	6.453	1	1.620	121	3.983	.048
askCopy	59.022	1	1.918	121	30.776	.000
askClar	50.730	1	1.781	121	28.480	.000
GSNet	31.911	1	3.073	119	10.384	.002
askExh	22.061	1	3.501	121	6.302	.013
chgTop	8.430	1	2.198	119	3.836	.053
pstTime	24.113	1	2.934	114	8.219	.005
onlyNeed	8.892	1	2.317	119	3.838	.052
pstNotBot	231.974	1	2.130	110	108.906	.000
pstIncomp	276.348	1	1.868	113	147.929	.000
notPurs	108.312	1	3.339	120	32.441	.000

Table 30: Analysis of variance (ANOVA) for pClus differences

As SPSS (2017) notes, the significance (sig.) of the results should not be

interpreted in the usual way where any value below 0.05 is significant. Instead, the higher

the value in the Sig. column, the less likely the variable indicates a meaningful difference

between the participants in the two groups. Because all values to 0.50, which is the

general benchmark of significance, all variables were retained in this analysis.

Confidence cluster (cClus) results (Participant N = 123)	cClus A center value (participant N = 46, 37% of N)	cClus B center value (participant N = 77, 63% of N)
*chlEso	3	♦2
*chlEvery	4	♦2
*chlAccess	3	♦2
*chlOld	3	♦2
*chlDecImp	4	♦2
*chlNonSch	4	♦3
confExact	5	5
Overwh	4	♦2
*chlTerm	5	♦3
*chlNewOld	5	♦3
*exptKnow	5	♦3

Table 31: cClus center values
* Reverse scaled in clusters and additive indices, and reversed responses are reported in this table
♦Participants in this cluster agreed more with this statement, but due to being reverse scaled the value for the cluster in this table is smaller than in the other cluster

The table above (Table 31) lists the average response values for the confidence

variables in cClus A and cClus B. Although the values in cClus B are less than those in

cCluster A, which makes it seem like the participants in that group disagree with the

statements saying that they feel more challenged when searching for different types of

information, due to reverse scaling those in cClus B actually agree that they felt more

challenged when looking for the various types of information. This is generally a two

point difference on average.

ANOVA						
	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
chlEso	22.591	1	1.109	117	20.380	.000
chlEvery	116.444	1	1.242	120	93.719	.000
chlAccess	44.162	1	2.710	120	16.295	.000
chlOld	26.160	1	1.918	118	13.638	.000
chlDecImp	72.988	1	1.530	121	47.693	.000
chlNonSch	34.451	1	2.410	111	14.293	.000
confExact	20.128	1	1.428	120	14.096	.000
Overwh	92.612	1	2.215	121	41.808	.000
chlTerm	106.168	1	2.095	121	50.677	.000
chlNewOld	104.161	1	1.961	118	53.108	.000
exptKnow	132.941	1	1.933	120	68.777	.000

Table 32: Analysis of variance (ANOVA) for cClus differences

As SPSS (2017) notes, the significance (sig.) of the results should not be

interpreted in the usual way where any value below 0.05 is significant. Instead, the low

values in the Sig. column indicate a meaningful difference between the participants in the

two groups. In this final cluster solution, the confGood variable was removed because its

value in this table when included was too high, which indicated that it was not useful in

meaningfully differentiating between the two groups.

Interest cluster (iClus) results (N = 123)	iClus A center value (participant N = 40, 33% of N)	iClus B center value (participant N = 36, 29% of N)	iClus C center value (participant N = 47, 38% of N)
*prefF2F	♦2	6	♦2
helpIncl	2	4	6
helpOnly	2	3	4

Table 33: iClus center values
* Reverse scaled in clusters and additive indices, and reversed responses are reported in this table
♦Participants in this cluster agreed more with this statement, but due to being reverse scaled the value for the clusters in this table are smaller than in the other cluster

The table above (Table 33) lists the average response values for the personality

variables in pClus A and pClus B. The reverse scaling in this analysis makes the results a

little more difficult to interpret, but participants in iClus A and iClus C were actually

more likely to disagree that they would prefer F2F help when needed rather than a

mandatory session on how to search for information (prefF2F). However, the participants

in these two clusters differed on how much they agreed that a session that included

library resources and services (helpIncl) or would only include this information

(helpOnly) would be. Those in iClus C preferred to thought that the sessions would be

much more helpful, as indicated by a 4 point and 2 point difference, respectively.

ANOVA						
	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
PrefF2F	169.218	2	1.267	116	133.570	.000
HelpIncl	105.897	2	1.678	120	63.099	.000
HelpOnly	64.218	2	1.612	118	39.846	.000

Table 34: Analysis of variance (ANOVA) for iClus differences

As SPSS (2017) notes, the significance (sig.) of the results should not be

interpreted in the usual way where any value below 0.05 is significant. Instead, the low

values in the Sig. column indicates a meaningful difference between the participants in

the three groups.

Cluster analysis summary

The results of these cluster analyses indicate that difference in student personality,

confidence, and interest in library instruction can group doctoral students in the social

sciences. The major difference between the personality clusters was that those in the first

cluster, pClus A, were less likely to ask for help because they did not want to bother

anyone and they did not want to appear incompetent. There were slightly fewer

participants in pClus A (N = 57, 46%). In terms of confidence, those in the second

confidence cluster, cClus B, were more likely to feel challenged by obstacles to finding

information and therefore less confident overall. A majority of the participants were in cClus B (N = 77, 63%).

Although the interest clusters were only based on three statement, three clusters emerged from the analysis. The second group, iClus B, was the smallest of the three groups (N = 36, 29%), and were most likely to prefer face-to-face help rather than a mandatory library instruction session. Participants in the other two groups, iClus A and iClus C agreed that they would prefer a mandatory library instruction session on searching for information, but disagreed on how helpful a session would be for other students in the program. Participants in iClus A felt that the sessions would not be helpful to other students, regardless of whether they included or only consisted of library resources in the instruction. Those in iClus C were more likely to indicate that they thought a session that included library resources would be helpful than one that only included library resources. iClus C also had the most participants (N = 47, 38%).

Although the cluster analyses uncovered difference between participants, the null hypotheses for whether membership in one cluster predicted membership in another cluster was not rejected. This meant that cluster membership for a particular factor did not predict cluster membership for another factor. Stronger clusters were also generated in which only the participants with a shorter than average distance from the cluster center were included in the cluster. This meant that the respondents in each cluster had higher than average levels of agreement with other clusters members to statement responses. However, the prediction power for these smaller clusters was weaker than in the larger ones. The specific binary and multinomial logistic regressions used to these hypotheses are summarized in Table 35, below.

Independent variable(s)	Dependent variable	Method	Was model significant?
pCluster membership	cCluster membership	Binary logistic regression	*Yes
pCluster membership	iCluster membership	Multinomial logistic regression	No
cCluster membership	iCluster membership	Multinomial logistic regression	No
pCluster membership & cCluster membership	iCluster membership	Multinomial logistic regression	No

Table 35: Cluster prediction summary
*Result not reported due to small effect size

Summary of RQ 2 results

The qualitative results from the focus group and individual interviews in Phase 1 and Phase 2, respectively, suggested that there might be certain factors that could differentiate between the IE in doctoral students in the social sciences. The qualitative data also included times when participants changed their IE behavior, especially when searching for information. These changes were operationalized into three concepts that were hypothesized to be related to each other and to participant IE behavior. The first, personality, hypothesized that the degree to which participants were open to asking for help/clarification; not unhappy if they retrieved a lot of information, even if it was unexpected; and would consider changing their research based on what they found would affect their behavior. The second, confidence, hypothesized that the degree to which participants were confident in finding information and felt less challenged by the obstacles identified in the change in behavior theme would cause participants to behave differently from participants who were less confidence and felt more challenged. The third, interest, hypothesized that the degree to which participants were interested in library instruction would affect behavior.

Personality, confidence, and interest were grouped together in additive indices

and clusters. When the results of all participants were analyzed, no index scores were

able to significantly predict other index scores and no cluster memberships were able to

predict membership in other clusters. However, it was possible to predict interest index

scores using confidence index scores for participants in the last stage of their program. It

was also possible to predict interest index scores using personality and confidence scores,

separately, for the participants who lived more than an hour away from their school. In

RQ 3, the ability of the index scores and cluster memberships to predict Phase 3

participant behavior was quantitatively tested.

Research Question 3 (RQ 3) asked: How is information engagement (IE) related to

the value of academic libraries?

The major results for RQ 3 follow in the bulleted list below, and Table 36, which

follows afterwards, outlines the major qualitative themes identified from Phases 1 and 2.

- Participants valued *Electronic Resources* (3.1), especially *Google* products (3.1.1), more than any other, but focus group and individual interview participants also valued *Print Resources* (3.2).
    - o Participants in Phase 3 reported the highest usage of online resources, with 114 (91%) searching online at least once a week.
    - o Participants in Phase 2 reported the highest usage of library resources, with four (27%) asking a librarian for help at least once a month and seven (47%) visiting a library at least once a month in the previous semester.
    - o Participants in the Phase 3 survey phase were willing to pay an average of $30 for a book and $10 for an article that they needed for their research. However, more than half (N = 75, 61%) of survey respondents would not pay anything for an article.
- Participants used a variety of *Human Resources* (3.3) and *Social Networks* (3.4) to find and share information. They also valued *Software* (3.5) that could do more than keep track of bibliographic information.
- Demographic factors, as described in the Description of the sample at the beginning of Chapter 4, did not seem to significantly affect the qualitative codes applied to participant responses in the focus group and individual interviews

- Participant willingness to pay for a book could be significantly predicted using participant personality, confidence, and interest index scores.
    - An increase of 1 point on a participant's personality index score increased the amount that they would be willing to pay for a book $0.50.
    - An increase of 1 point on a participant's confidence index score increased the amount that they would be willing to pay for a book $0.34.
    - When a participant's personality, confidence, and interest index scores were combined, an increase of 1 point on a participant's personality index score significantly increased the amount that they would be willing to pay for a book $0.44.
    - Students who lived more than one hour away from their campus were willing to pay $0.95 more for a book for an increase of one point on their confidence scale. This was more than any demographic sub-group of the survey population.
- Personality variables could significantly predict whether a participant started a search on a topic that they were unfamiliar with using Google Scholar or a search engine versus any other resource for 90 (73.4%) of the participants.

The qualitative findings from Phase 1 and Phase 2 and presented in RQ 2 suggested different IE types that could exist in social science doctoral students. The quantitative findings in RQ 2 divided the Phase 3 participants into multiple clusters and scored them on indices based on personality related, confidence, and interest in library instruction variables. The qualitative and quantitative results for this research question test whether the clusters and index scores could predict the IE behaviors for the participants in Phase 3.

Themes related to the value of academic libraries

*RQ3 Themes	Focus groups		Individual interviews	
	Group count	Times coded	Participant count	Times coded
• Electronic resources				
o Article	3	63	15	63
o Specific database or journal	3	36	13	62
o Websites				
▪ Google search or scholar	3	72	15	83
▪ Scholarly				
• Library	3	30	15	63
▪ Illicit	3	22	4	15
• Human resources				
o Academics				
▪ Librarian	3	38	15	62
▪ Advisor or Committee	3	18	7	22
▪ Author	3	12	5	11
o Students (incl. PhD)	3	23	7	16
o Virtual communities				
▪ Academia.edu or ResearchGate	3	17	6	19
▪ Facebook or Twitter	2	9	2	4
• Print or physical resources	3	52	15	56
• Software				
o Citation	3	11	6	12
o Other	3	24	11	28
• Institutional				
o Current	3	61	15	75
o Other	3	23	8	21

Table 36: RQ3 qualitative themes identified in Phase 1 and 2
* Please see *Interpreting thematic coding tables* on page 83 for how to interpret Table 36.

Table 36, above, reports the resources that participants utilized to find and

organize information. These resources are usually self-explanatory, so definitions and

examples are given in Appendix G rather than in this section. These resources relate to

the topic of library value because data analysis resulting in the qualitative themes

identified in the first two phases of the study found that participants accessed and utilized

a variety of resources, some of which were provided by their academic library, and others that were not.

3.1 Electronic Resources and 3.2 and Print Resources

Although participants in all focus group and individual (N = 15) interviews reported that they used Print (3.2) or other Physical Information resources, participants also reported that they accessed Electronic Resources (3.1), specifically journal Articles, most frequently. Participant 35 stated that "it's almost always gonna be articles that I would want to find first," and Participant 4 took this preference further by stating that "unless there's…an article that's contained within a book…I'm always searching at… the article level for basically everything I do." Participants were also knowledgeable about specific databases, such as "Articles+" (P2), and participants in all focus group and 13 (87%) individual interviews were able to name at least one that they had used. Participants used Google (3.1.1) products, because Google cast the "widest net" (P14, P19). As one participant explained:

> I would say initially in my research I was using the library…Somebody early on had directed me that way [by saying that] if you want to do a lit review for this field you should go to the library site, and there was…I haven't been to it for a long time, but there's something called LLBA? It's the Language, Linguistics, and Behavior Abstracts area of the library site. So initially I was using that a lot to do lit review. Honestly, I kind of gave up on it and just resorted to Google in the last, almost exclusively in the last few years just because, yeah, it has everything. Maybe it's just a field to field difference. In my field, I'm not too concerned as to whether it's a peer-reviewed journal article or just a conference proceedings or even an unpublished manuscript…I like to cast my net pretty wide and get everything that's out there. So…for me the Google Scholar method is kind of what I mostly use (P19).

While Participant 19's switch from library resources to Google Scholar was due to the fact that she was in her Dissertation stage and that others in that stage might be more

likely to have similar stories, a participant's stage and other demographic factors did not seem to affect their use of Google Scholar because it was used so often. In addition to Google Scholar, participants also used the Google search engine for a "regular Google search" (P10) more frequently than library resources. Despite the prevalence of Google Scholar and Search, focus group and individual interview participants had used a library resource at least once. Library resources included a participant's home institution's website and catalog, but could also include research guides, which one participant called "research starters" (P3). Demographic factors did not seem to affect library use.

3.3 Human Resources

In the focus group and individual interviews, participants' responses were more likely to include academic Librarians than other Human Resources (3.3). Sometimes the participants directly stated that they "went to the reference librarian" (P10), but sometimes the researcher had to infer that a librarian was contacted, as in the following quotation: "Sometimes I'll do that chat, but after 10 they're not there" (P16). These findings suggested that the library's electronic, physical, and human resources were valuable. In order to test these findings in a larger sample, questions of resource importance and library usage, in visits or asking a librarian for help, were operationalized into Likert scale responses and reported in Tables 36, 37, 38, 39, and 40, below. Some participants chose the "Prefer not to answer" option or did not respond to the question, and the n values for each resource are in the last column in the table.

Importance of resources (N = 123)	Mean	Standard deviation	Prefer not to answer or no response
Journals (includes peer-reviewed and professional/trade)	6.91	0.32	2
Books (includes edited volumes)	5.41	1.59	0
Conference presentations and proceedings	4.30	1.60	0
News articles	3.74	1.78	2
Government and non-government reports and whitepapers	3.71	1.82	8
Non-text documents	3.03	1.73	26
*Other	5.60	1.84	113

Table 37: Participants' responses to "I would rank the importance of these resources to my research as follows (with 7 being very important and 1 being very unimportant)"
*Other items included dissertations/theses (N = 2), self-collected data (N = 1), recordings (N = 1), social media discourse/podcasts/texts/databases (N = 3), and media, such as broadcasts, videos, and Youtube (N = 3).

Table 37, above, reports the average ranking of each resource's importance to

participant's research. Journals were ranked by almost all 123 survey respondents (N =

121, 98%) as being very important to their research. The small standard deviation

indicates that the range of rankings for this resource's importance were high for a

majority of the participants. Books and conference presentations and proceedings were on

average ranked as important as their mean rankings were above 4.0. However, their

standard deviations indicate that a majority of the responses ranked the items as being of

average importance. Participants ranked news articles, reports, and non-text documents a

bit below 4.0 on average. Participants also had the option to write in other resources, and

although only ten participants did so, they ranked those sources as being important to

their research (mean = 5.60). However, the relatively large standard deviations indicate

that the ranking for these resources varied more than for the more highly ranked sources.

This means that journals tended to be ranked as important to the participants, but the

importance of other sources varied, which would make predicting their value for each respondent more difficult.

Online usage	Never	Less often than once a month	At least once a month	A few times a month	At least once a week	Prefer not to answer or no response	Total for phase
Phase 1	1 (5%)	0	2 (10%)	0	16 (80%)	1 (5%)	20
Phase 2	0	0	0	2	13	0	15
Phase 3	0	0	2 (13%)	7 (47%)	114 (93%)	0	123
Total	1	0	4	9	143	1	158

Table 38: Participants' responses to "Last semester, I searched for research-related information online"

The table above (Table 38) reports how often participants looked for information online, which included library and non-library provided resources, in the previous semester. Most (N = 114, 91%) participants looked for information online at least once weekly. Although one participant in the Phase 1 claimed to never look for information online during that time frame, they had looked for information there in the past. Participants in the first two phases of the study were asked to list the number of times they looked for information online and then select a time period, such as week, month, or semester. While this yielded more detailed information, it also made it difficult to compare with the other usage data. The time periods above were taken from the Public Library Typology study (Pew, 2016) and used in the Phase 3 survey. Responses from the first two phases were then coded into the appropriate category.

Help usage	Never	Less often than once a month	At least once a month	A few times a month	At least once a week	Prefer not to answer or no response	Total for phase
Phase 1	9 (45%)	9 (45%)	0	1 (5%)	1 (5%)	0	20
Phase 2	3 (20%)	8 (53%)	1 (7%)	3 (20%)	0	0	15
Phase 3	52 (42%)	52 (42%)	13 (11%)	2 (2%)	4 (3%)	0	123
Total	64	69	14	6	5	0	158

Table 39: Participants' responses to "Last semester, I asked someone at the library for research-related help either online or in-person"

The table above (Table 39) reports how often participants asked a librarian for help online, in person (FtF), by phone, and by email in the previous semester. Participants in the Phase 2 asked librarians for help the most often, with at least four (27%) asking at least once a month, compared to two (10%) and 19 (15%) in Phases 1 and 3, respectively. The results reported above were turned into a dichotomous variable of high and low use. Participants who never asked the librarian for help were coded as 0 and those who asked for help were coded as 1s. These variables were labeled AskHL.

Study space usage	Never	Less often than once a month	At least once a month	A few times a month	At least once a week	Prefer not to answer or no response	Total for phase
Phase 1	10 (50%)	2 (10%)	1 (5%)	3 (15%)	3 (15%)	1 (5%)	20
Phase 2	7 (47%)	3 (20%)	0	1 (7%)	4 (27%)	0	15
*Phase 3	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total	17	5	1	4	7	1	35

Table 40: Participants' responses to "How often do you use library spaces to study during the school year?" re-coded into above categories
*Data not collected for this phase of the study

The table above (Table 40) reports how often participants used library space to study in the previous semester. Participants in the first two phases expressed more confusion over this question than any other, and it was not asked in Phase 3 of the study.

	Never	Less often than once a month	At least once a month	A few times a month	At least once a week	Prefer not to answer or no response	Total for phase
Phase 1	7 (35%)	4 (20%)	5 (25%)	1 (5%)	2 (10%)	1 (5%)	20
Phase 2	3 (20%)	5 (33%)	2 (13%)	2 (13%)	3 (20%)	0	15
Phase 3	33 (27%)	44 (36%)	31 (25%)	10 (8%)	5 (4%)	0	123
Total	43	53	38	13	10	1	158

Table 41: Participants' responses to "Last semester, I visited the physical library for research-related purposes"

The table above (Table 41) reports how often participants used the library's physical space to work on research in the previous semester. Eight (40%), seven (47%), and 46 (37%) of the participants in each phase reported using these spaces at least once a month. The results reported above were turned into a dichotomous variable of high and low use. Participants who visited the library less than once a month were coded as 0 and those who visited it at least once a month were coded as 1's. These variables were labeled VisitHL. As reported in the results for RQ 1, 110 (89%) of the survey participants lived within an hour of the campus, so living that far away does not seem to account for the low number of library visits.

In addition to how often participants accessed information online, asked a librarian for help, and used the library's space, the survey also asked two value related questions about their willingness to pay for the two most commonly coded resources, books and articles.

Willingness to pay (WtP) (N = 123)	Mean	Standard deviation	n who would pay $0 (in USD)	Maximum in USD ($)
Book	28.73	17.23	13	80
Article	10.16	10.31	75	60

Table 42: Participants' responses to "If I need a _____ for research, I would be willing to pay on average the following amount in US dollars"

The table above (Table 42) summarizes how much the average participant would be willing to pay for a book or an article that they needed for their research. Overall, participants were willing to pay more for books than articles. However, a significant proportion of participants (N = 75, 61%) were not willing to pay at all for articles. The responses for how much they would be willing to pay for a book were used as the dependent variable in a series of simple and multiple regressions, which are explained later on in this section. The article amounts reported above were turned into a dichotomous variable of willingness to not pay and willingness to pay. Participants who were not willing to pay were coded as 0 and those who were willing to pay were coded as 1's. These variables were labeled ArtHL.

Simple and multiple linear regression

The additive indices were used to predict how much participants would be willing to spend on a book for research (Book$). The combinations tested are listed in Table 43 below, and details on significant models follow.

Independent variable(s)	Dependent variable	Method	Was model significant?
Personality index (pInd)	Book$	Simple linear regression (SLR)	Yes
Confidence index (cInd)	Book$	SLR	Yes
Interest index (iInd)	Book$	SLR	No
pInd & cInd & iInd	Book$	Multiple linear regression (MLR)	Yes
Personality (p) variables	Book$	MLR	No
Confidence (c) variables	Book$	MLR	No
Interest (i) variables	Book$	MLR	No

Table 43: Linear regression prediction summary for how much participants would pay for a book that they needed for their research

Two SLR models were significant. The first significant model used the

personality index (pInd) to predict how much the participant would be willing to spend

on a book for research (Book$). pInd ($M = 44.63$, $SD = 8.51$) significantly predicted

Book$ ($M = 25.93$, $SD = 18.47$), $F(1, 121) = 6.672$, $p = .011$, adjusted $R^2 = .044$.

According to Cohen (1988) this is a small effect size. When the pInd value increased by

1, the amount the participant was willing to pay for a book that they needed for research

increased $0.50.

The second significant model used the confidence index (cInd) to predict how

much the participant would be willing to spend on a book for research (Book$). cInd ($M$

$= 40.02$, $SD = 10.08$) significantly predicted Book$ ($M = 25.93$, $SD = 18.47$), $F(1, 121) =$

4.250, $p = .041$, adjusted $R^2 = .026$. According to Cohen (1988) this is a small effect size.

When the cInd value increases by 1 the amount the participant was willing to pay for a

book that they needed for research increased $0.34.

Only one MLR model was significant. This model used the personality index

(pInd), confidence index (cInd), and interest index (iInd) to predict how much the

participant would be willing to spend on a book for research (Book$). The means,

standard deviations, and intercorrelations are reported in Table 44 below.

	Mean	Std. Deviation	1	2	3
Book$	25.93	18.467	.229*	.184	.081
1. pInd	44.63	8.508	-	.383*	-.168
2. cInd	40.02	10.076	-	-	-.168
3. iInd	10.33	3.900	-	-	-

Table 44: Descriptive statistics for MLR to predict Book$ using pInd, cInd, and iInd
*$p < .05$

These variables significantly predicted Book$, $F(3, 199) = 3.50$, $p = .018$, but

only pInd contributed significantly to the prediction. The adjusted R squared value was

.058, which according to Cohen (1988) is a small effect size. When pInd increases by 1

point, the amount that participants were willing to pay for a book increases by $0.44.

Overall, this model is weaker than when pInd was used by itself to predict how much a

participant was willing to spend on a book that they needed for research.

As in RQ 2, participants were also broken into sub-groups based on demographic

characteristics to see if the IV for a particular sub-group could predict the DV. Once

again, the small subset (N = 13, 11%) of the total 123 participants who lived more than

an hour from their school had confidence index scores that could significantly predict the

DV, which was how much participants were willing to pay for a book that they needed

for their research. Confidence index score ($M = 41.38$, $SD = 10.71$) significantly

predicted the amount that participants were willing to pay ($M = 24.62$, $SD = 16.39$), $F(1,$

$11) = 6.967$, $p < .05$, adjusted $R^2 = .332$. According to Cohen (1988), this is a large effect

size. When the confidence index score increases by one point, the amount the participant

is willing to pay increases by $0.95. This means that students who are more confident in

their ability to find information and feel less challenged by obstacles to finding

information are willing to pay more money for a book that they need for their research.

Binary logistic regressions for behavior variables DVs

Binary logistic regressions (BLR) were performed for the five dependent

dichotomous variables (DVs) defined below:

1. ArtHL: whether participants were not willing to pay to access an article or they were willing to pay
2. AskHL: whether participants did not ask a librarian for help in the Fall 2016 semester or they did
3. VisitHL: whether participants visited the library less than once a month or at least once a month
4. GSE: whether a participant chose Google Scholar or a search engine as the resource that they would consult first when looking for information on a topic that they were unfamiliar with or not
5. PS: whether a participant would consult a person or use a non-person resource first when looking for information on a topic that they were unfamiliar with.

The independent variables (IVs) included the personality, confidence, and interest

variables, indices, and clusters developed in the results listed under RQ2. Overall, this

resulted in 45 BLRs. Of these, only one of the models was significant.

When BLR was performed to test the hypothesis that personality variables could

predict whether a participant would start looking for information on a topic that they did

not know about using Google Scholar or search engine, or another resource. Personality

variables investigated whether participants were open to asking for help/clarification;

were not unhappy if they retrieved a lot of information, even if it was unexpected; and

would consider changing their research based on what they found would affect their

behavior. These variables were able to significantly predict this DV, $x^2 = 31.584$, $df = 11$,

$N = 109$, $p = .001$. The Cox and Snell R^2 of .252 and Nagelkerke R^2 of .336 indicate a

strong association between the personality variables and most preferred resource. This is

further demonstrated in the table below (Table 45), which indicates that personality

variables correctly predicted that participants would start with Google Scholar or a search

engine versus another resource for 90 (73.4%) of the participants.

Classification Table[a]					
	Observed		Predicted		
			GSE		Percentage Correct
			0	1	
Step 1	GSE	0	34	16	68.0
		1	13	46	78.0
	Overall Percentage				73.4

a. The cut value is .500

Table 45: Classification table for personality cluster (pClus) membership prediction using personality cluster membership (N = 123)

The table below (Table 46) shows that the GSNet variable, which was the

participant's 7-point Likert scale response to how much they agreed that they used

Google Scholar because it cast the widest net, is a significant predictor in the model.

Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	GSNet	.654	.154	18.156	1	.000	1.924
	ChgTop	-.249	.176	1.993	1	.158	.780
	PstIncomp	.193	.164	1.396	1	.237	1.213
	NotPurs	-.152	.137	1.233	1	.267	.859
	Rout	.186	.192	.934	1	.334	1.204
	PstNotBot	-.089	.178	.247	1	.619	.915
	OnlyNeed	-.079	.169	.220	1	.639	.924
	AskCopy	.083	.196	.180	1	.671	1.087
	AskExh	-.046	.123	.142	1	.707	.955
	AskClar	-.075	.210	.126	1	.723	.928
	PstTime	.049	.149	.110	1	.740	1.051
	Constant	-1.942	1.809	1.152	1	.283	.143

a. Variable(s) entered on step 1: AskClar, AskCopy, AskExh, NotPurs, Rout, GSNet, ChgTop, OnlyNeed, PstNotBot, PstTime, PstIncomp.

Table 46: Model summary of personality variables to predict whether a participant would start a search with Google Scholar or a search engine or not (N = 109)

The Exp(B) indicates how much one unit of change in GSE affects their grouping in the ArtHL variable (Leech, Barrett, & Morgan, 2011). Because the Exp(B) is more than 1 for GSE, those who agreed more with the statement that they used Google Scholar because it cast the widest net were also more likely to not start their search with Google Scholar or a search engine. This result is discussed more in Chapter 5, but one reason for this relationship might be that participants preferred a different resource because they felt that Google Scholar's ability to cast the widest net was not helpful when they were unfamiliar with a topic.

The qualitative findings in Table 36 also suggest that in addition to their Current Academic institution's resources, many individual interview participants (N = 8; 53%) had access to Other resources at another institution, either through having their own login credentials or asking a friend at the other institution for access to a resource. Participants in the focus groups (coded in N = 22 times) were much more likely to use Illicit websites, such as Sci-Hub to electronically access items compared to individual interview participants (N = 4, 27%). As discussed in the results for RQ 2, further investigation into illegal usage of resources was not further explored in the Phase 3 survey, but is discussed in Chapter 5 and 6.

3.4 Social Networks and 3.5 Software

The two remaining qualitative themes in Table 36 focus on participant usage of Software (3.5) and Virtual Communities, usually in the form of Social Networks (3.4). Once information resources were obtained, participants in all focus group interviews and eleven (73%) in the individual interviews participants used Software that did something

more than or Other than manage citations to organize and store them, such as Mendeley

(P4). Overall, twice as many participant responses in the focus group interviews (24

versus 11) and individual interviews (28 versus 12) were coded as using these programs

than programs that only managed Citations, such as Zotero (P16). Demographic factors

did not seem to affect the use of either types of Software.

Social Networks were utilized more by focus group participants (N = 26 times)

versus the individual interviews (N = 23 times coded over N = 8, 53% of interviews).

Academia.edu and ResearchGate were the virtual communities that participants used

most often to find information, post their research, and connect with scholars. When

discussing the benefits of Academia.edu, one participant explained that:

> I look for resources on [Academia.edu] because there's a lot of unpublished
> research… People are putting…works in progress up there and then also there's a
> lot of articles that get published that you have access to even if you don't have
> access to that databases. So it's…kind of open source on Academia.edu which I
> appreciate immensely. So my own university doesn't carry…some of the
> databases I need…[so] I love Academia.edu, I think it's one of the greatest things
> out there, I use it all the time (P31).

ResearchGate and Academia.edu also allowed participants to network by including

mechanisms that allowed them to request information from scholars. Some participants

agreed that they would sometimes ask certain researchers for articles "just for the act of

asking…[to show they were] interested and engaged in the scholarship" (P14) or "direct

questions to authors [in order to create] networks [so]…people start recognizing your

name" (P9). Participants who were not in Communication or related programs seemed to

use ResearchGate more often than students who were, but no other demographic

differences seemed to affect participant use of or interest in these sites. These qualitative

findings were operationalized as frequency and Likert scale questions in the Phase 3

quantitative survey, and the results of these questions are reported in RQ 4 because library instruction does not often cover these topics, but they can do so in order to promote increased IE in doctoral students.

Summary of RQ 3 results

The findings for this RQ suggest that there are a number of factors that affect what social science doctoral students use and value when engaging with information. Online resources and access are the most highly valued resources when participants related critical incidents when they looked for information and ranked them in the survey. The participants in the Phase 2 individual interviews reported the highest usage of librarian services and library space.

Predicting participant behavior was difficult. Participant responses and the indices and clusters formed in RQ 2 were used as independent variables to predict six total dependent usage and willingness to pay variables. Of these, the indices were most likely to predict significantly positive relationships between participant scores and their willingness to pay for books that they needed for their research. The largest any sub-group was willing to pay was $0.95, and these were the students that lived more than an hour away from their institution. Personality variables significantly predicted whether a participant started a search in an area they were unfamiliar with for 90 (73.4%) of the survey participants. The implications of the findings from RQs 1, 2, and 3 combine with qualitative data from the dissertation study to suggest ways that academic libraries can increase IE through instruction in RQ 4.

Research Question 4 (RQ 4) asked: How can academic libraries promote increased

information (IE) engagement of doctoral students?

The major results for RQ 4 follow in the bulleted list below, and Table 47, which

follows afterwards, outlines the major qualitative themes identified from Phases 1 and 2.

- Phase 1 and Phase 2 interview participants connected the information that they found in their searches as contributing to scholarly *Outcomes/goals* (4.1).
  - o Participants in the focus group interviews (N = 20) were likely to apply information to the Outcomes/goals suggested by other participants. On the other hand, participants in the individual interviews (N = 15) were less likely to apply information to other Outcomes/goals because they could not think of many. This finding suggests that doctoral students do not normally think of information as applying to other Outcomes/goals, but agree that they are related if Outcomes/goals are suggested.
  - o Phase 3 survey participants were likely to agree that they had used or would use the information that they found while searching for all suggested IE Outcomes/goals.
- When asked to think of *Tasks Facilitated by a Magic Wand* (4.2), participants gave a variety of responses. Most of these related to finding information rather than organizing or filtering it.
- Phase 3 survey participant responses showed that they used several academic social networking sites and were interested in learning more about information topics. These networks and information topics are currently not covered in most library instruction as reported in LIS literature, but including them could increase IE in this population.
  - o Participants used Academia.edu and ResearchGate.net to find information and post their research more than any other social network.
  - o Participants were more likely to connect with other scholars after meeting them in person.
  - o Participants were equally likely to connect with other scholars prior to meeting them in person, if ever, on Academia.edu, Facebook, LinkedIn, ResearchGate.net, and Twitter.
  - o Participants were most likely to respond that Twitter did not apply to their finding or posting information, or meeting other scholars.

The results of the first three research questions described IE and looked for

relationships between IE and behavior for the social science doctoral students who

participated in this dissertation study. The final research question results report how

participants related IE to their own goals, and what information topics they were most

interested in learning about. Academic librarians can use this information to reframe

library instruction sessions for this group.

Themes related to library instruction topics that can increase IE

*RQ4 Themes	Focus groups		Individual interviews	
	Group count	Times coded	Participant count	Times coded
• Outcomes/goals				
o Future work	3	21	7	11
o Networking	2	19	4	8
o Career	3	6	4	5
• Tasks facilitated by magic wand				
o Other	n/a	n/a	13	32
o Seeking	n/a	n/a	7	12
o Organizing	n/a	n/a	4	10
o Filtering	n/a	n/a	4	5

Table 47: RQ4 qualitative themes identified in Phase 1 and Phase 2
* Please see *Interpreting thematic coding tables* on page 83 for how to interpret Table 47.

4.1 Outcomes/goals

As indicated in Table 47, above, the qualitative themes for this RQ fell into two

broad categories, Appendix G defines these themes and gives illustrative examples.

Outcomes/goals (4.1) were activities that participants felt were related to the information

with which they engaged. These were broken up into three sub-themes, and of these,

Future Work, which included identifying and applying for grants, and deciding where and

what to publish next, were coded in all focus group and 11 (47%) of the individual

interviews. Demographic factors did not seem to affect the application of this code to

participant responses. One participant described future work by saying that "It's made me

think what other studies and what other potential research I could do...also it gives me

pilots or more goals in the future" (P20).

Networking described incidents when participants connected or planned to connect with other scholars. Sometimes the participants did not explicitly say that they were networking, such as Participant 9 who would "exchange ResearchGate information with people that I'm interested in getting to know." The Career code was applied to information that would aid participants in their career related aspirations. One participant described looking up information about other scholars in her area so that she could "follow them and try to be like them" (P16). Participants in the focus groups also identified Networking (N = 19 coding instances) and Career Planning (N = 6 coding instances) more often than individual interview participants (8 coding instances in N = 4, 27% and 5 coding instances in N = 4, 27%, respectively). Demographic factors did not seem to affect participant experience or interest in Networking or applying information to their future Careers.

The Outcomes/goals themes were applied less frequently in the individual interview data because participants in the individual interviews did not think of many IE related Outcomes/goals on their own. This finding suggests that doctoral students do not normally think of information as applying to other Outcomes/goals, but agree that they are related if Outcomes/goals are suggested to them. This finding was also a result of the Phase 3 quantitative survey, as indicated in Table 48, below. Some participants chose the "Prefer not to answer" option or did not respond to the question, and the n values for each topic are in the last column in the table.

IE related outcomes (N = 123)	Mean	Standard deviation	Prefer not to answer or no response
Suggest topics for research	5.65	1.41	0
Suggest place to present/publish	5.56	1.46	0
Identify and apply for grants	5.50	1.52	1
Manage my scholarly identity	5.48	1.46	1
Network	5.31	1.55	2
*Other	6.33	1.15	120

Table 48: Participants' responses to "I have used or would be willing to use the information that I found in my searches to" (with 7 being definitely will use and 1 being definitely will not use)
*Other results included "identify community partners for collaborative research opportunities" (N = 1).

The table above (Table 48) reports how likely participants would be willing to use the information that they found for the activities suggested by the qualitative results of Phases 1 and 2. In general, all participants were more likely than not to use the information that they found for each of the activities as indicated by the mean response value to being over the four-point middle of the 7-point Likert scale. The standard deviations are relatively the same, and that combined with the relatively high mean rankings for each topic suggest that a majority of the participants were willing to apply information to those outcomes.

4.2 Tasks facilitated by a Magic Wand

In addition to investigating what Outcomes/goals doctoral students in the social sciences related to IE, the study also identified which areas of IE they were most challenged by. The magic wand question, which asked, "If you had a magic wand that could help you in future searches, what would you have it do?" was only used in the individual interviews. The most common sub-theme for Tasks Facilitated by a Magic Wand (4.2) was coded as "Other" in Table 47 (32 coding instances in 13, 87% of

individual interviews). This theme was assigned to the responses in which participants wanted a broad range of technological and other interventions that would help them do more than find, filter, and organize information. Out of all of the focus group and individual interview questions, the magic wand question had the widest range of responses. Some responses would require magic to exist, such as the participant who wanted a "robot wand" that she could "point…at [her] desk and just tell it to get all the books [she would] need...[which]…it would already know" (P32).

Others participant responses were more actionable. For instance, some participants suggested that the wand essentially remove certain library policies, as described by the following participant:

> Man, I just want my things…like I just want them immediately. I guess it would be a library that has everything…So if a thing just got published it should come out and it should be available to me…[Also,] I can have them for as long as I need them (P28).

Other responses described existing library resources and services for finding, filtering, accessing and organizing information. For instance, most databases offer a thesaurus that would define "potential synonyms" (P33) or suggest the correct term "[translated] into academ-ese" (P26), but none of the interview participants had heard of it, although Participant 22 did indicate that she was aware of subject terms. Another participant wished to be able to tell the system to "exclude these specific journals" (P30), which can be accomplished using the NOT command or similar when constructing searches. Most library catalogs, databases, and Google Scholar allow users to be able to search for keywords, concepts, and an author's last name (requested by P27) at the same time, using the advanced search.

Finally, some responses to this question suggested tools for finding information that could be possible in the near future. One participant thought it would be useful to see recommendations to related articles, which she described as, "'people who read this article also looked at these' just to see if it's something that I wouldn't have thought to look up" (P35). An increasing number of databases are providing this sort of information, such as Science Direct, Scopus, and Mendeley. Another participant responded that:

> It'd be really kinda cool to have like a magic wand that for any book or article would magically show a brain map or…some sort of brainstorm of…the history of every idea that brought that piece into birth so that you could kind of see where it was contextualized in the broader history of ideas and where it might lead, I guess because of that history (P29).

For the IE topics that are commonly covered in library instruction according to the LIS literature, the area that participants identified most often as being in need of a magic wand was finding information (N = 7, 47% of individual interviews).

Participants in the Phase 1 and 2 interviews were asked if they had received library instruction.

Instruction (N = 123)	Yes (n)	No (n)
Phase 1	11 (55%)	9 (45%)
Phase 2	12 (80%)	3 (20%)
*Phase 3	n/a	n/a

Table 49: Participants' attendances in library information session
*Data not collected for this phase of the study

Table 49, above, reports the number of participants in the first two phases who had attended a library information session at any point in their post-secondary education. It was difficult to draw any meaningful conclusions from this information because many of the participants, even those in Phase 2 who were more likely to have received this instruction than in the first, claimed that any information sessions before their doctoral program were not very helpful to them once they started their current program.

Participants reported that library instruction was not helpful because they did not

remember what was covered, they attended a session at a different university, or the

material covered in their undergraduate and master's programs was not detailed enough

to help them in their doctoral programs. Therefore, this question was not included in the

survey in the Phase 3. Instead, questions asking about what they would like to learn were

asked in order to answer RQ 4. The next two tables report on IE related topics that

participants would be interested in learning about and that academic librarians could

consider offering. Some participants chose the "Prefer not to answer" option or did not

respond to the question, and the n values for each network are in the last column in the

table.

Social network uses (N = 123)	Find information	Post my research	Connect with other scholars prior to meeting them in person, if ever	Connect with other scholars after meeting them in person	Prefer not to answer or no response
Academia.edu	49	31	25	20	49
Facebook	21	15	25	56	39
LinkedIn	22	10	28	37	50
ResearchGate.net	55	34	28	22	43
Scholarly liststerv	41	5	14	9	61
Twitter	24	12	25	23	69

Table 50: Participants' responses to "I have used the following sites/networks to…"

As indicated in Table 50, above, participants were most likely to indicate an

activity on ResearchGate.net (total activity N = 139), followed by Academia.edu (total

activity N = 125), Facebook (total activity N = 117), LinkedIn (total activity N = 97),

Twitter (total activity N = 84), and a scholarly listserv (total activity N = 69). Three

participants also included Google Scholar to either find information or post their research

as open responses to this question.

Topics of interest	Mean	Standard deviation	No response
Managing my scholarly identity	5.80	1.30	0
Research methodologies/methods	5.42	1.53	1
Turning my dissertation into a book	5.24	1.97	0
Reusing data from other studies or making mine available for reuse	5.11	1.78	0
Open access publishing	5.05	1.83	1
The library resources available to me	4.73	1.70	0
*Other	6	1.73	120

Table 51: Participants' responses to "I would be interested in learning about the
following (with 7 being very interested and 1 being very disinterested)
* Other results included interdisciplinary works, publishing non-conclusive research to
prevent someone else from wasting their time doing the same thing, and how to manage
academic-related social media accounts, like ResearchGate (N = 1 for each).

When asked which topics they would be most interested in learning about,

participants were most interested in learning to manage their scholarly identity. Some

participants chose the "Prefer not to answer" option or did not respond to the question,

and the n values for each topic are in the last column in the table. In general, they were

more interested than not to learn about all of the topics as all the mean rankings for each

topic were higher than 4.0, the mid-point of the 7-point scale. The relatively high mean

and low standard deviation for the "Managing my scholarly identity" response indicates

that participants were overall very interested in learning about this topic. Participants had

the highest standard deviation around their mean ranking for the "Turning my dissertation

into a book," which suggests that the interest in this topic varies more than interest in

other topics.

Summary of RQ 4 results

The findings for RQ 4 suggest ways that academic libraries can increase participant IE. Some findings, such as participants not finding library instruction helpful support findings in other studies. Other findings suggest topics that library instruction can cover that have not been reported in the LIS literature. These topics came from the goals/outcomes that the interview participants connected to information and tasks that they would want a magic wand to help them accomplish. The survey participants confirmed their interest and usage of social network usage and information topics that librarians can cover in instruction sessions, which could increase IE. The results of all four RQs and how they connect with other findings in LIS literature are further discussed in Chapter 5.

Summary of Knowledge Claims:

The Knowledge Claims identified by this dissertation regarding social science doctoral student IE follow below, by research question.

RQ 1.1 Based on the qualitative interviews in Phases 1 and 2 of the dissertation study, individual factors rather than situational or institutional variables led to the creation of factors that predicted IE behavior.

RQ 1.2 Significant facilitators, which helped IE, included searching and organizing strategies, as well as awareness of the academic library resources and services that made IE more convenient.

RQ 1.3 Significant barriers, which hindered IE, included not finding and not knowing how to access information. The former were based on topic or field specificity, and the latter was usually related to library policy.

RQ 2.1 The qualitative interview data analysis from Phases 1 and 2 suggested that an individual's knowledge and personality affected their IE behavior.

RQ 2.2 As a group, the doctoral students who participated in this study were likely to start with familiar resources, until they encountered IE challenges, which usually occurred in their coursework and qualifying exam stages.

RQ 2.3 The individual factors that affected IE behavior were conceptualized as personality, confidence, and interest.

RQ 2.4 Participants in the Phase 3 survey were grouped via cluster analysis and additive indices based on their responses to questions that were related to these variables.

RQ 2.5 There was a significant relationship among index scores indicated that Phase 3 participants who had passed their dissertation proposal stage were less likely to think that library instruction would be helpful to other students in their program if they had higher confidence in their ability to find information.

RQ 2.6 A similar relationship was found for students who lived more than an hour from their institution. Also, distance students who had higher personality scores, meaning they were more open to asking for help/clarification; less unhappy if they retrieved a lot of information, even if it was unexpected; and would be more likely to consider changing their research based on what they found, were also more likely to be more confident in their information searching abilities.

RQ 3.1 The qualitative and quantitative data analysis indicated that participants valued both electronic and print resources. Information was valuable for this group, and Phase 3 participants were willing to pay an average of $30 and $10 for a book and article that they needed for their research, respectively. At the same time, 75 (61%) of the Phase 3 participants were not willing to pay anything for an article.

RQ 3.2 The personality and confidence scales could predict how much a participant would be willing to pay for a book that they needed for their research, with an increase of $0.50 and $0.34 per point for the personality and confidence scales, respectively. For the distance students, this amount was $0.95 per point increase on the confidence scale.

RQ 3.3 Participant responses to the personality variable questions could also predict whether a Phase 3 participant would start a search on a topic that they were unfamiliar with 73 percent of the time.

RQ 4.1 The qualitative and quantitative data analysis suggests that the participants in the study did find information important, but found it difficult to apply to outcomes beyond searching for, finding, and accessing a document. However, once other goals, such as career goals were suggested, many expressed interest.

RQ 4.2 The information related goal that the participants in Phase 3 were most interested was how to manage their scholarly identity. This topic intersects with other IE tasks, such as finding and organizing information, which academic librarians can cover during library instruction.

CHAPTER 5: DISCUSSION

This chapter discusses the findings presented in Chapter 4 by research question (RQ). Each RQ contains multiple points of discussion broken up into different subsections. For each subsection, the discussion compares and contrasts the relevant qualitative and quantitative data with the findings from other Library and Information Science (LIS) studies. Each RQ section ends with a summary of the major points and how they connect to the next RQ.

Discussion topics for Research Question 1 (RQ 1): What are the critical factors that characterize information engagement (IE) for doctoral students in the social sciences?

This dissertation has conceptualized IE to include behaviors related to finding, filtering, accessing, and organizing information. The existing LIS literature suggested that different strategies arose due to situational, institutional, and individual factors. The social science doctoral students in this dissertation faced many of the same situational and institutional challenges to completing IE activities, but developed different strategies for overcoming them. Rather than viewing these challenges as applying similarly to students based on their stage or demographic factors, this dissertation found that similar types of challenges could occur in any stage. The results of this RQ identified Facilitators and Barriers that helped and hindered IE for most participants.

Finding and accessing information

While expert searchers and doctoral students often have similar levels of education and experience, several studies have shown that doctoral students differ from expert searchers in how they formulate search strategies and use search tools (Korobili, Malliari, & Zapounidou, 2011; Bøyum & Aabø, 2015; Catalano, 2013; Spezi, 2016). Some studies emphasize that these differences are less prominent as doctoral students progress in their studies (Barrett, 2005; Spezi, 2016), but even those who complete their doctorate and end up supervising their own doctoral students will not necessarily have acquired expert searching skills (Barry, 1997; Research Information Network, 2011; Catalano, 2013; Nicholas et al., 2016). These varying levels of searching ability suggest that individual experiences and knowledge gained, which Khosrowjerdi and Iranshahi (2011) conceptually linked in their term prior knowledge, account for differences in how searchers use search tools and techniques. The results of RQ 1 suggest that knowledge and experiences are important factors in the strategies that doctoral students use to find information. The similarity of the major tasks in social science doctoral education programs helps ensure that by the time doctoral students have completed their dissertation proposal/prospectus, which will be referred to as the proposal in the rest of this chapter, they will have encountered the major challenges to finding information. At this stage, strategies for overcoming similar challenges will change very little, if at all. These challenges usually coincided with a doctoral program task that required different searching strategies or resource types.

Previous literature has identified the stage after students have completed their coursework and their qualifying or comprehensive exams as being the stage where the

largest proportion of students will drop out of their doctoral program (Rockinson-Szapkiw & Spaulding, 2014). Poor information searching skills might account for some of this attrition, and several LIS studies have investigated the benefits of dissertation research and writing seminars, workshops on research and writing topics, and pairing students with librarians (Libutti & Kopala, 1995; Fleming-May & Yuro, 2009; Du & Evans, 2011; Harris, 2011). However, the results of this RQ suggest that the dissertation proposal or dissertation writing stages may be too late to reach certain students. For instance, Participant 6 explained that in coursework and through his qualifying exams he primarily used books and journal articles. When he began doing research for his dissertation proposal, he had to learn how to find information on government websites, government reports, and terrorist websites. An instructional or other intervention that taught him how to efficiently search for information in these resources could have been helpful.

However, other participants described major changes when preparing for their qualifying or comprehensive exams. Rather than separating these differences by demographic factors, such as the participant's stage in their program, it is can be more useful to describe the change in terms of varying searching behavior for tasks that could occur in multiple stages. For instance, P4 discussed forward and backward searching, which were non-LIS terms for Known Item and Pearl Growing, respectively. The latter has been identified as a popular information search strategy among doctoral students (Earp, 2008). Barry (1997) refers to Keyword Searching as a novice searcher strategy, even though the faculty who supervise doctoral students are likely to use it. Participant 3 seemed to find keyword searches more difficult because she did not know what, if

anything, would result. This reflects a finding from a study by Chu and Law (2007), which was that while many graduate students used keywords to find information, complex keyword searches were often ineffective. The responses from Participants 6, 4, and 3, above, suggest that defining an area of research is a conceptual challenge for doctoral students. This challenge is at the heart of what Gardner (2009) defined as progressing from a knowledge consumer to creator, and by Fleming-May and Yuro (2009) as the development from student to scholar.

A complicating factor in this process for academic librarians who would want to assist doctoral students in their development is that this change can occur at any time. Students in Coursework can face similar challenges if they need to find information on unfamiliar topics for which they do not have specified readings. Sometimes the syllabus or the instructor were able to help them identify the proper keywords. As one student recounted, "I would've never have been, 'Yeah, feminist episiotomy, let me put those two things together.' I know what epistemology is but…feminists have their own?" (P26). While their course instructor could occasionally help point them towards useful resources or offer helpful keywords, sometimes the instructor themselves was unfamiliar with the area. The same participant recounted another instance where:

> I was writing a paper on family construction...about how animals are constructed like family, and I... was so lost trying to write this paper. I didn't even know where to start. I was typing in family, I was typing in family construction...I don't do family scholarship. I wouldn't have even known the journals for family communication...I was just walking in blind…I submitted two drafts to this professor and she was like, 'Just keep looking, just keep looking,' and I was like, 'Give me more information, tell me what to search, just tell me what to find, tell me the words,' and she…was just [repeated], 'Keep searching, keep searching' (P26)

Relying solely on Keyword Searching to find documents, or the belief that one could find relevant documents if only one could guess the correct keywords, caused participants in all stages of their doctoral program high levels of frustration. Library Instruction sometimes covers alternative ways to browse for materials and how to systematically develop synonyms for and different combinations of keywords.

Unfortunately, many participants did not think that librarians could help them in this area. As one student explained:

> I think one of the main things is knowing how [searching] works and what words to use… and I don't know how that could be taught cuz it's not necessarily a library skill, right? It's a critical thinking skill or something, but knowing what terms to use to find what you're looking for…I think that, in general, that's what people have the most trouble with cuz they'll, you know, they're used to Google (P28).

This response also illustrates that some students who have reached the highest levels of education are unsure as to what their academic libraries and librarians can offer them. Participants were also confused by how to access information that they had found. For instance, Participant 15 described his main IE related challenge as finding information, but that while writing his dissertation the main challenge was accessing what he had found. Unlike some of the other study participants, Participant 15 knew about the interlibrary loan (ILL) article delivery service, but like many students in the dissertation writing phase, he was more willing than not to satisfice (Simon, 1955) with other, more conveniently accessible materials. This finding suggests that information literacy or other Library Instruction is a facilitator, but one with mixed effectiveness for doctoral students facing IE challenges.

Library instruction

More often than not, the Phase 1 and Phase 2 participants had received some form of Library Instruction, usually on information literacy topics, at some point in their educational careers. The timing and effectiveness of this instruction varied, but many were one-shot instruction classes. For instance, Participant 21 did not remember everything that had been covered in classes from his freshman and sophomore years, but he seemed to have found the frequent instruction helpful, although it was "a while ago" (P21). This raises an interesting distinction between participant perceptions of helpfulness versus measurable impact of its effectiveness over time. Few studies have measured the long term benefits of one-shot classes, and those that have tend to rely on self-reported data, such as how helpful attendees found the instruction (Wong, Chan, and Chu, 2006) rather than objective indicators of success. In contrast, Participant 28 seemed to find multiple instruction sessions to be less helpful because they repeated the same instruction, specifically about databases. This may be why she did not associate library instruction with the critical thinking skills needed to identify more useful keywords for searching.

While it is likely that most one-shot classes cover databases and how to use them, these and other forms of Library Instruction are not standardized within a discipline or even within a single institution. In spite of this uneven coverage of content, other studies have found that faculty members advising doctoral students assume that students have learned relevant searching skills in a class at some point of their education (Spezi, 2016). Even librarians may make this assumption, as recounted by one participant who said that during her program's orientation to the library, "there was kinda the assumption like, you

should know how to do it already. So they just showed us literally where on the webpage [the search box] was so we could get to it ourselves" (P35). This response appears to be the opposite of the assumption that graduate students were information illiterate, which Green (2010) and Monroe-Gulick and Petr (2012) argued was inaccurate.

For doctoral students, an assumption that they know how to use services or resources, like databases, at one institution, or even for an area of research, is doubly dangerous. The results of this dissertation found that most participants moved to a different institution at least once between degrees, and some will move from a different disciplinary area (Monroe-Gulick & Petr, 2012). One participant, stated that a one-shot introduction to "different selective databases…for communication" (P25) at the beginning of his master's program was very helpful because he had done his undergraduate degree in political science. However, the Phase 1 and Phase 2 participants seemed to learn many of the advanced search features outside of the library, such as P33 who used multiple fields and truncation. This result was similar to Rempel (2010), who found that doctoral students were likely to teach themselves searching skills that other populations would need to be taught in a library instruction class. According to Catalano (2010), most graduate students have not heard of advanced search features at all.

These differences in perceptions of library instruction's helpfulness and effectiveness, and whether that perception was the result of other individual characteristics and/or if it affected participant behavior, was one of the reasons why interest in library instruction became both an independent and a dependent variable in the dissertation study, rather than a demographic question about whether or not a participant had received it. At its best, Library Instruction was reported to be an effective Facilitator

that introduced doctoral students to information resources and services. Data analysis enabled a comparison of how participants felt about having a mandatory instruction session versus face-to-to face help, which other studies have found to be preferable to doctoral students (Fleming-May & Yuro, 2009; Mikitish & Radford, 2013). Participant's responses indicated that they were fairly ambivalent about whether a research workshop that included library resources and services would be helpful to other students in their program, and they typically disagreed that such a workshop that only included library resources and services would be helpful. However, participants in each stage of their program had a slight increase in the group's average interest in library instruction scale, and some, like P29, advocated for mandatory one-on-one instruction early in students' doctoral careers. This suggests that more experienced students found Library Instruction to be more helpful over their years in the program, but this was not a statistically significant different, nor was a rationale readily apparent. One unambiguous finding from the qualitative data in this dissertation and that was also found in other studies of doctoral students (Catalano, 2013; Sadler & Given, 2007) was that if a student received helpful instruction from a librarian once, they were more likely to ask another librarian for help in the future.

Flow experiences and multiple logins

This study is among the first to discuss doctoral student perceptions of Flow (also in O'Brien & Toms, 2008) and their use of Multiple Logins for accessing the resources at other institutions. The former is important because it further connects LIS studies to engagement studies from other fields. The latter is important because it is a reminder that

doctoral students often navigate diverse sources of information. This could be accomplished using legal methods, such as Participant 5 who was taking classes at another university, and illegal means of access, such as torrenting entire books (P5). Both Flow and Multiple Logins act as Facilitators related to convenience in finding and accessing information. The expectations that form when comparing various sources of information shapes the perceptions of what information should cost and how easy it should be to access (Williams, Nicholas, & Rowlands, 2010; Hoy, 2017). While it is has been found in previous research that all library users and information seekers prefer Convenience (Connaway et al., 2011), the doctoral student participants were willing to go extreme, even what they admitted were illegal lengths, to obtain information, so while Flow and Multiple Logins facilitated their IE, a lack of either did not deter participants from pursuing information in most cases. Instead, other Barriers, including Library Policies, were likely to hinder participant IE.

Library policies

      While not being able to find or access information were Barriers that all participants faced at multiple times in their doctoral careers, some Barriers were more significant to students at some institutions. In addition to participants expressing frustration at Not Finding information, several participants also expressed more severe and lasting frustration with library policies if they were uncertain why they were in place. The former were coded under the Not Finding theme, and the latter under the Not Knowing theme. More participants in the focus group interviews expressed frustration and anger at Not Knowing rather than Not Finding. Their frustrations ranged from

confusion over how library systems and services worked, to disappointment with the library's collections, to outright disagreement with certain policies.

The rationale and system through which library systems and services worked was a main source of confusion for all study participants. Many participants did not know the extent of the resources available to them, which meta-analyses of graduate and doctoral student studies have also found (Catalano, 2013; Spezi, 2016). Other scholars have suggested that this confusion may be due to commercial resources such as Google, especially since undergraduate and graduate students have reported using Google and Google Scholar prior to and more often than library databases (Wu & Chen, 2014). Participants reported that Google Scholar was used as a resource for finding and accessing articles. Google Scholar's ability to access resources from a variety of websites dovetailed with participants' general belief that they should be able to quickly access any resource for free. The perception of convenience and belief that Google cast the "widest net" (P14, P19) likely contributed to student disappointment with academic library collections, which has been reported in other studies (Rowlands, Nicholas, Williams, Huntington, Fieldhouse, Gunter, Withey, Jamali, Dobrowolski, & Tenopir, 2008; Spezi, 2016).

Focus group interview participants were particularly upset with having to pay a Fee for interlibrary loan items and with the Recall policy, which required them to return books earlier than the original due date if another library user requested them. Reports on the use of SciHub (Hoy, 2017), suggest that a large number of academics believe that information, especially articles that are in PDF format, should be shared (P9), and for the doctoral students who participated in the Phase 1 and Phase 2 interviews, this could apply

to digital or physical items. However, this was usually not the participants' first option. Like Participant 19, who described asking a friend to check out a book from their institution to give to her rather than paying an ILL fee, focus group and individual interview participants indicated that illegally downloading or sharing articles was more often than not the "last step" (P24) the student would pursue if getting it themselves, through a resource like Academia.edu and ResearchGate, or the library, had failed.

The candor of the interview participants in discussing behavior and the general agreement in the focus groups to these comments resonated with Williams et al.'s (2010) suggestion that social and situational factors rather than ethical and legal considerations shape views on sharing information. While some participants described what academic publishers might consider a clear case of digital piracy, such as torrenting an entire book to read a chapter for a class assignment (P5), participants seemed uncertain where social, ethical, and legal boundaries lay. For instance, in the first focus group interview, participants did not begin talking about asking their friends at other institutions for articles until around the middle of the interview. After other participants agreed that they had also done this, or would consider doing so in the future, participants then talked about requesting PDFs of articles from people they did not know on Twitter using the icanhazpdf hastag.

The icanhazpdf hashtag is an example of the complexities of educating users on how to ethically copy, share, and access information (Williams et al., 2010). While this hashtag is increasingly being reported in LIS studies (Greenhill & Wiebrand, 2012; Gardner & Gardner, 2015; Swab & Romme, 2016), it was first reported in another field (Chandra & Chatterjee, 2011). The participants in the first focus group were curious to

hear about the practical aspects how to use the hashtag, but less concerned with the legal and moral implications. At the same time, they also discussed when they would consider using it, and seemed to come to a consensus that it was not the first place they would go to access an article because it did not seem as unproblematic as asking the library's inter-library loan service for a copy.

In a similar fashion, individual interview participants were not likely to mention asking friends at other institutions for articles until later on in the interview. Unfortunately the small sample sizes in Phase 1 and Phase 2 makes it impossible to say which factors influenced why more participants in the focus groups discussed asking people to send them articles or downloading them from places such as torrent sites or SciHub. This is an area for further research, and it is discussed in Chapter 6.

One reason for requesting electronic copies of articles was so that participants could keep a copy for themselves. Participants also wanted to hold onto physical materials, which explains their frustration with the Recall policies at their institution, especially in the focus group interviews. Some responses, like Participant 14's who directly said that his wanting to hold onto materials was selfish, seemed to reflect findings that Millennials have lower empathy and less concern for others (Twenge, Campbell, & Freeman, 2012). However, Participant 14 was a member of Generation X, which suggests that the need to access necessary information crosses generational distinctions. While the individual interview participants were less visceral in their rejection of the recall policies, their calculations about the value of the resources that they obtained did take them into consideration, such as Participant 32 who admitted that she would rather pay a fee for losing a book than returning it. These reactions to the Recall

policy suggest the propensity of some students to Hoard information, which is a finding

discussed a bit more in RQ 2, and suggests that some students feel secure having more

information, even if they do not intend to use it. This practice, which has also been

referred to as squirreling information away, has been noted in studies of researchers and

students (Centre for Information Behaviour and the Evaluation of Research, 2008;

Connaway & Dickey, 2010; Carpenter et al., 2012). The recall policy takes that security

away.

Despite Library Policy seemingly being a significant Barrier to IE from the focus

group interview data, the interview participants and findings from other studies of

doctoral students did not report Library Policies as being significant Barriers. The amount

and frequency of Library Policies mentioned as Barriers likely reflect a sampling issue

because all of the focus group participants (except for one) attended the same institution,

so the fees and policies that vexed the focus group participants might simply be non-

existent at other institutions. For this reason, participants in the Phase 3 survey were not

solicited for their perceptions of library policies as IE barriers.

Other barriers

Other LIS studies for the doctoral student population suggest that Cost (Tenopir,

2014), Distance from campus (Brahme & Walters, 2010), and delivery Time (Carpenter

et al., 2012; Catalano, 2013) could present Barriers to IE. As described above, the focus

group participants seemed to value free access to information very highly, and they

specifically tended to agree that they should be able to access any resource that they

needed for free. Some participants were especially tenacious in convincing the library to

purchase DVDs (P14, P18) or books (P18, P16, P21) so that they could borrow them.

They were also willing to reach out to other scholars, including colleagues at other

institutions or the author(s) of a document for a copy, when all else failed. This practice

fills a similar function as the "invisible college," a term first coined in the 1600s by

Robert Boyle (OED, 2017), and later applied to the circulation of prepublications and

other scholarly communication among researchers and academics (Crane, 1972).

Certain discipline specific archives, such as arXiv.org for physics mathematics,

and computer science, are modern day equivalents of the invisible college through their

provision of open access to publications, especially pre-publications. However, these are

primarily for the sciences, and only one participant (P19) in Phases 1 and 2 mentioned a

social science archive similar to arXiv.org, and that was lingbuzz, a linguistics archive. In

the social sciences, the use of academic social networks, such as ResearchGate and

Academia.edu seem to provide an updated take on invisible colleges. Rather than

anonymous sites, such as SciHub, academic social networks fall more in line with the

personal aspect of sharing information. Participants, such as Participant 9, felt that asking

for information on these sites could also facilitate Networking with other scholars.

As mentioned before, participants were also willing to spend money on certain

resources, whether it was paying a late fee (P32) or buying it from a vendor, especially if

it was not too expensive (P14). The varying circumstances that caused some students to

pay for materials that they could access through the libraries prompted the inclusion of

willingness to pay (WtP) questions for books and articles, and the responses to how much

Phase 3 survey participants were willing to pay were dependent variables for behavior

predicted by their personality, confidence, and interest indices and clusters.

Phase 1 and Phase 2 participants were less willing to compromise on Time, especially the time needed to travel if they had to come to campus to pick up items, such as Participant 15. Although no students reported being in online doctoral programs, which meant that at one point they had attended at least some of their classes on their institution's campus, some participants had moved away from campus after they completed their coursework. Participants who had defended their proposal were more likely to have moved away, and some were working at other institutions. Distance was not a significant factor in doctoral student attrition reported by the CGS Ph.D. Attrition Project (Sowell, Zhang, Bell, & Redd, 2008; Sowell, Bell, & Kirby, 2010), but Distance can affect access to information. Participants were not willing to come back to campus to access materials (P15) or to ask for help (P29). With regard to asking for help, some participants noted that they also did not ask for help when they were closer to campus (P31), which suggests that being willing to ask for help was an individual factor that was less liable to change over time.

These findings differed from a study of distance doctoral students in education, which found that these students actually preferred to use library resources and were likely to contact librarians for help (Brahme & Walters, 2010). Although mentioned infrequently as a Barrier in Phases 1 and 2, the participants in the Phase 3 survey were asked if they lived over an hour from their program's institution, and this variable had significant impacts on their views of library instruction and willingness to pay for a book, which are further discussed under RQ 3.

Large scale studies (Carpenter et al., 2012) and meta-analysis of doctoral students (Catalano, 2013; Spezi, 2016) have suggested that delivery or the Time needed to access

materials is a major, if not the biggest barrier, that these students face. This barrier, however, was not mentioned very often in the Phase 1 and Phase 2 interviews. Students in coursework were more likely to state that a lack of Time before an assignment was due prevented them from contacting a librarian (P26), or increased their annoyance at not being able to find a resource (also reported in Radford, 1993). However, it is also possible that students in the social sciences, or at least the ones in this study, were simply more willing to Satisfice (Simon, 1955), or find something good enough for their assignment (P3). Catalano's (2013) meta-analysis of graduate student, including doctoral, information seeking behavior concluded that Satisficing due to time constraints was found in most studies for this population. Taken together with Participant 3's statement above, it seemed that time was a barrier, but that its effect was situational and contextual. A willingness to Satisfice was likely a personality trait, and therefore of greater importance to the study, so Phase 3 participants were asked about that rather than how they felt about delivery or access time.

Summary of RQ 1 discussion

This dissertation's findings highlight the importance of doctoral stage on student IE behavior, and it is important to also keep in mind their ever constant need to seek and incorporate new information as they situate their work (Barrett, 2005) and become experts of their field (Fleming-May & Yuro, 2009). Library resources, services, and Policies can help or hinder student IE. Library Instruction can be effective in teaching students about databases and how to find information, but student experiences with it vary in unpredictable ways. Library Policies can hinder student access to information, but

this can vary by institution. While Task and institutional variables acted as Facilitators and Barriers to the participants, as discussed in this section, individual student factors, especially how they perceived these Facilitators and Barriers, appeared to have the most influence on their perceptions of the library and their IE behavior. The section to follow on RQ 2 continues this discussion.

Discussion topics for Research Question 2 (RQ 2): What IE types exist for doctoral students?

The discussion about RQ 1's results posited that situational and institutional variables posed what were generally considered Facilitators and Barriers to IE for the doctoral students in this study. However, the range of participant responses, as measured by their responses and behaviors, to these Facilitators and Barriers varied, and other LIS studies report similar variations. Consequently, RQ 2 describes individual factors that might influence a particular student's response to IE challenges, Facilitators, and Barriers.

Resource preferences

LIS studies of doctoral students often begin with an acknowledgment that the complex needs of doctoral students within and between academic disciplines, coupled with their journey to establish themselves as scholars, make them a group that has a high potential to need information that their academic libraries can provide (Fleming-May & Yuro, 2009; Harris, 2011; Mikitish & Radford, 2013). A major complication with offering instruction to this group of students is that doctoral work tends to be

interdisciplinary (Earp, 2008), and disciplinary differences are often cited as significantly altering IE behaviors, such as resource preference and searching behavior (Catalano, 2013; Spezi, 2016). However, later studies have suggested that doctoral students in certain areas have more similarities than differences (Spezi, 2016), and this finding was reflected in the dissertation data.

The interview participants in Phases 1 and 2 primarily discussed finding and using journal articles and books. However, journal articles were what participants tended to look for first (P35), and sometimes they would not even consider looking at a book unless it had a specific article in it (P4). Phase 3 participants were asked to rank the importance of several types of resources, and results of this question indicate that journals are by far the most important resource for these social science students. This finding is consistent with other studies that focused on or included social science doctoral students (Research Information Network, 2010; Fleming-May & Yuro, 2009; Carpenter et al., 2012; Niu & Hemminger, 2012; Spezi, 2016), and more senior researchers also find journals, especially peer-reviewed ones, as the most important resource for their work (Nicholas et al., 2010; Tenopir, King, Christian, & Volentine, 2015).

Resource preference was one area where the participants in this study were similar to social science doctoral students who had participated in other studies. Other scholars have stated that doctoral students have similar requirements, levels of information need, and academic ability (e.g., Harris, 2011), so it is possible that they vary less in the range of behaviors than other student groups. This was very evident when the individual interview participants in Phase 2 were asked to recount critical incidents where they searched for information as most described identifying keywords, going to specific

databases, and then finding related items through "snowballing" (P22) before contacting someone else. This process was similar to the responses for critical incident questions where information was successfully found.

The similarity of responses resonates with Monroe-Gulick and Petr's (2012) study findings of first semester social science graduate students who were pursuing a master's degree. Snowballing, which has been referred to as pearl growing (Markey & Atherton, 1978), is often used by doctoral students when seeking information on an unfamiliar topic (Earp, 2008; Barrett, 2005; Vezzossi, 2009). By starting with this strategy, rather than keyword searches, many researchers, including Macauley and Green (2007), concluded that graduate students are not as information illiterate as some LIS scholars and practitioners might assume. It also suggests that doctoral students, like more senior researchers, understand that quality and trustworthiness are important indicators of research quality (Tenopir et al., 2015). However, the nature of doctoral work can lead to other challenges besides finding information.

Other IE challenges

In addition to Not Finding information, discussed above in RQ 1, initial Keyword Searches could also yield too many results, which was overwhelming (P23). Few participants were willing to search through thousands of results like Participant 25, and many were not concerned about potentially missing useful information (P22). Participant 25 was in his coursework stage, and Participant 22 was finishing her dissertation, which suggests that the range and variance of doctoral student perceptions of information

overload (Barrett, 2005; Carpenter et al., 2012) are individual characteristics that may not necessarily change as the student progresses through their program.

The interdisciplinary nature of social science work (Earp, 2008) also requires social science students to find information in unfamiliar disciplines that could include having to learn new tools, such as different databases, or new types of information, such as primary sources rather than secondary sources, like Articles. These old and esoteric articles (P24) were sometimes provided by library ILL services, but articles received through this service were missing some context. For instance, Participant 24 was an individual interview participant in Phase 2, and his comment that he might have been the only person to ever ILL a certain article highlights a Barrier to Situating Work. He believed that he might have been the only person to ever ask for that article to be digitized, but that may be because ILL services do not make these numbers publically available, if they are tracked at all. In contrast, many participants found Google Scholar to be helpful because it allowed them to see how many times other scholars had cited a particular article. Google Scholar was also useful for participants looking for more than articles, and students in all stages of their program were likely to use it as a tool, if not their primary tool for finding information because it returned so many different types of results. If the participants, such as Participant 19, were interested in documents beyond peer-reviewed articles, then Google Scholar was more helpful.

The diversity of responses to common information related tasks and IE challenges suggested that different individual characteristics might be stronger predictors of behavior than demographic ones, such as the participant's stage in their program, their gender, or their age. A discussion as to why interest in library instruction was tested as an

independent and a dependent variable in this study appears in the discussion of RQ 1 findings, above. The interview data formed the basis for the personality and confidence variables, respectively, and these are explained in the next section.

Developing personality, confidence, and interest as independent variables

The individual interview findings in Phase 2 built upon the initial focus group interview findings in Phase 1, and then these qualitative findings were tested quantitatively in Phase 3. The qualitative thematic codebook based on the Phase 1 and Phase 2 data lists and defines the themes and factors that differentiated between participants' information seeking and include: Prior Knowledge, Tenacity, Certainty, and Hoarding (see Appendix G). However, these concepts were not tested to be underlying factors in participant behavior in Phase 3 because in the prior two phases they were found to be inter-related and participants varied from situation to situation.

For instance, the final codebook based on data from Phase 1 and Phase 2 juxtaposes Tenacity and likeliness to Satisfice at two opposites on a continuum of how strongly participants would pursue an item or search for an item. Some participants appeared to be very tenacious when relating how they performed IE related or other tasks, such as Participant 16 who would spend over an hour looking for information before asking another person for help, even though she realized help was available. Tenacity, as defined in the final codebook in Appendix G, relates to a desire for independence, which other studies of doctoral student preferences for information seeking and other information behaviors have reported (Fleming-May & Yuro, 2009; Carpenter et al., 2012; Mikitish & Radford, 2013; Catalano, 2013; Spezi, 2016).

However, Tenacity could also vary depending on how important the information was to the participant at different moments in time.

In analyzing the interview data, it becomes apparent that the open-ended focus group interview questions and the critical incident interview questions were useful in identifying the range of doctoral student IE behaviors in general or in critical incidents of their choice. Analysis of these responses confirmed that the 35 total interview participants had similar levels of knowledge and similar IE behaviors to what other LIS studies of this population have reported. Analysis of results for RQ 2 found that in general and in successful searches for information, participants had similar preferences or routines.

Analysis of the qualitative data found participant response to information searching challenges to be more useful in grouping participants. Analysis of Phase 3 survey data attempted to test the effect of three different concepts on participant behavior. The first, interest in library instruction was discussed in RQ 1. The second was personality because when searching for information, some participants were more open to explore a lot of information, even if it meant sifting through large amounts of information or using unfamiliar searching resources or tools. These students were less likely to express information overload (Barrett, 2005). When faced with a finding or access challenge, some participants were more hesitant than others to ask for help. Other studies have found that students were hesitant to ask librarians for help (Catalano, 2013), as well as faculty members (Carpenter et al., 2012; Spezi, 2016). These two tendencies combined to form the personality variables. Participants with high levels of agreement to these questions were more open to receiving information and seeking it from others.

The final independent variable that came from analysis of the Phase 1 and Phase 2 data was participant confidence, which is the opposite of feeling anxious about finding the correct information, a hindrance reported by Blummer et al. (2012) and Spezi (2016). Participants with high levels of confidence believed that they could find information and did not claim to feel as challenged by particular obstacles, such as the participant who asserted that, "Nothing stops me per se. I mean, if it's out there I'll find it" (P6). Other studies of doctoral students have also reported that their participants had varying levels of confidence, but these were mainly small scale qualitative studies (Barrett, 2005; Earp, 2008; Fleming-May & Yuro, 2009; Mikitish & Radford, 2013).

Indices and clusters

No other study for this population created an additive index or clusters to predict IE behavior. The Zickuhr et al. study (2014) was the only one that grouped participants based on their responses to Likert-scale response questions using factor and cluster analysis. This inductive style of grouping participants has important advantages over deductive ones like the one used in this dissertation. Most importantly, researcher bias has less of an effect on the creation of the factors that separate participants. On the other hand, it is unclear what the effect of situation variables had on these groupings, and the analyses used in the Zickuhr et al. (2014) study required more participants than this dissertation could recruit.

When using index scores to predict other index scores and cluster membership to predict other cluster memberships, the results were largely unsuccessful. For instance, the cluster analyses also found personality cluster to be able to predict confidence cluster, but

due to the small effect size the results of that analysis were not reported. The implications and future work outlined in Chapter 6 discusses how future studies can mitigate the limitations of this study. However, the ability of some index scores for participants in certain sub-groups to predict their score on other indices suggests that the independent variables are related.

The first sub-group that had significant results were those in the final stage of their doctoral program. The confidence index scores of participants in the Dissertation stage were able to significantly predict their interest index score with a large effect size. This was a negative relationship, which meant that as participants increased in their confidence to find information, they were less likely to be interested in library instruction classes. At face value, this finding seems to contradict the wisdom behind offering library instruction for students in this stage, but follow-up interviews or collecting more data on which part of the Dissertation stage the students were in might play a factor. In other words, if the students who were more interested despite their high confidence scores, it could be because they had not yet finished their dissertation literature review, and actually could benefit from additional instruction, such as the dissertation research and writing workshops suggested by other studies (Libutti & Kopala, 1995; Fleming-May & Yuro, 2009; Du & Evans, 2011). The other possible issue could be the wording of the question. One question asked about a personal preference for face-to-face instruction for the participant, but the other two asked how useful they thought library instruction would be for other students in their program. As discussed in Chapter 6, further work needs to clarify the questions used as variables in the interest and other variable questions.

The other sub-group that had higher predictability were the distance students. Perhaps because there were only 13 of these in the survey portion of the study, their views were more homogenous. Specifically, confidence score could predict interest score, and personality score could predict confidence score. The confidence index score's ability to predict the interest index score had one of the largest effect sizes in this study. Based on the findings for this sub-group of distance students and the students in the post-proposal stage, it is likely that confidence does in fact have a negative relationship with interest in library instruction. For the distance sub-group, distance students who scored higher on the personality index were more likely to score higher on the confidence index.

Summary of RQ 2 discussion

In conclusion, the qualitative study findings in Phase 1 and Phase 2 suggested several possible ways to categorize participants. However, these categorizations did not seem to take into account the variance of behaviors that participants described in different situations, especially ones that challenged their IE. Rather than using factor analysis, which was used in the Zickuhr et al. (2014) study, this study used additive indices and clustering to group participants by their responses to a variety of challenging situations. The results of the analyses for this RQ indicate that certain index scores could predict others, but this was only statistically significant and applicable to a large proportion of the participants of certain sub-groups. Moreover, the clusters formed in this study could not predict membership in other clusters, unlike the clusters generated and tested in the Zickuhr et al. study (2014). One major contribution of this study is that it then uses the

variables, indices, and clusters to predict independently measured variables of participant behavior or proposed behavior, which is discussed in the next section.

Discussion topics for Research Question 3 (RQ 3), which asked: How is IE related to the value of academic libraries?

The RQ 1 and RQ 2 discussions above confirmed other studies' findings that doctoral student IE behavior varies in often unpredictable ways. The additive indices and clusters discussed in RQ 2 had limited predictive power. The results for RQ 3 had similar levels of success in predicting independently measured participant behavior, but it is the first time IE behavior has been significantly predicted for this population.

Willingness to pay (WtP) and usage variables

Michie, Van Stralen, and West's (2011) capabilities, opportunities, motivation, and behavior (COM-B) engagement model provided the basis for this dissertation's model. The qualitative findings from Phases 1 and 2 suggested an alternate model, which is depicted in Figure 8, below.
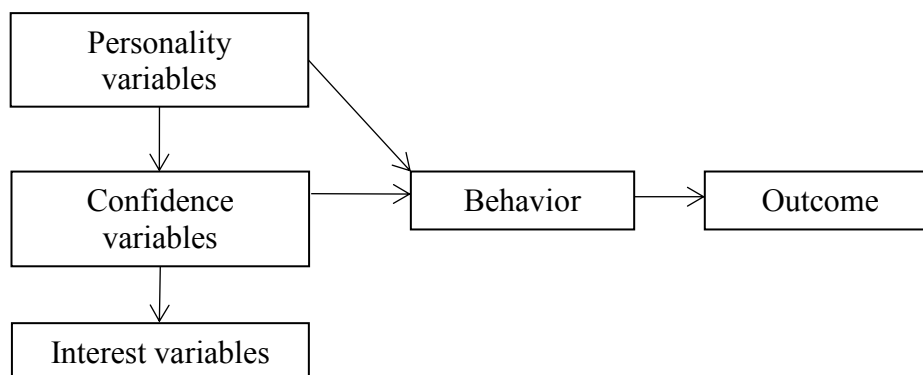
Figure 8: Doctoral student information engagement model (DSIEM)

Rather than using capabilities, opportunities, and motivation to predict behavior, the qualitative findings of this dissertation's Phase 1 and Phase 2 interviews suggested other individual factors, which were tested as independent variables (IVs) that could influence their behavior. This data also suggested different IE behaviors that could be tested as dependent variables (DVs). Library value literature has suggested that economic and usage variables have strong face validity among those in LIS and others (Saracevic & Kantor, 1997; Oakleaf, 2010).

The Phase 1 and Phase 2 interview data identified the Cost of materials and Library Policies, such as ILL Fees, as Barriers that prompted some participants to buy materials. As discussed under RQ 1, participants were willing to purchase resources, in spite of a strong and widespread belief that they should be able to access materials, especially articles, for free (Maughan, 1999). LIS studies have investigated academic library users' willingness to pay (WtP) for library services and resources (Melo & Pires, 2010; Kingma & McClure, 2015; Ko et al., 2016), although none have focused specifically on doctoral students.

As reported in Chapter 4, participants in this dissertation study were willing to pay an average of $28.73 with a maximum of $80 and an average of $10.16 with a maximum of $60 for a book and article that they needed for their research, respectively. These are much lower than the $66.67 and $30.39 that faculty were willing to pay for in-person and remote access of resources and services, but much more than the $5.31 and $13.14 that students were willing to pay for the same in a study by Kingma and McClure (2015). Ko et al. (2016) reported that university faculty and students in South Korea were even less willing to pay for books and journal articles. Faculty were willing to pay $6.31

for a book and $2.81 for a domestic journal article, while students were willing to pay $0.57 and $0.67 for a book and a journal article, respectively. These results are not comparable to this dissertation's findings because a further breakdown of what each level of student would pay in the Ko et al. (2016) is not available. However, they do reinforce the idea that these values can vary greatly, which was reflected in the few significant results for tests involving this DV.

Although personality index and confidence index scores could separately predict how much the participant would pay for a book, the effect size for these were very small. By combining all three indices, the model as a whole was significant, however only the personality index variable significantly contributed to the model. The effect size though was slightly larger than when the personality index model was used by itself to predict the amount. This suggests that the indices as a whole are not very strong predictors for the willingness to pay DV, and suggestions to improve future work are discussed further in Chapter 6.

The distance sub-group of 13 (11%) survey respondents' confidence index scores were able to predict the amount that the participant was willing to pay for a book with a large effect size. The amount increase was almost one dollar more for each dollar increase on the confidence scale, as reported in Chapter 4. This was the largest value per point increase on the willingness to pay variable, and this finding reinforces the idea that certain demographic factors, especially distance from campus (Catalano, 2013), can affect IE behaviors.

Library usage

Comparing library usage numbers for use of reference services and visits to the physical library with other studies was also difficult. The average participant in Phase 3 of this study asked a librarian for help and visited the library less often than once a month in the previous semester. These usage levels are lower than those reported by participants in other studies of social science doctoral students (Fleming-May & Yuro, 2009; Green & Macauley, 2007; Mikitish & Radford, 2013), but similar to those in larger studies (Carpenter et al., 2012). This suggests that students who are willing to be individually interviewed may be more likely to use the academic library than those who are willing to take an online survey, which is discussed further in Chapter 6. Library usage could not be statistically predicted based on the IVs used in this study, and the implications of this are also discussed in Chapter 6.

Personality variables and resource preference

The last type of DV was resource preference prediction for a specific situation, which was when the participant was looking for information on a topic that they were not familiar with. As reported in Chapter 4, 63 (51%) participants in Phase 3 selected Google Scholar or a search engine as the source that they were most likely to consult first, which is similar to other studies that found half of the doctoral students in the study were likely to start looking for information using an Internet search engine (Niu et al., 2010; Blummer, 2012). As reported in Chapter 4, this preference was significantly predicted by the variables used to create the personality index and the personality cluster. It was the only significant finding out of the 45 binary logistic regressions run for all variables

related to this RQ. The variables predicted what the participant would start with correctly in 73.4 percent of the cases. However, only one of the individual personality variables was significant. This variable asked the participant to rate on a 7-point Likert scale if they used Google Scholar because it cast the widest net. This means that out of the 11 questions grouped into this variable, only the participant's response to this question had a significant effect on their resource preference. Specifically, it suggests that the Phase 3 participants were more concerned with information overload, similar to the participants in Barrett's (2005) study, which is why those that believed that Google Scholar cast the widest net were less likely to use it or a search engine when starting a search on an unfamiliar topic. The fact that it took 11 variables to predict this suggests that greater variability in the IV is more likely to yield a significant prediction of the DV, but more work is needed on this topic.

Summary of RQ 3 discussion

The few successful DV predictions indicate that more work is warranted on the topic of social science doctoral student IE. Stronger models were achieved by increasing the variability of the IVs and limiting the response pool to sub-groups of the study population. The significant findings suggest that the model should be changed a bit to include the interest index as a DV of the personality and confidence constructs separately. The index prediction findings suggest that as participants increase in their confidence index score, their interest in library instruction index score decreases. Greater confidence scores made it more likely for participants to pay more for books, which was an unexpected finding considering the interview participants were generally against paying

for anything that they could get from their library. However, this finding makes more sense given that it is most pronounced in distance students, who live farther away from the library. This underscores the importance of situational and individual variables on seeking information. Only by looking at a sub-group of doctoral students that cannot easily get to the library, who are confident in their searching abilities, and who feel less challenged by searching obstacles, was it possible to predict that they would be willing to pay more for books that they needed for their research. While more research is needed to explain contradictory findings within this dissertation study and within LIS literature, the topics that libraries can include in instruction sessions to help students increase the IE is less ambiguous. Suggestions for library instruction are covered in the next RQ.

Discussion topics for Research Question (RQ 4), which asked: How can academic libraries promote increased IE of doctoral students?

The first RQ identified the critical factors that affected the Phase 1 and Phase 2 social science doctoral student participants' IE, and identified them to be mainly situational and institutional factors. The second RQ identified individual factors in Phase 3 participants that scored them on additive indices and grouped them based on personality, confidence, and interest variables. The third RQ attempted to use these individual variables to predict Phase 3 behaviors, which included willingness to pay for a book and an article, library usage, and resource preference. The fourth RQ relates the findings of these questions to suggestions for how academic librarians can promote increased IE in this population via library instruction. The sub-sections for this question

relate to the qualitative themes developed in Phases 1 and 2, and which are listed in Appendix G.

Outcomes/goals

As discussed in Chapter 3, engagement studies tend to relate engagement activities to defined outcomes and goals, but few studies of doctoral students have looked at goals beyond finding information. participants in the phase 1 focus groups were able to generate several outcomes/goals that they connected with their searches. These outcomes/goals were related to the participants' continual situating of their work. As discussed in RQ 1, participants are willing to take information that they have found and apply it to future goals, which included grants, jobs, or other future related career goals, participants were excited to realize that their searches could lead to successful outcomes in those areas. At the end of one focus group, a participant enthused: "I feel like I've learned more. I didn't know what to expect coming here, but I'm actually leaving with information, so that's great" (P16).

In contrast, the individual interview participants were less likely to apply the information that they found to Outcomes/goals. Occasionally some even asked the researcher what other participants had suggested. Despite not being able to think of many Outcomes/goals, once Outcomes/goals were suggested to them, they were usually willing to agree that they would consider them to be related to IE, and if they had not done something similar, they would consider doing so in the future. The survey participants' responses to questions asking if they would consider using information that they found to various goals/outcomes were also overwhelmingly positive. Out of the options, using

information to Network had the lowest mean score, which once again suggests that certain participants are hesitant to reach out to other scholars. Findings suggest that the use of social media is one topic that seems to be gaining interest among this group of students.

Social media networks

The qualitative data collected in this study seemed to indicate that certain social media platforms were very useful to some participants when used for certain tasks, such as finding information or connecting with scholars, but it did not seem to be widespread. The Carpenter et al. (2012) study suggested that doctoral students are cautious to adopt new technology. Since then, more research has been published on whether these are social or academic networks (Thelwall & Kousha, 2014), disciplinary differences between usage (Ortega, 2015), and their limitations and possibilities for growth (Williams & Woodacre, 2016). While scholars in LIS seem to accept that social networking sites, such as Twitter, Facebook, and LinkedIn, can be used to maintain ones' scholarly identity, more recent articles have differentiated between those sites and academic social networking sites, such as Academia.edu, ResearchGate, Zotero, Google Scholar, and Mendeley (Thelwall & Kousha, 2015; Ovadia, 2014; Williams & Woodacre, 2016). The participant responses resonated with the findings of the literature summarized by Williams & Woodacre (2016).

The quantitative survey findings suggests broad patterns of use for certain platforms, and participants in this study seemed to use social networking and academic social networking sites differently. For instance, survey participants were more likely to

use Academia.edu and ResearchGate to find information and post their own research. Participants were more likely to use Facebook and LinkedIn to connect with scholars after meeting them in person, and to a lesser extent to connect with scholars prior to meeting them in person. Participants were more likely to use scholarly Listservs only to find information, while Twitter had low usage rates overall.

Although academic social media sites use was not widespread according to the Phase 3 survey, when survey participants were asked to rate their interest on 7-point Likert scales on information topics, the "Managing my scholarly identity" option had the highest mean score. On average, each participants was more likely to be more interested in this topic than not, which similar studies have found (Carpenter et al., 2012; Gessner, Jaggars, Rutner, & Tancheva, 2011). In addition to identifying that social science doctoral students are likely to be interested in managing their scholarly identity, this dissertation's findings, specifically the participants' responses to the magic wand question, also suggest that reframing instruction on how to find information could be useful in increasing IE.

Tasks facilitated by magic wand

Only the individual interview protocol included the magic wand question, which asked, "If you had a magic wand that could help you in future searches, what would you have it do?" This means that only 15 participants responded to it. Out of all of the focus group and individual interview questions, the magic wand question had the widest range of responses. Some responses would require magic to exist, such as the "robot wand" (P32) that would know what the user wanted and would deliver it immediately. Others

were more manageable, especially the removal of library policies that prevented

immediate and indefinite access (P28). In fact, some responses described existing library

resources and services for seeking, filtering, accessing, and organizing information. For

instance, controlled vocabulary such as subject terms or thesauri could identify the

synonyms (P33) or scholarly terms (P26). Advanced searching allows for the exclusion

of specific journals (P30) and looking for keywords in multiple fields (P27).

Finally, some responses to this question suggested tools for finding information

that could be possible in the near future. These include pop-ups for recommended articles

based on what a user has accessed, which is a new feature in Science Direct, Scopus, and

Mendeley. Although researchers today might have to hope to find an encyclopedia article

or meta-analysis similar to the "brain map" (P29) that contains the history of thought

behind an idea, in the next 10 or 20 years, this brain map could indeed be automatically

generated by linking together information that scholars have accessed and cited. While

the results of the magic wand and other questions indicated that the doctoral student

participants in Phase 1 and Phase 2 are not aware of the existing library resources and

services that can benefit them, they were eager to learn once they realized that they were

not struggling alone, a common feeling among doctoral students (Carpenter et al., 2012).

Summary of RQ 4 discussion

In conclusion, the dissertation's qualitative data suggests that academic librarians

should offer instruction the use of academic social networks to maintain a scholarly

identity and how to find information for this population. The former is an emerging topic,

and currently may only apply to certain scholars in certain fields. The latter is a common

topic in library instruction, but the results of this and other studies suggest that it has not been very effective. When asked to rate their interest in learning about information topics, participants in the Phase 3 survey were least interested in learning about the library resources available to them. This suggests that library instruction classes need to reframe themselves to get appropriate information to the correct users and entice the non-users to take advantage of the library's resources and services. A discussion of the limitations of this study, implications of these results for practice and theory, plus directions for future work follow in Chapter 6.

CHAPTER 6: LIMITATIONS, IMPLICATIONS, AND FUTURE STUDY

This chapter outlines the limitations and implications of the dissertation. Based on the qualitative and quantitative findings, it then recommends directions for future study. Each section is further split into theoretical and study design recommendations.

Limitations

This dissertation explored an emerging topic in an understudied population. It drew on engagement studies in Education and user studies in Library and Information Science (LIS), but did not draw from an established theory. Due to its exploratory nature, its results are not generalizable to its target population, which is social science doctoral students, beyond the participant group itself. The theoretical and study design limitations are identified below.

Theoretical limitations

In this dissertation, the model proposed and later revised was based in the literature review including the limited empirical results available to date. No previous model of information engagement (IE) within LIS could be found for this population. The engagement models from the field of Education were more applicable to this area of research than the LIS model of O'Brien and Toms (2008) because the latter deals solely with information in an online environment. However, many of the variables and outcomes that are measured using models from Education are not applicable to information or academic library contexts. A very basic model of engagement from the

field of Health Informatics by Michie, Van Stralen, and West (2011) formed the basis for this dissertation's model.

In addition to being limited to a single model, the study only drew from LIS and Education research. Although data analysis ultimately concluded that individual perceptions are important in shaping the engagement of this population, theories and studies from the field of Psychology were not consulted in the study design. In a similar manner, although the topic of academic library deals with value, it did not draw from the theories or studies in Economics.

Design limitations

The restricted range of the doctoral student population was a major limitation in this study. The chosen study population was social science doctoral students in programs in the United States, except for LIS doctoral students. This population makes up a small percentage of students in higher education, and the design excludes doctoral students in the sciences, humanities, and professional schools; other graduate students; and undergraduate students. Out of the remaining students, a relatively small sample of 158 doctoral students participated in the study. In Phase 1, only 20 students from one solicited university participated in the focus group interviews which were designed to be exploratory, informing Phase 2 and 3. In Phase 2, only 15 students from one national listserv and a listservs in one institution participated in the individual interviews, which were also exploratory, building on Phase 1 results to inform the survey development. In Phase 3, 123 students from 15 solicited institutions filled out the online survey. The population size limited the analysis methods, such as exploratory factor analysis, that

could have been used to analyze the quantitative data. In addition to having a small sample size, the participants were not randomly sampled from the study population. This means that the study results are not generalizable to the study population beyond those surveyed. It is possible that the formats of the in-person focus group and phone individual interviews could have made it more likely for library users rather than potential users to respond to the recruitment fliers, but this was not reflected in the library usage data collected in all three phases.

Several measures were taken to mitigate the effect of these limitations. First, the methodology was designed to intentionally narrow the range of responses by starting with open questions in Phase 1, moving to critical incident questions in Phase 2, and ending with quantitative survey questions in Phase 3. At the same time, the pool of potential study participants was widened. In Phase 1, the researcher emailed the social science doctoral program chairs at one university with a request to email their students a study recruitment flier, while in Phase 3, the researcher emailed the program directors at over 100 departments in the social sciences at 14 institutions with this request. In terms of inclusion in the study, potential participants in Phase 2 had to pass the strictest criteria for inclusion in the study, because only five students from each of the three phases was included. This limitation was removed in the other two phases. Nearly all of the potential participants who expressed interest in the study passed the screening for each phases, but a few self-selected to not participate afterwards by either not scheduling an interview, failing to show up for an interview at the appointed time, or not filling out the survey. The mixed methods design of the study facilitated the measures taken in each phase of the dissertation study. By varying the data collection and analysis methods in each phase,

the strengths of each helped triangulate participant responses across the study. The qualitative data gathered in Phases 1 and 2 provided rich examples of doctoral student IE, which identified a variety of behaviors and factors that could potentially explain those behaviors. The quantitative survey used in Phase 3 helped test the extent to which the factors uncovered in Phases 1 and 2 predicted behaviors in a larger sample of participants.

The data collection design also was a study limitation. Participants were asked to share increasingly less demographic information at each phase of the study because that information did not seem to affect the results, and the small sample sizes made those potential effects difficult to measure. The range of responses were also limited. For example, usage was split into five ordinal levels, which narrowed the variability of the data. Participants in each phase also self-reported their past or intended actions, so it is possible that they reported what they wished they had done or would do instead of what they actually had or would do in certain situations. In addition to doing this purposely, it is also possible that they did so unintentionally due to the Hawthorne Effect (Roethlisberger & Dickson, 1939). The interview data collection was limited in that it only consisted of audio recordings and notes taken by the researcher and assistants, so there were no visual cues in the data. The transcription process also included mainly verbal data, although laughter was recorded. However, other information such as the length of pauses and participant tone of voice were lost.

Finally, the entire dissertation was susceptible to researcher bias. Miles, Huberman, and Saldaña (2015) state that researcher bias includes the "effects of the researcher on the case" (p. 296) and vice versa. This bias potentially went beyond the

subjectiveness that Corbin and Strauss (2015) claim is inherent to qualitative research, as in the data collection and analysis in Phases 1 and 2. An example of avoidable potential bias was that the researcher interviewed and paid each of the participants in Phase 1 and Phase 2. In Phase 3, the researcher contacted and paid each of the participants. This high level of involvement could have had an effect on the participants' joining the study and their responses to the interview and survey questions. Radford and Connaway (2017) suggest that assistant moderators should compensate participants in focus group interviews rather than the primary researcher. Shoaf (2003) also suggests using a professional moderator for focus groups in order to reduce researcher bias, and a similar logic would suggest using another person besides the researcher to conduct the individual interviews.

Another example of the researcher's effect on the study was that some participants may have been affected by the fact that the researcher was a doctoral student, like them, and eight of the Phase 1 focus group participants were in the researcher's own doctoral program, albeit in different departments and area of concentration of study. These affiliations could have made the participants more candid, but they may also have been more reticent so as not to hurt the researcher's feelings or damage their reputation in the researcher or their peers' eyes. So while Young (1993) suggests that participants in focus groups may be less inhibited in their responses, it is more likely that participants felt more pressure to conform to the group's consensus (Connaway & Radford, 2017). At the same time, the study could potentially effect the researcher because she was a doctoral student. Miles et al. (2015) also caution that the researcher may go native, which

involves being "co-opted into the [participants'] "perceptions and explanations" (p. 294). As a doctoral student herself, the researcher was already a native.

In order to mitigate potential researcher bias, measures were taken to obtain additional input and points of view in the data collection and analysis process. Specifically, in the focus group interviews, there were one or two graduate students taking notes as the researcher moderated the discussion. These assistant moderators, who were also in the LIS Area of Concentration in the PhD program, were encouraged to ask clarification or follow-up questions, which helped give more insight into areas that the researcher may have overlooked. These notes were incorporated into the data analyzed in Phase 1. Participant responses were written on white boards during the focus groups so that they could suggest additions or modifications, which Connaway and Radford (2017) suggest is a useful way to ensure that the data collected accurately reflects participant responses. Finally, the researcher developed the qualitative coding schemes, so these were highly subjective. The application of the codes was subjective, so another researcher trained in this method coded 20 percent of the qualitative data. There was a high percentage of agreement in inter-coder reliability, which suggests that the coding scheme and its application were appropriate and adequately reflect the data. . These study design and theoretical limitations have important implications for future studies, which are described below.

Implications

Despite the limitations outline above, the qualitative and quantitative analysis identified useful implications for future studies. Major theoretical and study design implications are identified next.

Theoretical contributions and implications

Bates (2005) described the three phases of theory building as being description, prediction, and explanation. Theories often accomplish those phases using models. The revised dissertation model uses the data collected over the three dissertation study phases to build upon four existing theories and/or models of engagement, described in Chapter 2. The model incorporates the factors of personality, confidence, and interest as being related to IE. It tests the effect of these factors on IE behavior. These tests indicate that personality variables had a significant effect on a participant's resource choice. Another series of tests also found that participant personality and confidence had a significant effect on how much they would pay for a book needed for research, and that the largest effect size for this relationship was for students who lived more than an hour away from their institution. The personality and confidence variables were based on information seeking, which is a relatively theory rich area of LIS (Kim & Jeong, 2006). Resource preference relates to library usage, and the amount one is willing to pay relates to economic value. Usage and value are two ways of measuring academic library value (Saracevic & Kantor, 1997; Oakleaf, 2010). Therefore, these findings link the areas of information seeking and academic library value in a novel way.

At the same time, the model is simple and it has limited predictive power for IE

behaviors. This implies that future work should focus on model and theory building, and

suggestions for how to expand this work follow in the Directions for future study section.

The findings related to the model imply that variables for this population's engagement

should be measured at the individual rather than the institutional or situational level. This

is not to say that institutional or situational variables do not affect doctoral student

behavior, but rather that they should be the same for each study participant until enough

about the individual factors is known to partial out the effect of other variables in the

model.

The limited number of quantitative significant findings also implies that the value

of academic libraries to participants and the IE of this population might benefit from

being studied separately until more is known about both. The dissertation's findings

about doctoral students' constant situating of their work implies that the cognitive

information behavior approach might have limitations that a different meta-theoretical

approach, such as the social constructionist information practice approach, would avoid.

This meta-theoretical approach is rarely, if ever, taken for value studies, and could also

be used to extend future work in the study of academic library and other types of value.

Practical implications

The theoretical implications outlined above imply that doctoral student

personality and confidence factors affect behaviors such as library usage and willingness

to pay for research books, which were used as proxies for academic library value. If these

information seeking related factors affect those behaviors, then in order to increase their

value, academic libraries need to affect information seeking. One way to affect information seeking is through library instruction, so the findings suggest takeaways for library instruction, especially for social science doctoral students.

The qualitative data anlaysis suggests that the effectiveness of library instruction that a student may encounter up to and including their doctoral education can vary widely in effectiveness and perceived helpfulness. The focus group interviews in Phase 1 produced a much wider range of responses than the individual interviews in Phase 2. This finding was partially due to differences in the methodologies (Connaway & Radford, 2017), as discussed in Chapter 3. The focus group participants also enjoyed sharing information, learning about new resources and strategies for overcoming obstacles, and commiserating over shared challenges, such as not picking the correct keyword when searching for information. Other studies of doctoral students that used a focus group method for collecting data have made similar observations (Fleming-May & Yuro, 2009; Carpenter et al., 2012). While this finding suggests that group instruction might be a useful and enjoyable format for this population, the results from dissertation analysis on ambivalence to library instruction discussed in RQ 1 and limited interest in instruction as measured by the interest variable, index, and clusters suggest otherwise. This is not to say that this population will always prefer face-to-face instruction, which this study and other studies (Fleming-May & Yuro, 2009; Mikitish & Radford, 2013; Carpenter et al., 2012) have suggested is more desirable.

Qualitative and quantitative data analysis suggests that doctoral students in the social sciences may benefit from different types of library instruction at different times in

their doctoral career. These times relate to the challenges that they are likely to report

having in each stage of their program, and are listed below in Table 52.

	Seek	Filter	Access	Organize	Other
1st semester	Keywords; Google Scholar and similar; *Disciplinary databases**	*Subject headings*	*Article and book delivery*	Folders	Liaison's role; Scholarly info
2nd year	Disciplinary databases	Subject headings	Article and book delivery	Citation managers	Norms of scholarly ID in field
Before exams	Related databases; Liaison c*onsultations*	*Thesaurus*	Interlibrary loan; *Challenges if moving off campus*	Other organization apps	Networking; Academic Social Networks
Before proposal	Liaison consultations	Thesaurus	Challenges if moving off campus	Data backup and security	Findability; Metrics to determine scholarly impact
After proposal	Challenges encountered♦	Challenges encountered♦	Challenges encountered♦	Challenges encountered♦	Data use/reuse Copyright

Table 52: Summary of library instruction topics by doctoral student stage
*Topics in *italics* indicate that students should be made aware of these topics, but not necessarily in detail unless the student requests it
♦Indicates that students should be encouraged to lead the conversation/lesson by sharing what challenges they have encountered in order to fill any gaps in their knowledge

Each row in Table 52, above, suggests different IE topics across multiple IE behaviors

that can benefit students in different stages of their doctoral programs. Each column

suggests a sequence for providing instruction on different IE behaviors and topics so that

skills and knowledge scaffold, or build upon what was previously covered. It should also

be emphasized that Table 52 only suggests a rough guide for academic librarians, which

they can modify based on the skills, knowledge, and needs of the class or student that

they are instructing. Librarians can also ask faculty and students for their input on the

topics, timing, and sequence of topics outlined above, which could allow for possible

collaborations with faculty and students. After defending their proposal, doctoral students can also help run sessions for students in later cohorts, and the challenges that they have encountered can also provide valuable insight for future instruction for students in their program.

In addition to the topics outlined above, the interactions of the students in the focus groups suggest that group instruction may be more effective if reframed in three ways. First, doctoral students should attend sessions with other students in their discipline or who are studying similar research topics that require the same types of resources if students from multiple disciplines are being included. Currently, doctoral student instruction, with the possible exception of some dissertation writing workshops, is very similar to the course based instruction offered to other levels of students. However, students that are studying the same topic, but from different fields can provide valuable feedback to each other for how to identify keywords or introduce field specific resources to others. This leads to the second point, which is, instead of focusing on how to do searches in general, the participants should be asked what challenges they have faced and how they have overcome them. Third, the doctoral students should be encouraged to share the tips and tricks that they have learned for finding information.

Research on graduate student information seeking has already found that this population, which includes doctoral students, are likely to consult their peers (George, Bright, Hurlbert, Linke, St. Clair, & Stein, 2006), although the degree to which they do so can vary by discipline (Kerins, Madden, & Fulton, 2004). However, the studies of graduate and doctoral student information seeking indicate that doctoral students will have serious gaps in their information seeking knowledge and skills if they only refer to

other students for help. Therefore, having a librarian in who can facilitate these discussions and answer any questions that the group cannot answer with their collective knowledge could be a collaborative and effective way to teach information seeking and other IE skills.

In some ways this approach is similar to the flipped classroom approach. This approach originated in the field of Education, and is unique because it moves the theoretical component, which is usually covered by a lecture, outside of the classroom, and it moves the practical application, which is usually an assignment, into the classroom (Educause, 2012). This approach has been found to increase meaningful student engagement (Schullery, Reck, & Schullert, 2011), and Arnold-Garza (2014) argues that many characteristics of the flipped classroom approach are similar to what the ACRL recommends for information literacy instruction (ACRL, 2012). In particular, Arnold-Garza (2014) states:

> The most fertile ground…is Category 7: Pedagogy, which almost perfectly describes a flipped classroom, with emphases on diversity in learners and teachers, use of interactive and progressive activities, use of appropriate technology, connecting skills to real-world needs, and seeing the learner holistically, not just in one learning context (p. 12).

Reports of flipped classroom information literacy instruction primarily come from use in undergraduate classes (Maddison, Beneteau, & Sikoloski, 2014; Maddison, 2015; Cohen, Poggiali, Lehner-Quam, Wright, & West, 2016), where it was found that assigning students to view materials prior to the class was an effective use of time and helped ensure that the students were starting with a similar baseline of knowledge (Steffy, 2013). In fact, Miller (2013) suggests that putting in the students in small groups could facilitate peer learning, even if some of the students had not watched the lectures ahead of time.

The one reported study of flipped instruction in graduate information literacy instruction suggests that the sample of master's level students benefited similarly from this instruction style. From a library perspective, flipped instruction has the potential to be more effective for doctoral students because their relatively higher baseline of knowledge mitigates one of the primary challenges of incorporating this method in information literacy instruction, which is the challenge of assigning "pre-work to a class you haven't visited yet" (Arnold-Garza, 2014, p. 16). From a doctoral student perspective, if the library offered a few short electronically available videos or handouts, they could review them as needed, and research suggests that they might be more inclined to ask a librarian for help or attend a library instruction session if these materials are helpful (Sadler & Given, 2007).

Another way to help doctoral students, and other academic library users, would be to provide preemptive reference (Matthews, 2008) in which library staff or a service could automatically appear in situations where users may need help. This point of use help could include pop-ups in library catalogs or databases. Unfortunately, research on strategic pop-ups indicates that users may find them intrusive, and in some cases invasions of privacy. Mu, Dimitroff, Jordan, and Burclaff (2011) conducted a usability study for a virtual reference service that had three different methods of alerting users to the service plus one control that did not mention it. The 22 participants, including 10 graduate students, found the notice for the service that included pictures and text or a notice with just text as being more helpful than the pop-up notice that displayed when they did not find any results to a search or found too many results. Furthermore, the participants found the pop-up notice to be a violation of their privacy and intrusive. A

study of academic librarian perceptions of virtual reference services found that while 50

librarians out of 102 thought that the user would follow a pop-up prompt to ask for help if

they received too many or too few hits, 43 felt that the user would ignore it (You,

DesArmo, Mu, & Dimitroff, 2014). More importantly, 89 responded that the user would

feel negatively about such a pop-up in those situations, and more specifically, 27

responded that the user would feel it was intrusive and 18 responded that the user would

feel it was an invasion of their privacy (You et al., 2014). However, both studies did find

that factors such as awareness of reference services, pop-up timing, and transparency as

to why the pop-up was displaying could decrease the perceived intrusiveness and

violations of privacy.

Implications for study design

The significant factors behind this dissertation's strongest qualitative and

quantitative findings imply that similar factors in future studies can help focus the

population and variables in future work. The use of mixed methods to triangulate data

helped to focus disparate data on under-studied topics into significant quantitative

findings. The gradual narrowing of topic and broadening of potential population pool

described in the Limitations section, above, provided logical links between the findings

from each phase.

The need to have more variability in the dependent variables is another study

design implication of this dissertation. The amount of money that a participant would pay

for a book that they needed for their research was the variable that had the most

significant findings. The other dependent variables were mainly bivariate, and only one,

which was whether a participant would start with Google Scholar or a search engine

instead of another resource when looking for information that they were unfamiliar with,

had a significant finding. Suggestions for how to address the limitations and implications

of this study in future work follow.

Directions for future study

The limitations and implications of this dissertation provide several directions for

future study. The theoretical and study design suggestions are reported separately, below.

Theoretical diretions

Based on the limitations and implications of this dissertation, future studies on the

topic of doctoral student IE and academic library value may benefit by incorporating

theories from other fields, particularly Psychology and Economics. Theories from

Psychology could extend research by incorporating theories of individual behavior and

personality. There are also several psychological instruments that could be incorporated

into the study design, which are identified in the next section. Researchers have tested

these instruments over large samples, and their use can help make findings more

generalizable to a larger population. Economic theories have created different methods of

studying how people make rational value based decision. One such method is the

Contingent Valuation method, which has been used in LIS studies of academic library

value (Kingma & McClure, 2015; Ko, Shim, &Pyo, 2016), and provides more context for

willingness to pay variables. Theories from the field of Education can also extend future

work. Individual learning theories, such as Bandura's Social Cognitive Learning theory

(2001), consider at many of the same factors as engagement, such as attention, agency, and motivation. Possible study designs that incorporate some of these theories and methods are identified in the next section.

Study design directions

Different meta-theoretical perspective and theories suggest different methods for studying engagement and library value. Qualitative methodologies can expand knowledge about the different types of engagement factors, and more importantly to identify the other variables used to measure engagement behavior. Methodologies that take into account theories from Psychology and Economics can provide a different perspective on the personality, confidence, and interest variables developed in the dissertation. Quantitative methodologies can incorporate quasi-experimental designs in order to measure differences in IE based on different types of library instruction methods. For instance, a few randomly selected mandatory instruction classes could utilize the flipped instruction method suggested in the section above. The surveys used in future studies can also incorporate a larger range of responses in the variables. For instance, the dependent variable for usage could ask how many days it has been since the participant has visited a library rather than asking them how often they would do so in a typical semester.

Future work in both qualitative and quantitative studies could benefit from using more methods to triangulate interview and survey data. For instance, a future study could include an observation of an information seeking session where the user experiences challenges or is tasked to find information on a topic that is unusual. This unusual topic

could be in an unfamiliar discipline, or it could provoke a strong emotional reaction, which could be due to its importance or potential to change their field.

Depending on the study design, future work should utilize different sampling procedures. By recruiting random participants from clearly defined population pools, such as all of the social science doctoral students in one university, the study might be more likely to include more non-users of library resources and services. The results of this study would likely be more applicable to the population than the results of this dissertation's purposive sampling procedure. The sampling can also be used to interview and survey a more diverse set of participants. Possible participants could include academic librarians who instruct doctoral students, doctoral students in areas other than the social sciences, and experienced researchers who may be researchers or faculty members. These suggestions for future work, which are based on the limitations and implications of this dissertation's findings, have the potential to increase the LIS field's understanding of how doctoral student IE affects their valuation of the academic library.

Conclusion

This dissertation's limitations, implications, and suggestions for future work highlight the difficulties, but also the possibilities for defining and measuring academic library value. The values of education and the institutions that provide it are increasingly measured by individual outcomes that individual institutions identify and prioritize. What gives academic libraries an advantage over other units in higher education institutions (HEIs) is that LIS research has been shifting from the perspective of the user in the life of the library to the library in the life of the user for years (Connaway & Hood, 2015).

An important intersection between institutional and individual outcomes in higher education and academic libraries is the information needed to produce the scholarly publications, grants, and patents that can contribute to successful careers in academia. Doctoral students, and especially social science doctoral students, due to the interdisciplinary nature of the work in those disciplines, are an understudied population that need to engage with information and could benefit from library instruction to get that information. By framing this study in terms of engagement, this dissertation connects the fields of Education and LIS research. A brief summary of the dissertation's research questions (RQs) and significant findings follows.

RQ 1: What are the critical factors that characterize information engagement for doctoral students in the social sciences?

Based on the qualitative interviews in Phases 1 and 2 of the dissertation study, individual factors rather than situational or institutional variables led to the creation of factors that predicted IE behavior. Significant facilitators, which helped IE, included searching and organizing strategies, as well as awareness of the academic library resources and services that made IE more convenient. Significant barriers, which hindered IE, included not finding and not knowing how to access information. The former were based on topic or field specificity, and the latter was usually related to library policy.

RQ2: What information engagement types exist for doctoral students?

The qualitative interview data analysis from Phases 1 and 2 suggested that an individual's knowledge and personality affected their IE behavior. As a group, the doctoral students

who participated in these phases were also likely to start with familiar resources, until they encountered IE challenges, which usually occurred in their coursework and qualifying exam stages. The individual factors that affected IE behavior were conceptualized as personality, confidence, and interest. Participants in the Phase 3 survey were grouped via cluster analysis and additive indices based on their responses to questions that were related to these variables. A significant relationship among index scores indicated that Phase 3 participants who had passed their dissertation proposal stage were less likely to think that library instruction would be helpful to other students in their program if they had higher confidence in their ability to find information. A similar relationship was found for students who lived more than an hour from their institution. Also, distance students who had higher personality scores, meaning they were more open to asking for help/clarification; less unhappy if they retrieved a lot of information, even if it was unexpected; and would be more likely to consider changing their research based on what they found, were also more likely to be more confident in their information searching abilities.

RQ3: How is information engagement related to the value of academic libraries?

The qualitative and quantitative data analysis indicated that participants valued both electronic and print resources. Information was valuable for this group, and Phase 3 participants were willing to pay an average of $30 and $10 for a book and article that they needed for their research, respectively. At the same time, 75 (61%) of the Phase 3 participants were not willing to pay anything for an article. The personality and confidence scales could predict how much a participant would be willing to pay for a

book that they needed for their research, with an increase of $0.50 and $0.34 per point for the personality and confidence scales, respectively. For the distance students, this amount was $0.95 per point increase on the confidence scale. Participant responses to the personality variable questions could also predict whether a Phase 3 participant would start a search on a topic that they were unfamiliar with 73 percent of the time.

RQ4: How can academic libraries promote increased information engagement of doctoral students?

The qualitative and quantitative data analysis suggests that the participants in the study did find information important, but found it difficult to apply to outcomes beyond searching for, finding, and accessing a document. However, once other goals, such as career goals were suggested, many expressed interest. In fact, the information related goal that the participants in Phase 3 were most interested was how to manage their scholarly identity. This topic intersects with other IE tasks, such as finding and organizing information, which academic librarians can cover during library instruction.

The analysis of qualitative and quantitative data indicates that information plays an important role in the lives of doctoral students, but it can still be difficult to tease out what their perceptions or actions will be. The findings of this dissertation show that it is possible to identify patterns of behavior, especially for certain sub-groups of the participants. By identifying the information needs, behaviors, and outcomes of this under-studied group, librarian practitioners and LIS scholars can increase IE in effective and

significant ways that benefit academic libraries, HEIs, and the students, faculty, and staff

that those institutions serve.

APPENDICES

Appendix A: Glossary

Academic libraries: "libraries that belong to institutions of higher education including publicly funded, federal, state, provincial, or national universities or colleges, privately funded universities or colleges, two-year community or junior colleges which can be publicly or privately funded, tribal colleges, professional schools, and special focus institutions that offer a single or small set of programs" (Curzon & Quiñónez-Skinner, 2009, p. 11)

Engagement: "the amount of time and energy devoted to educationally purposeful activities" (Trustees of Indiana University, 2014)

Information: a "physical surrogate of knowledge" (Farradane, 1979, p. 17)

Information engagement: the individual, situational, and institutional factors that affect behaviors related to finding, filtering, accessing, and organizing information

Input: "that which is put in or taken in, or which is operated on or utilized by any process or system (either material or abstract)" (OED, 2015)

Input measures: quantifiable variables used to measure input

Output: "that which is produced in an industry or process" (OED, 2015)

Output measures: quantifiable variables used to measure output

Standard: "a definite level of excellence...or a definite degree of any quality, viewed as a prescribed object of endeavour or as the measure of what is adequate for some purpose" (OED, 2015)

Student learning outcomes: results or competencies that students gain from their college education (Spady, 2002)

Value of academic libraries: a measure of the positive impact that library resources and services makes on the institution's faculty, staff, and students (Oakleaf, 2010)

Appendix B: IE models
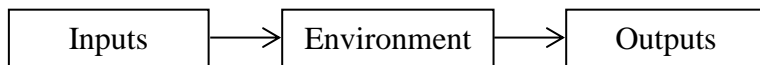
Figure 9: Astin's I-E-O Model. Adapted from: Joseph R. Matthews, *The Evaluation and Measurement* (Westport: Library Unlimited, 2007): 132.
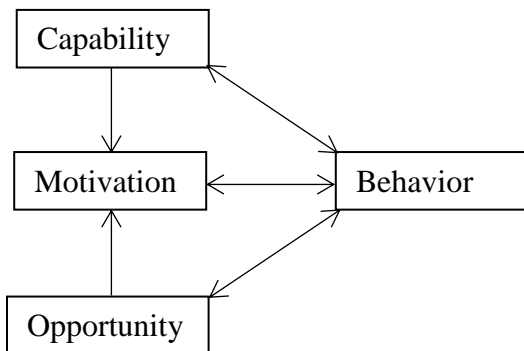

Figure 10: COM-B model. Adapted from Susan Michie, Maartje M. van Stralen, and Robert West. (2011). The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implementation Science, 6*(1), 42.
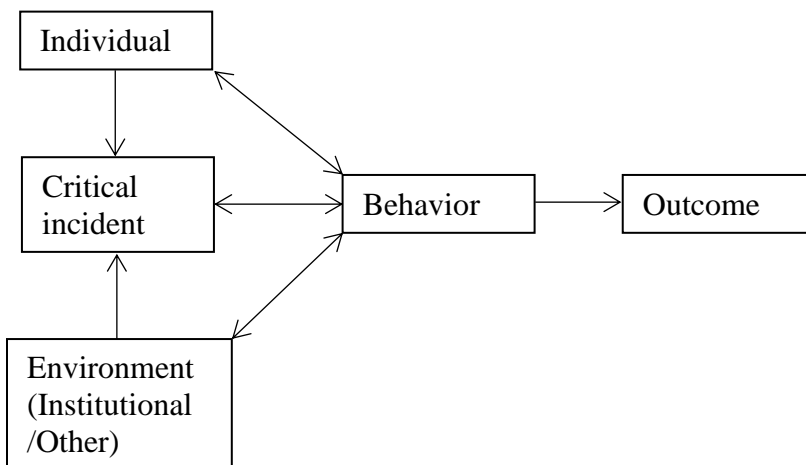

Figure 11: Proposed model for dissertation

Appendix C: Davenport & Prusak's (1997) hierarchy of IE

```
┌─────────────┐
│  Simulate/  │
│    Live     │
└─────────────┘
       ▲
       │
┌─────────────┐
│  Present/   │
│    Teach    │
└─────────────┘
       ▲
       │
┌─────────────┐
│   Argue/    │
│   Defend    │
└─────────────┘
       ▲
       │
┌──────────────────────┐
│   Act on/ Discuss    │
│   (for attributes    │
│  related to content, │
│  source, or situation)│
└──────────────────────┘
       ▲
       │
┌─────────────┐
│    Read/    │
│    View     │
└─────────────┘
```
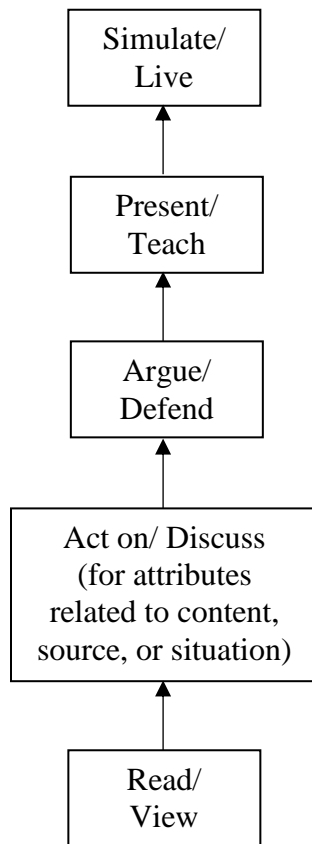
Figure 12: Adapted from Davenport & Prusaks's (1997) hierarchy of information engagement where items at the top of the figure require higher levels of engagement (p. 93)

Appendix D: IRB approval notices

RUTGERS

October 29, 2015

Stephanie Mikitish
SCILS - Library and Information Science
4 Huntington Street
College Ave Campus

P.I. Name: Mikitish
Protocol #: 16-223M

Dear Stephanie Mikitish:

X				
Initial	**Amendment**	**Continuation**	**Continuation w/ Amend**	**Adverse Event**

Protocol Title: "Information Engagement Typologies of Social Science Doctoral Students"

This is to advise you that the above-referenced study has been presented to the Institutional Review Board for the Protection of Human Subjects in Research, and the following action was taken subject to the conditions and explanations provided below:

Approval Date: 10/29/2015
Expedited Category(s):7

Expiration Date: 10/28/2016
Approved # of Subject(s): 30

This approval is based on the assumption that the materials you submitted to the Office of Research and Sponsored Programs (ORSP) contain a complete and accurate description of the ways in which human subjects are involved in your research. The following conditions apply:

- **This Approval**-The research will be conducted according to the most recent version of the protocol that was submitted. **This approval is valid ONLY for the dates listed above;**
- **Reporting**-ORSP must be immediately informed of any injuries to subjects that occur and/or problems that arise, in the course of your research;
- **Modifications**-Any proposed changes MUST be submitted to the IRB as an amendment for review and approval prior to implementation;
- **Consent Form(s)**-Each person who signs a consent document will be given a copy of that document, if you are using such documents in your research. The Principal Investigator must retain all signed documents for at least three years after the conclusion of the research;
- **Continuing Review**-You should receive a courtesy e-mail renewal notice for a Request for Continuing Review before the expiration of this project's approval. However, it is your responsibility to ensure that an application for continuing review has been submitted to the IRB for review and approval prior to the expiration date to extend the approval period;

Additional Notes:	• Initial Expedited Approval per 45 CFR 46.110 • HSCP Certification will no longer be accepted after 7/1/15 (including for anyone previously grandfathered). CITI becomes effective on July 1, 2015 for all Rutgers faculty/staff/students engaged in human subjects research.

Failure to comply with these conditions will result in withdrawal of this approval.
Please note that the IRB has the authority to observe, or have a third party observe, the consent process or the research itself. The Federal-wide Assurance (FWA) number for the Rutgers University IRB is FWA00003913; this number may be requested on funding applications or by collaborators.

Respectfully yours,

Acting For--
Beverly Tepper, Ph.D.
Professor, Department of Food Science
IRB Chair, Arts and Sciences Institutional Review Board
Rutgers, The State University of New Jersey

cc: Dr. Marie L. Radford

(MW:nh)

RUTGERS

June 13, 2016

Stephanie Mikitish
SCILS - Library and Information Science
4 Huntington Street
College Ave Campus

P.I. Name: Mikitish
Protocol #: 16-698M

Dear Stephanie Mikitish:

X				
Initial	**Amendment**	**Continuation**	**Continuation w/ Amend**	**Adverse Event**

Protocol Title: "Refining Information Engagement Typologies"

This is to advise you that the above-referenced study has been presented to the Institutional Review Board for the Protection of Human Subjects in Research, and the following action was taken subject to the conditions and explanations provided below:

Approval Date:	6/1/2016	**Expiration Date:**	5/31/2017
Expedited Category(s):	6,7	**Approved # of Subject(s):**	15

This approval is based on the assumption that the materials you submitted to the Office of Research and Sponsored Programs (ORSP) contain a complete and accurate description of the ways in which human subjects are involved in your research. The following conditions apply:

- **This Approval**-The research will be conducted according to the most recent version of the protocol that was submitted. **This approval is valid ONLY for the dates listed above;**
- **Reporting**-ORSP must be immediately informed of any injuries to subjects that occur and/or problems that arise, in the course of your research;
- **Modifications**-Any proposed changes MUST be submitted to the IRB as an amendment for review and approval prior to implementation;
- **Consent Form(s)**-Each person who signs a consent document will be given a copy of that document, if you are using such documents in your research. The Principal Investigator must retain all signed documents for at least three years after the conclusion of the research;
- **Continuing Review**-You should receive a courtesy e-mail renewal notice for a Request for Continuing Review before the expiration of this project's approval. However, it is your responsibility to ensure that an application for continuing review has been submitted to the IRB for review and approval prior to the expiration date to extend the approval period;

Additional Notes:	▪ Expedited Approval per 45 CFR 46.110 ▪ HSCP Certification will no longer be accepted after 7/1/15 (including for anyone previously grandfathered). CITI becomes effective on July 1, 2015 for all Rutgers faculty/staff/students engaged in human subjects research.

Failure to comply with these conditions will result in withdrawal of this approval.
Please note that the IRB has the authority to observe, or have a third party observe, the consent process or the research itself. The Federal-wide Assurance (FWA) number for the Rutgers University IRB is FWA00003913; this number may be requested on funding applications or by collaborators.

Respectfully yours,

Farah Onuwa

Acting For--
Beverly Tepper, Ph.D.
Professor, Department of Food Science
IRB Chair, Arts and Sciences Institutional Review Board
Rutgers, The State University of New Jersey

cc: Dr. Marie L. Radford

RUTGERS

January 10, 2017

Stephanie Mikitish
SCILS - Library and Information Science
4 Huntington Street
College Ave Campus

P.I. Name: Mikitish
Protocol #: 17-317M

Dear Stephanie Mikitish:

	X				
	Initial	**Amendment**	**Continuation**	**Continuation w/ Amend**	**Adverse Event**

Protocol Title: "Testing information Engagement Typologies"

This is to advise you that the above-referenced study has been presented to the Institutional Review Board for the Protection of Human Subjects in Research, and the following action was taken subject to the conditions and explanations provided below:

Approval Date:	12/21/2016	**Expiration Date:**	12/20/2017
Expedited Category(s):	7	**Approved # of Subject(s):**	100

This approval is based on the assumption that the materials you submitted to the Office of Research and Sponsored Programs (ORSP) contain a complete and accurate description of the ways in which human subjects are involved in your research. The following conditions apply:

- **This Approval**-The research will be conducted according to the most recent version of the protocol that was submitted. **This approval is valid ONLY for the dates listed above;**
- **Reporting**-ORSP must be immediately informed of any injuries to subjects that occur and/or problems that arise, in the course of your research;
- **Modifications**-Any proposed changes MUST be submitted to the IRB as an amendment for review and approval prior to implementation;
- **Consent Form(s)**-Each person who signs a consent document will be given a copy of that document, if you are using such documents in your research. The Principal Investigator must retain all signed documents for at least three years after the conclusion of the research;
- **Continuing Review**-You should receive a courtesy e-mail renewal notice for a Request for Continuing Review before the expiration of this project's approval. However, it is your responsibility to ensure that an application for continuing review has been submitted to the IRB for review and approval prior to the expiration date to extend the approval period;

Additional Notes:	▪ **Expedited Approval per 45 CFR 46.110** ▪ **HSCP Certification will no longer be accepted after 7/1/15 (including for anyone previously grandfathered). CITI becomes effective on July 1, 2015 for all Rutgers faculty/staff/students engaged in human subjects research.**

Failure to comply with these conditions will result in withdrawal of this approval.
Please note that the IRB has the authority to observe, or have a third party observe, the consent process or the research itself. The Federal-wide Assurance (FWA) number for the Rutgers University IRB is FWA00003913; this number may be requested on funding applications or by collaborators.

Respectfully yours,

Farah Onwar

Acting For--
Beverly Tepper, Ph.D.
Professor, Department of Food Science
IRB Chair, Arts and Sciences Institutional Review Board
Rutgers, The State University of New Jersey

cc: Dr. Marie L. Radford

Appendix E: Interview and survey questions

Appendix E1: Focus group interview questions

1. Think about a time that you looked for information related to your coursework, qualifying exams, proposal, or dissertation. Tell me about the kind of information you were trying to fine. [Probe if needed on looking for citations, conducting a literature review, and researching methods]

2. What other goals does your information seeking help you achieve?

3. How do you get started looking for information?

4. What are some of the things that have stopped your searches in the past? What do you do when you are stuck?

5. The concept of flow often comes up in studies of engagement. Flow is a state in which one experiences high levels of focus, attention, and enjoyment in an activity. It is also known as being in the zone. Can you tell me about times that you have felt this way while searching for information? How did these feelings improve your searching? What other things would you like to tell me about your experiences searching for information? What else helps you achieve your goals? (Probe, ask about library use or librarians, if not mentioned).

Appendix E2: Individual interview questions

1. Tell me about how you get started looking for information related to your classes or research.

2. Remember a time when you looked for information regarding [task suggested by their stage] and were successful. Describe how you initially regarded the task, what you did while looking for the information, and why you pursued the strategies that you did.

    a. What did you expect to find when looking for the information based on what you knew and had done before?

    b. What opportunities did you perceive?

    c. What facilitated your efforts to find the information?

    d. In what ways did this information-seeking session change what you did on future searches?

3. Remember a time when you looked for information regarding [task] and were unsuccessful. Describe how you initially regarded the task, what you did while looking for the information, and why you pursued the strategies that you did.

    a. What did you expect to find when looking for the information based on what you knew and had done before?

    b. What opportunities did you perceive?

    c. What hampered your efforts to find the information?

    d. In what ways did this information seeking session change what you did on future searches?

4. What other goals does your information seeking help you achieve?

5. The concept of flow often comes up in studies of engagement. Flow is a state in which one experiences high levels of focus, attention, and enjoyment in an activity. It is also known as being in the zone. Can you tell me about times that you have felt this way when dealing with information?

6. If you had a magic wand that could help you in future searches, what would you have it do?

7. What else would you like to tell me about information as it relates to your life as a doctoral student/candidate?

Appendix E3: Survey questions

Info. This survey is split into 3 parts, which include:

Information usage: 13 questions (6 with multiple parts) on 4 pages

Information-related statements: 24 questions (1 with multiple parts) on 4 pages

Demographics and submission: 10 questions on 1 page

For questions with multiple parts, you must choose "Does not apply" if you do not rank an option

1.1. I would rank the importance of these resources to my research as follows:

	Very unimportant	2	3	4	5	6	Very important	Does not apply
Books (includes edited volumes)	○	○	○	○	○	○	○	○
Conference presentations and proceedings	○	○	○	○	○	○	○	○
Government and non-government reports and whitepapers	○	○	○	○	○	○	○	○
Journals (includes peer-reviewed and professional/trade)	○	○	○	○	○	○	○	○
News articles	○	○	○	○	○	○	○	○

	Very unimportant	2	3	4	5	6	Very important	Does not apply
Non-text documents	○	○	○	○	○	○	○	○
Other [ ]	○	○	○	○	○	○	○	○

1.2. Last semester, I searched for research-related information online

○ Never

○ Less often than once a month

○ At least once a month

○ A few times a month

○ At least once a week

○ Prefer not to answer

1.3. Last semester, I asked someone at the library for research-related help either online or in-person

○ Never

○ Less often than once a month

○ At least once a month

○ A few times a month

○ At least once a week

○ Prefer not to answer

1.4. Last semester, I visited the physical library for research-related purposes

○ Never

○ Less often than once a month

○ At least once a month

○ A few times month

○ At least once a week

○ Prefer not to answer

1.5. When I start a search on a research-related topic that I am unfamiliar with, I likely will consult the following people or resources as follows:

	Highly unlikely	2	3	4	5	6	Highly likely	Does not apply
Someone that I know, even if it is not their specialty	○	○	○	○	○	○	○	○
Someone who specializes in that area, even if I do not	○	○	○	○	○	○	○	○

	Highly unlikely	2	3	4	5	6	Highly likely	Does not apply
know them personally								
The references from an item that I am familiar with	○	○	○	○	○	○	○	○
A specific database/journal for that area	○	○	○	○	○	○	○	○
Google Scholar	○	○	○	○	○	○	○	○
Google or another search engine	○	○	○	○	○	○	○	○
The library catalog to find a book in that area	○	○	○	○	○	○	○	○

1.6. When I start a search on a research-related topic that I am unfamiliar with, I am most likely to consult

○ Someone that I know, even if it is not their specialty

○ Someone who specializes in that area, even if I do not know them personally

○ The references from an item that I am familiar with

○ A specific database/journal for that area

○ Google Scholar

○ Google or another search engine

○ The library catalog to find a book in that area

1.7. If I needed a BOOK for research, I would be willing to pay on average the following amount in US dollars

[   ]

1.8. If I needed an ARTICLE for research, I would be willing to pay on average the following amount in US dollars

[   ]

1.9. In the following stages of my doctoral program, I would say that my habits searching for research- related information changed

	Very little	2	3	4	5	6	Very much	Does not apply
Before starting	○	○	○	○	○	○	○	○
During coursework	○	○	○	○	○	○	○	○
While preparing for my qualifying/comprehensive exams	○	○	○	○	○	○	○	○

	Very little	2	3	4	5	6	Very much	Does not apply
While preparing my proposal/prospectus	○	○	○	○	○	○	○	○
While writing my dissertation	○	○	○	○	○	○	○	○

1.10. The most helpful thing I learned about searching for research-related information was

[   ]

1.11. I would be interested in learning about the following

	Very disinterested	2	3	4	5	6	Very interested	Does not apply
Research methodologies/methods	○	○	○	○	○	○	○	○
Reusing data from other studies or making mine available for reuse	○	○	○	○	○	○	○	○
Open access publishing	○	○	○	○	○	○	○	○
Turning my dissertation into a book	○	○	○	○	○	○	○	○
Managing my scholarly identity	○	○	○	○	○	○	○	○
The library resources available to me	○	○	○	○	○	○	○	○
Other: [ ]	○	○	○	○	○	○	○	○

1.12. I have used the following sites/networks to

	Find information	Post my research	Connect with other scholars prior to meeting them in person, if ever	Connect with other scholars after meeting them in person	Does not apply
Academia.edu	☐	☐	☐	☐	☐
Facebook	☐	☐	☐	☐	☐
LinkedIn	☐	☐	☐	☐	☐
ResearchGate.net	☐	☐	☐	☐	☐
Scholarly listserv	☐	☐	☐	☐	☐

	Find information	Post my research	Connect with other scholars prior to meeting them in person, if ever	Connect with other scholars after meeting them in person	Does not apply
Twitter	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐

1.13. I have used or would be willing to use the information that I found in my searches to

	Definitely will not use	2	3	4	5	6	Definitely will use	Does not apply
Network	○	○	○	○	○	○	○	○
Suggest topics for research	○	○	○	○	○	○	○	○
Suggest places to present/publish	○	○	○	○	○	○	○	○
Identify and apply for grants	○	○	○	○	○	○	○	○
Manage my scholarly identity	○	○	○	○	○	○	○	○
Other:	○	○	○	○	○	○	○	○

2.1. If I had a question about a particular article/study, I would feel comfortable asking someone for clarification

Completely disagree	2	3	4	5	6	Completely agree	Does not apply
○	○	○	○	○	○	○	○

2.2. If I were unable to access a particular article/study, I would feel comfortable asking someone for a copy

Completely disagree	2	3	4	5	6	Completely agree	Does not apply
○	○	○	○	○	○	○	○

2.3. I would only ask someone for help finding or accessing information if I had exhausted all other options

Completely disagree	2	3	4	5	6	Completely agree	Does not apply
○	○	○	○	○	○	○	○

2.4. If the library can't get it, I won't pursue it further, even if it seems incredibly useful

Completely₂ disagree   3   4   5   6   CompletelyDoes not agree   apply

Completely₂ disagree | 3 | 4 | 5 | 6 | CompletelyDoes not agree apply

○   ○   ○   ○   ○   ○   ○   ○

2.5. I am confident in my ability to find EXACTLY what I need

Completely $_2$ disagree   3   4   5   6   CompletelyDoes not agree   apply

○   ○   ○   ○   ○   ○   ○   ○

2.6. I am confident in my ability to find something GOOD ENOUGH for what I need

Completely $_2$ disagree   3   4   5   6   CompletelyDoes not agree   apply

○   ○   ○   ○   ○   ○   ○   ○

2.7. I tend to stick to a routine when searching for research-related information

Completely $_2$ disagree   3   4   5   6   CompletelyDoes not agree   apply

○   ○   ○   ○   ○   ○   ○   ○

2.8. I frequently feel overwhelmed about the amount of information that is available

Completely $_2$ disagree   3   4   5   6   CompletelyDoes not agree   apply

○   ○   ○   ○   ○   ○   ○   ○

2.9. I use Google Scholar because it casts the widest net

Completely $_2$ disagree   3   4   5   6   CompletelyDoes not agree   apply

○   ○   ○   ○   ○   ○   ○   ○

2.10. I wouldn't mind changing a topic of research for a certain project based on what I found in a search

Completely $_2$ disagree   3   4   5   6   CompletelyDoes not agree   apply

○   ○   ○   ○   ○   ○   ○   ○

2.11. I only search until I find what I need

Completely $_2$ disagree   3   4   5   6   CompletelyDoes not agree   apply

○   ○   ○   ○   ○   ○   ○   ○

2.12. It can be a challenge knowing the correct words used by scholars in my field to define my ideas

Completely $_2$ disagree   3   4   5   6   CompletelyDoes not agree   apply

○   ○   ○   ○   ○   ○   ○   ○

2.13. It can be a challenge looking for information on an esoteric topic or other topic where there is not much information available

Completely $_2$ disagree   3   4   5   6   CompletelyDoes not agree   apply

○   ○   ○   ○   ○   ○   ○   ○

2.14. It can be a challenge looking for information in older texts/research

Completely disagree	2	3	4	5	6	Completely agree	Does not apply
○	○	○	○	○	○	○	○

2.15. It can be a challenge looking for information that is not in scholarly resources

Completely disagree	2	3	4	5	6	Completely agree	Does not apply
○	○	○	○	○	○	○	○

2.16. It can be a challenge having to switch between searching for newer research (to stay relevant in my field) and older research (to see where an area of research began), or vice versa

Completely disagree	2	3	4	5	6	Completely agree	Does not apply
○	○	○	○	○	○	○	○

2.17. It can be a challenge having to find everything I need to know about a topic

Completely disagree	2	3	4	5	6	Completely agree	Does not apply
○	○	○	○	○	○	○	○

2.18. It can be a challenge not being able to access what I need to when I need it

Completely disagree	2	3	4	5	6	Completely agree	Does not apply
○	○	○	○	○	○	○	○

2.19. It can be a challenge deciding what is important or will be important in my field in the near future

Completely disagree	2	3	4	5	6	Completely agree	Does not apply
○	○	○	○	○	○	○	○

2.20. I feel that I am expected to know more than I actually do about searching for information

Completely disagree	2	3	4	5	6	Completely agree	Does not apply
○	○	○	○	○	○	○	○

2.21. I would prefer to have face-to-face research help when I need it rather than a mandatory session on searching for research-related information

Completely disagree	2	3	4	5	6	Completely agree	Does not apply
○	○	○	○	○	○	○	○

2.22. In the past, I have not asked for research help because

	Completely disagree	2	3	4	5	6	Completely agree	Does not apply
I didn't want to bother anyone	○	○	○	○	○	○	○	○

	Completely disagree	2	3	4	5	6	Completely agree	Does not apply
There wasn't enough time	○	○	○	○	○	○	○	○
I didn't want to seem incompetent	○	○	○	○	○	○	○	○
Other [____]	○	○	○	○	○	○	○	○

2.23. I think it would be helpful to require other students in my program to attend a research related workshop that includes library resources and services

Completely disagree	2	3	4	5	6	Completely agree	Does not apply
○	○	○	○	○	○	○	○

2.24. I think it would be helpful to require other students in my program to attend a research related workshop that ONLY includes library resources and services

Completely disagree	2	3	4	5	6	Completely agree	Does not apply
○	○	○	○	○	○	○	○

3.1. My gender is

○ Male

○ Female

○ Other [____]

○ Prefer not to answer

3.2. My age falls into the following range

○ Under 18

○ 18 - 24

○ 25 - 34

○ 35 - 44

○ 45 - 54

○ 55 - 64

○ 65 and older

○ Prefer not to answer

3.3. I am an international student

○ Yes

○ No

○ Other [____]

○ Prefer not to answer

3.4. I am in the following department/discipline

○   Write in department/discipline [   ]

○   Prefer not to answer

3.5. I am in the following stage of my program

○   Coursework or pre-qualifying/comprehensive exams submission/defense

○   Post-qualifying/comprehensive exams submission/defense and pre-dissertation proposal/prospectus defense

○   Post dissertation proposal/prospectus defense

○   Prefer not to answer

3.6. I live more than an hour away from where the school I am getting my degree at is located

○   Yes

○   No

○   Prefer not to answer

3.7. The school where I am getting my degree is located in the following region of the country

○   Midwest (includes the following states: IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, WI)

○   Northeast (includes the following states: CT, MA, ME, NH, NJ, NY, PA, RI, VT)

○   South (includes the following states: AL, AR, DE, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV)

○   West (includes the following states: AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY)

○   Pacific (includes the following states: AK, HI)

○   Prefer not to answer

3.8. I am able to log onto databases through other schools besides where I am getting my degree

○   Yes

○   No

○   Prefer not to answer

3.9. I would like the digital gift card sent to the following email address

[   ]

3.10. I agree to "Submit" my responses for inclusion in this study OR "Discard" my responses so that they will not be included in this study

○   Submit

○   Discard

Thank you for your interest in this study! Please contact mikitish@scarletmail.rutgers.edu with any questions.

Appendix F: Preliminary qualitative themes

I. Tasks
   A. Stage based
      1. Coursework
      2. Qualifying/comprehensive exams
      3. Proposal
      4. Dissertation
      5. Other
   B. Conference submission
   C. Article
   D. Teaching
   E. Situate work
II. Resources
   A. People
      1. Professional academics
         a. Advisor
         b. Committee member(s)
            i. Outside member
         c. Librarian
      2. Students
         a. PhD student
      3. Relationship
         a. Pre-existing
      4. Social network
         a. Academia.edu
         b. Researchgate.net
         c. Twitter
         d. Facebook
         e. LinkedIn
         f. listserv
   B. Collections
      1. Databases
         a. EBSCO
         b. Google Scholar
         c. Journals
         d. Articles+
         e. arXiv
         f. LingBuzz
         g. Academia.edu
         h. Researchgate.net
         i. NJVid
   C. Item type
      1. Book
         a. Edited volume
         b. E-book
      2. Article
         a. Review article
      3. Media
         a. DVD
         b. Stream
      4. Other
   D. Websites
      1. Google
         a. Search
         b. Scholar
         c. News
         d. Video
         e. Images
         f. Books
         g. Alerts
      2. Amazon
      3. RSS alerts
      4. YouTube
         a. TED talks
      5. Vimeo
      6. Government
      7. Wikipedia
      8. Microsoft research
      9. Library
         a. Research guides
         b. Catalog
     10. Academic web pages
     11. "Popular" (non-scholarly)
     12. Illicit
   E. Software
      1. Citation managers
         a. Refworks
         b. Mendeley
      2. Mentalmodeler.org
      3. Papers
      4. Other
   F. Library
      1. Type
         a. Academic
         b. Public
      2. Affiliation
         a. Affiliated
         b. Non-affiliated

III. Barriers
  A. Library policy
    1. Embargo
    2. Request limit
    3. ILL fee
    4. Recall
  B. Timeliness
    1. Item delivery
    2. Deadline
  C. Specificity
    1. Topic
    2. Field
  D. Book chapters
  E. Not finding
  F. Cost
  G. Illegal to obtain
  H. Off-campus
IV. Affect
  A. Positive
    1. Happy
  B. Negative
    1. Disappointment
    2. Frustration
    3. Uncertainty
      a. Item related
      b. Access related
    4. Distraction
    5. Worried about losing face
V. Outcomes/goals
  A. Networking
  B. Future work
    1. Grants
    2. Publishing
      a. Where to publish
      b. What to publish
  C. Career
    1. CV's
    2. Jobs
  D. Teaching
VI. Facilitators
  A. Multiple institutional logins
  B. PDFs
  C. Friends at other institutions
  D. Google book snippets
  E. Organizational strategies
    1. Schedule

    2. Folder
    3. Information
    4. List
  F. Searching strategies
    1. Known item
    2. Citation tracking
    3. Exploratory
  G. Flow
    1. Writing and searching
       combined
    2. Only writing
    3. No flow
    4. Keyword
  H. Contacting author
  I. "Pushes" to related articles
  J. Library instruction
  K. Convenience
VII. Change in behavior
  A. Event
    1. Qualifying exams
    2. Type of paper
VIII. Factors
  A. Tenacity
  B. Hoarding
  C. Multitasking

Appendix G: Final qualitative thematic codebook

Name	Definition	Examples	Focus Group Interviews		Individual Interviews	
			N of instances	N of groups	N of instances	N of participants
I. Tasks	Participant mentions the following tasks when describing interactions with info					
A. Stage based	Participant describes work in any of the following stages of doctoral study					
1. Coursework	Time before qualifying/comprehensive exams	P7: Well last semester I had to do a…a project in one of my classes…	11	3	20	8
2. QualComp exams	Time spent researching, writing, or defending qualifying/comprehensive exams	P4: …but it…Well, so, when I was doing my comps…	11	3	21	5
3. Proposal	Time spent researching, writing, or defending dissertation proposal/prospectus	P10: Okay so I was looking for writing a proposal…	2	2	10	4
4. Dissertation	Time spent researching or writing dissertation	P4: My experiences were different when I was in course work then they are now post coursework and dissertation torture.	5	2	20	7
5. Other	Time before doctoral studies began	P5: Yeah. Well, yeah, I mean, recently I was looking for um…so I'm doing a practicum this semester…	2	1	13	6

B. Conference	Participant describes researching, writing, or presenting at a conference	P2: Yeah, workshops at conferences, you know, when they have like pre conferences.	3	1	0	0
C. Article	Participant researching, writing, or presenting non-conference publication		0	0	1	1
D. Teaching	Participant describes preparing for class or teaching	P2: Would you consider also information that we look for in order to help our students?	11	3	8	6
E. Situate work	Participant deals with information about field of study without a specific task (e.g., paper) in mind	P3: ...a lot of it is just me trying to work my way my way backwards so that I know I have like a like a good understanding or something so…; P10: ...I try to look for really old ones to see where it started…	27	3	27	11
II. Resources	Resources accessed for info					
A. Human resources	People that participant consults for finding/accessing info					
1. Academics	Scholars and those employed by an academic institution	P1: ...for one of my friends or colleagues, so I'll like save that PDF and I'll send it to them.	43	3	40	12
a. Advisor	Committee chair (Carpenter et al., 2012; Libutti & Kopala, 1995)	P13: I do, too. I go to my advisor, first, my first advisor, they always said it was…	12	3	22	7

b. Committee member	Any committee member besides chair	P9: Can I add something? I often use my committee…	6	2	11	6
c. Author	Author of a specific work	P2: …I ended up emailing the person who wrote the article…	12	3	11	5
d. Librarian	Academic librarian	P10: I went to the reference librarian…; P16: ...Sometimes I'll do that chat, but after 10 they're not there.	38	3	62	15
2. Students	Non-doctoral students		0	0	1	1
a. PhD student	Doctoral students at their current and other institutions	P2: Or a student who is older than you, like a mentor.	23	3	16	7
3. Virtual communities	Online social networks for scholars. Participants do not have to be connected to specific individuals or have profiles of their own.	P16: Is that like Orchid?	1	1	1	1
a. Academia.edu		P6: ...the scholars I do follow on Academia.edu.	7	2	11	6
b. Researchgate.net		P4: So ResearchGate has actually been really awesome.	10	2	5	2
c. Twitter		P1: But now I know on, on Twitter I'm connected around the world and have used the hashtag icanhazpdf.	2	1	4	2
d. Facebook		P13: And sometimes you just write on Facebook with somebody who you don't	7	2	12	5

		even really know as a person just like you find what they want and okay.				
e. LinkedIn		P4: It's linked to all your publications, and you're searchable and you can make like you make, you know, you have like a network like LinkedIn or something?	1	1	2	2
f. listserv		P2: And also I'm on a really cool listserv…	5	2	3	3
4. Other	Includes people not covered by other categories (e.g. mothers) (Carpenter et al., 2012)		2	2	6	4
B. Electronic resources	Sources of digital info where participant finds/accesses info	P11: Yes I'd definitely rather have an electronic form...	5	1	0	0
1. Specific database	Participant names specific databases (e.g., JSTOR) or database aggregators (e.g., Articles+)	P2: ...there's like the Articles+ thing…	12	3	35	11
a. Journals	Journal collection accessed directly or through library webpage (Carpenter et al., 2012)	P1: Yeah, within the journal, different keywords…	24	3	27	6
2. Articles	Journal articles found/accessed online (Carpenter et al., 2012)	P4: I like almost exclusively search for scientific articles.	63	3	63	15
3. E-books		P17: I've gotten kicked off of an ebook before…	5	3	3	3
4. Websites		P1: ...I'll start on a regular search engine first and then go from there to try to find	1	1	0	0

		the terms that might be related to…				
a. Google		P6: …so yeah…there you go. But most of it's going on my own on the computer and Googling for stuff, so.	9	2	8	5
i. Search		P10: Just a regular Google search.	9	2	18	11
ii. Scholar		P14: ...there's not going to be anything in Google Scholar about it.	41	3	48	13
iii.Other	Other Google services besides Search & Scholar	P14: ...the other one is Google Image search.	13	3	9	6
b. Amazon		P14: ...I'm so angry I go to Amazon…	5	1	5	3
c. Videos	Online video respositories or streaming sites (e.g., YouTube, Vimeo)	P6: Or vimeo is something that I just learned about.	9	2	3	3
d. Non-academic	Includes popular and news sites that do not have scholarly articles	P7: ...I found myself actually looking at more popular websites…	13	3	6	3
e. Wikipedia		P2: I like Wikipedia as my starting point.	3	1	2	2
f. Scholarly	Online content provided by an academic institution	P1: ...but it's pretty much this website that has pretty much a genealogy tree for PhD academics.	9	2	3	3
i. Library	Includes participant's home institution's website and catalog	P3: I think the library at [current institution] also has the really good, I forget what	30	3	63	15

		they're called research starters?				
ii. Not HE affiliated	Website provided through an institution/organization besides a college/university, e.g. government, Microsoft research	P5: Also there's some like…so usually anything that's put out by Microsoft Research I've found to be good for media studies.	7	1	6	4
g. Illicit	Participant acknowledges receiving information through illegal means	P5: Well there's also some, I mean, there's a couple…illicit sites that I use if I'm looking for something that I can't find.	22	3	15	4
C. Print or physical resources	Print/physical resources for finding/accessing info	P18: ...there's a lot of really great documentaries that cost hundreds and hundreds of dollars that there's no way that I could afford. One of them called the Black Oppressed, they just have on VHS, so I asked if they could purchase the DVD.	3	2	2	1
1. Books		P10: Then I go to the section and I look through books…	40	3	56	15
a. Monograph		P1: …also books, monographs, readers, and yeah. I guess that's it.	1	1	0	0
b. Edited volume		P6: Yeah, so well actually, there's been really good books like bin Laden, like the bin Laden reader.	3	1	0	0

c. Textbook		P16: And the same was for other textbooks…	5	2	0	0
D. Software	Includes programs and apps that help participant organize information					
1. Citation managers	Software whose primary purpose is to create bibliographies (e.g., Zotero, Refworks)	P16: So, our advisors tell us, "Oh, you know, you need to get a citation, manager," so I'm trying to use Zotero.	11	3	12	6
2. Other	Software that does more than or other things besides create bibliographies (e.g. Mendeley)	P4: I just recently started using Mendeley.	24	3	28	11
E. Institutional	Physical or electronic resources provided by a higher educational institution					
1. Current academic	Institution where participant is currently enrolled	P5: ...I was having a difficult time on [current institution's] library website…	61	3	75	15
2. Other	Includes all other institutions except for where participant is currently enrolled	P5: ...I actually have access to [other institution's] library access because I did a consortium class there last semester and they haven't revoked my…	23	3	21	8
III. Barriers	Prevent participants from finding/accessing info	P18: I'm usually not coming to campus for a couple of days anyway...I only come to campus for my books, but…	1	1	0	0

A. Library policy	Rules or practices created, followed, and enforced by an academic library	P14: ...with key books I know I'm going to need to take notes, and you're not supposed to do that in library books.	13	2	12	6
1. Embargo	Library does not have access to recent content within a certain timeframe	P16: …there's something called a moratorium, like when articles just come out and the library doesn't have access to them.	10	2	0	0
2. Request limit	Library can only request a certain number of items through inter-library loan for free or at all	P2: ...I tried to request it via the interlibrary loan and then I got an email saying that, "Oh we already exceeded our limit for requesting articles…	3	2	1	1
3. ILL fee	Library charges participant to cover the shipping or licensing of interlibrary loan materials	P16: It's not that it's just twenty bucks, it's the principle. Why should you have to pay for it?	6	2	0	0
4. Recall	Library requires participant to return item earlier because another user has requested it	P14: Oh no, I was very upset about the recall process.	8	1	2	1
B. Timeliness	Time related barriers	P17: Like because of time, I've decide this is not important anymore.	2	2	3	1
1. Item delivery	Participant receives item after it is needed	P20: ...I don't really I don't follow up because I know that by the time I get it, I'm not going to want to read it or anything like that.	1	1	3	2

2. Deadline	Participant realizes they will receive item after it is needed, so does not request it	P18: Or I have a deadline tomorrow, whatever that is.	4	2	1	1
C. Specificity	Participant acknowledges that the info is esoteric, rare, old, or otherwise difficult to seek/access					
1. Topic	Participant is frustrated by specific research topic	P1: …for certain topics that again, like if they're not in the research literature then I'll start on a regular search engine first and then go from there to try to find the terms that might be related to…	12	2	21	11
2. Field	Participant is frustrated by research field in general	P1: Especially because it's psychology, a lot of things that are like, not trademarked.	8	1	19	8
D. Book chapters		P18: Book chapters, I would definitely go to Google Scholar because you can definitely if it's in an important article that's in a book I'm surprised that I can find pretty much free PDFs on the web…	12	2	4	2
E. Not finding	Participant is frustrated by not finding information that they believe should be easy to find	P3: Yeah, it's a combination of either not knowing or just not finding.; P13: I have a problem with not finding out the journal that I want to	26	3	18	7

		search in, not the journal article but the journal itself…				
F. Cost	Info is expensive to find/access	P14: They're very expensive.	11	3	8	5
G. Distance	Participant feels that they are far from campus	P19: I'm always off campus, so I have to login through the firewall, and that process is too much for me.	4	2	7	4
H. Not knowing	Participant acknowledges that they do not know something	P13: ...there are physical books that I want to read that are newly published but it's not at the library, and is there like, is there a is there a list?	38	2	36	11
IV. OutcomesGoals	Participant identified outcomes and goals related to, but beyond finding/accessing info		0	0	6	5
A. Networking	Participants have connected or plan to connect with other scholars	P9: Yeah, like any time I go to a conference we exchange ResearchGate information with people that I'm interested in getting to know…	19	2	8	4
B. Future work	Information found did not directly link with what was needed in described incident, but is saved for later use	P20: It's made me think what other studies and what other potential research I could do...also it gives me pilots or more goals in the future, future different goals.	5	3	2	2

1. Grants	Participants plan to use information to apply for future grants	P13: I also look up which grants they get if I really like those scholars.	2	2	2	2
2. Publishing			0	0	1	1
a. Where	Participants use info to decide where to publish (e.g., identifying journals with high impact factors)	P18: And that's really good too because you can do a keyword search in the journal, and that can be really useful especially if that's where you want to publish it.	8	3	1	1
b. What	Participants use info to decide what to publish (e.g., seeing what has been published in a specific journal)	P15: It wasn't so much the where to publish, like that's part of it, but it's more like what's getting out…	6	3	5	4
C. Career	Info will aid participants in their career related aspirations	P16: So you can follow them, and try to be like them.	2	1	1	1
1. CV's	Participants plan to use or have used information to design their curriculum vitae	P11: So like actually looking at people's cv's I really like to model my cv off of their cv, right?	2	1	0	0
2. Jobs	Participants plan to use or have used information to find or apply to positions	P4: …I've done a lot of information searching to tailor my cover letters to specific employers…	2	1	4	3
V. Facilitators	Assist participants in finding/accessing info					
A. Multiple institutional logins	Participant can personally access resources at other academic institutions	P5: Privileges. And I also have access to [another institution's] because [J] at	1	1	6	2

		some point logged into her account on my computer…				
B. Organizational strategies	Methods by which participants saved information	P3: It's so helpful to have an organization system for all the things that you have.	3	1	4	3
1. Schedule	Participant created a plan with dates/times to read/work with info	P20: ...I'll put together an action plan. Like I'll read this book and this article on this in this day, so that's kind of what my flow's in, with a plan of what I'm going to do next or how I'm going to do with all these materials that I've found.	2	1	2	1
2. Folder	Participant organized documents in folders	P20: It's one list per folder. Like for different topics I just have a folder, for if I'm looking for this particular search on this particular day, I'll have a folder for that one day even.	4	2	23	11
3. Information	Participant organized information other than documents	P13: I do the mental modeling with big cardboards in different colors and Post-its. I do that all the time, otherwise I don't, and it's half of my room.	13	2	7	4
4. List	Participant created a list of items to find	P11: I've definitely gone to the library, gotten a book I	10	2	1	1

		realized that I need to add it to my list too…				
C. Searching strategies	Methods described by participants for finding info		0	0	5	2
1. Known item	Participant looked for specific item	P4: So yeah, I would do, I would say mostly in my daily life I do that sort of like forward searching, like this is what I want, how can I get it…	7	3	14	6
2. Pearl growing	participants used list of references in documents to find other related documents (Markey & Atherton, 1978)	P9: ...I was sort of like searching quick search for references to find, you know, authors that I'd heard of or topics that I found interesting, and I kind of used that to jump from article to article.	14	3	25	11
3. Exploratory	Participant researched specific topic	P18: Yeah no pressure, I have time, I'm just exploring that's important to me like being...	6	2	22	10
4. Keyword	Participant looked for information using specific terms	P1: Yeah, within the journal, different keywords…	14	3	38	12
D. Flow	A state in which one experiences high levels of focus, attention, and enjoyment in an activity (Csikszentmihalyi, 1990)	P7: It's like it was there and I was in the moment. Yeah.	21	3	24	11

1. Writing and searching combined	Flow was specifically a combination of writing and searching	P2: I guess well, how do you like define the difference between searching and then actually starting to consume the information, because I generally don't associate being in the zone with just searching for stuff.	16	3	7	3
2. Only writing	Flow specifically applied to writing only		0	0	7	3
3. No flow	Participants has not encountered flow related to info	P5: I'm not sure I've ever been in the zone, I'm not sure it's ever happened.	7	2	1	1
E. Pushes to related articles	Database suggests related articles	P4: It's true, I've definitely had the articles that are similar to the one you're searching for.	8	1	0	0
F. Library instruction	Academic librarian provides formal (e.g., class based) or informal (e.g., one on one) instruction in finding/accessing info	P17: Yeah we definitely have like an information session my first year with the liaison, but I just didn't know just enough about like sociology or like graduate school research to know why that was meaningful.	3	2	21	11
G. Convenience	Finding and/or accessing info was fast and easy (Connaway, Dickey & Radford, 2011)	P15: Yeah I do it electronically cuz I'm really lazy so I'll sit in front of my computer, and I'll go to special issues of journals in my field.	19	3	14	6

VI. Change in behavior	Anything that necessitates a temporary or permanent change in info related behavior	P4: I would say that when I did my comps my searching strategy was vastly different from what I typically, not vastly different…	13	3	24	12
VII. Factors	Factors that might impact information engagement		0	0	0	2
A. Tenacity	The degree to which participant will pursue a known item	P6: Well nothing stops me per se, I mean, if it's out there I'll find it.	16	3	24	11
B. Hoarding	Degree to which student will collect items	P17: …But I pick up an awful lot of books from [home institution] library that I don't end up opening, and I don't know, I guess it's good that I at least have them…	6	2	8	4
C. Prior knowledge	Participant often uses resource/service, knows of it, or has experience using it (Khosrowjerdi & Iranshahi, 2011)	P22: I'll go into specific databases um EBSCOhost, Comm Mass Media Complete, you know, MUSE, if I'm looking for something rhetorical uh sometimes I'll go to specific journals, but, you know, I'm a 4th year doctoral student and I didn't always do that and I learned the hard way that it's, it's really best to go to specific journals	9	3	55	15

D. Certainty	Degree to which student will rely on keywords as their only searching strategy.	P15: To see who's writing right now, and what they seem to be taking swings at, and from there if I'm feeling lost and I need to find a path I go there, which seems like it's kind of similar to you.	12	1	13	8
E. Satisficing	Degree to which student will accept alternatives to a known resource if they cannot find/access it (Simon, 1955)	P9: Yeah, I'll substitute.	8	3	8	5
IX. Tasks facilitated by magic wand	Participant responses to, "If you had a magic wand that could help you in future searches, what would you have it do?"					
A. Filtering	Participant wanted magic wand to identify for relevant results if too many were returned	P21: A magic wand would be able to know exactly...what I'm looking for...[and] would pull up those exact articles so kind of like better filtering mechanisms.			5	4
B. Seeking	Participant wanted magic wand to find relevant information	P26: Tell me what the correct term is to translate it into academ-ese.			12	7
C. Organizing	Participant wanted magic wand to store information or create a system for doing so	P24: You could...write up a PDF, but not have to print it out...or be able to search your own notes.			10	4

D. Other	Participant wanted magic wand to do something besides filter, seek , or organize information	P28: Man, I just want my things…like I just want them immediately. I guess it would be a library that has everything…So if a thing just got published it should come out and it should be available to me…[Also,] I can have them for as long as I need them."			32	13

REFERENCES

Aabø, S. (2009). Libraries and return on investment (ROI): A meta-analysis. *New Library World*, *110*(7/8), 311-324.

Anthony, K. (2010). Reconnecting the disconnects: Library outreach to faculty as addressed in the literature. *College & Undergraduate Libraries*, *17*(1), 79-92.

Arnold-Garza, S. (2014). The flipped classroom: Assessing an innovative teaching model for effective and engaging library instruction. *College & Research Libraries News, 75*(1), 10-13.

Artino Jr, A. R., & Stephens, J. M. (2009). Academic motivation and self-regulation: A comparative analysis of undergraduate and graduate students learning online. *The Internet and Higher Education*, *12*(3), 146-151.

Arum, R., & Roksa, J. (2011). *Academically adrift: Limited learning on college campuses*. Chicago, IL: University of Chicago Press.

Association of College and Research Libraries. (2010). *Information Literacy Competency Standards for Higher Education*. Chicago: Association of College and Research Libraries.

Association of College and Research Libraries. (2011). *Standards for Libraries in Higher Education.* Chicago: Association of College & Research Libraries.

Astin, A. W. (1993). *What matters in college? Four critical years revisited*. San Francisco, CA: Jossey-Bass.

Astin, A. W. (2004). To use graduation rates to measure excellence, you have to do your homework. *Chronicle of Higher Education*, *51*(9), B20.

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology, 52*(1), 1-26.

Banta, T. W., Busby, A. K., Kahn, S., Black, K. E., & Johnson, J. N. (2007). Responding to a fiscal crisis: A data-driven approach. *Assessment & Evaluation in Higher Education, 32(*2), 183-194.

Barrett, A. (2005). The information-seeking habits of graduate student researchers in the humanities. *The Journal of Academic Librarianship, 31*(4), 324-331.

Barry, C. A. (1997). Information skills for an electronic world: Training doctoral research students. *Journal of Information Science, 23*(3), 225-238.

Bates, M.J. (2005a). An introduction to metatheories, theories, and models. In Fisher,

K.E., Erdelez, S., & McKechnie, L.E.F. (Eds.), *Theories of information behavior* (1-24). Medford, NJ: Information Today, Inc.

Bates, M. (2005b). Information and knowledge: An evolutionary framework for information science. *Information Research, 10*(4), paper 239. Retrieved from http://InformationR.net/ir/10-4/paper239.html

Bates, M.J. (2009). Information behavior. In M.J. Bates & M.N. Maack (Eds.), *Encyclopedia of Library and Information Sciences* (3rd ed.) (2381-2391). http://dx.doi.org/10.1081/E-ELIS3-120043263

Behr, M. D., & Hayward, J. L. (2008). Do off-campus students still use document delivery? Current trends. *Journal of Library Administration*, *48*(3-4), 277-293.

Bickley, R., & Corrall, S. (2011). Student perceptions of staff in the Information Commons: A survey at the University of Sheffield. *Reference Services Review*, *39*(2), 223-243.

Bielavitz, T. (2010). The Balanced Scorecard: A systemic model for evaluation and assessment of learning outcomes? *Evidence Based Library and Information Practice*, *5*(2), 35-46.

Blummer, B., Lohnes Watulak, S., & Kenton, J. (2012). The research experience for education graduate students: A phenomenographic study. *Internet Reference Services Quarterly, 17*(3–4), 117–146.

Bowen, S. (2005). Engaged learning: Are we all on the same page. *Peer Review*, *7*(2), 4-7.

Bøyum, I., & Aabø, S. (2015). The information practices of business PhD students. *New Library World, 116*(3/4), 187-200.

Brahme, M., & Walters, L. (2010). While technology poses as the great equalizer, distance still rules the experience. *Journal of Library Administration, 50*(5-6), 484-514.

Brophy, P. (2006). *Measuring library performance: Principles and techniques*. London: Facet.

Bruce, C., Partridge, H., Davis, K., Hughes, H., & Stoodley, I. (2014). *Information experience: approaches to theory and practice*. Bingley, UK: Emerald Group Publishing.

Budd, J. M., Hill, H., & Shannon, B. (2010). Inquiring into the real: A realist phenomenological approach. *The Library Quarterly, 80*(3), 267-284.

Calhoun, K., Cantrell, J., Gallagher, P., & Hawk, J. (2009). *Online catalogs: What users and librarians want*. Retrieved from https://www.oclc.org/content/dam/oclc/reports/onlinecatalogs/fullreport.pdf

Cambridge, D. (2006). Personally engaged information literacy in general education through information ecology and fieldwork. In Gibson, C. (Ed.), *Student engagement and information literacy* (143-168). Chicago, IL: Association of College and Research Libraries.

Campos, P.F. (2015, April 5). The real reason college costs so much. *The New York Times*, p. SR4

Carifio, J., & Perla, R. J. (2007). Ten common misunderstandings, misconceptions, persistent myths and urban legends about Likert scales and Likert response formats and their antidotes. *Journal of Social Sciences, 3*(3), 106-116.

Carpenter, J., Wetheridge, L., & Tanner, S. (2012). Researchers of tomorrow: The research behaviour of Generation Y doctoral students. Retrieved from http://www.jisc.ac.uk/media/documents/publications/reports/2012/Researchers-of-Tomorrow.pdf

Carpenter, R. L. (1981a). College libraries: A comparative analysis in terms of the ACRL standards. *College and Research Libraries*, *42*(1), 7-18.

Carpenter, R. L. (1981b). Two-year college libraries: A comparative analysis in terms of ACRL standards. *College and Research Libraries*, *42*(5), 407-15.

Charmaz, K. (2014). *Constructing grounded theory*. London, UK: Sage.

Catalano, A. (2013). Patterns of graduate students' information seeking behavior: A meta-synthesis of the literature. *Journal of Documentation, 69*(2), 243-274.

Centre for Information Behaviour and the Evaluation of Research. (2008). Information behaviour of the researcher of the future: A CIBER briefing paper. London, UK: CIBER. Retrieved from http://www.jisc.ac.uk/media/documents/programmemes/reppres/gg_final_keynote_11012008.pdf

Chandra, S., & Chatterjee, P. (2011). Digital indiscretions: New horizons in medical ethics. *The Australasian Medical Journal, 4*(8), 453.

Chu, S. K. W., & Law, N. (2007). Development of information search expertise: Research students' knowledge of source types. *Journal of Librarianship and Information Science, 39*(1), 27-40.

Clapp, V. W., & Jordan, R. T. (1965). Quantitative criteria for adequacy of academic

library collections. *College and Research Libraries*, *26*(5), 371-380.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Cohen, M., Poggiali, J., Lehner-Quam, A., Wright, R., & West, R. (2016). Flipping the classroom in business and education oneshot sessions: A research study. *Journal of Information Literacy, 10*(2), 40-63.

Coleman, P., & Jarred, A. D. (1994). Regional association criteria and the Standards for College Libraries: The informal role of quantitative input measures for libraries in accreditation. *The Journal of Academic Librarianship*, *20*(5), 273-284.

Connaway, L.S., and Dickey, T.J. (2010). The digital information seeker: Report of findings from selected OCLC, RIN, and JISC user behavior projects. Retrieved from http://www.jisc.ac.uk/media/documents/publications/reports/2010/digitalinformationseekerreport.pdf

Connaway, L. S., Dickey, T. J., & Radford, M. L. (2011). "If it is too inconvenient I'm not going after it:" Convenience as a critical factor in information-seeking behaviors. *Library & Information Science Research, 33*(3), 179-190.

Connaway, L.S., Lanclos, D., & Hood, E. (2013). "I find Google a lot easier than going to the library website." Imagine ways to innovate and inspire students to use the academic library. ACRL 2013: Imagine, Innovate, Inspire, 10-13 April 2013, Indianapolis, Indiana (USA). Retrieved from http://www.ala.org/acrl/sites/ala.org.acrl/files/content/conferences/confsandpreconfs/2013/papers/Connaway_Google.pdf

Connaway, L.S., and Powell, R.R. (2010). *Basic research methods for librarians*. Santa Barbara, CA: Libraries Unlimited.

Connaway, L. S., & Radford, M. L. (2010). Virtual reference service quality: Critical components for adults and the net-generation. *Libri*, *60*(2), 165-180.

Connaway, L.S., & Radford, M.L. (2017). *Research methods in Library and Information Science* (6th ed.). Santa Barbara, CA: Libraries Unlimited.

Contreras, A. (2007). How not to fix accreditation. *Chronicle of Higher Education*, *53*(49).

Cook, C., & Heath, F. M. (2001). Users' perceptions of library service quality: A LibQUAL+ qualitative study. *Library Trends*, *49*(4), 548-584.

Corbin, J., & Strauss, A. (2015). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Thousand Oaks, CA: Sage.

Corno, L., & Mandinach, E. B. (1983). The role of cognitive engagement in classroom learning and motivation. *Educational Psychologist, 18*(2), 88-108.

Cox, A. M. (2012). An exploration of the practice approach and its place in information science. *Journal of Information Science, 38*(2), 176-188.

Crane, D. (1972). *Invisible colleges: Diffusion of knowledge in scientific communities*. Chicago, IL: University of Chicago Press.

Crawford, G. A., & White, G. W. (1999). Liberal arts colleges and standards for college libraries: A quantitative analysis. *The Journal of Academic Librarianship*, *25*(6), 439-444.

Creswell, J.W. & Clark, V.L.P. (2011). *Designing and conducting mixed methods research* (2nd ed.). Thousand Oaks, CA: SAGE Publications, Inc.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal performance*. NY: Cambridge University Press.

Curzon , S. C., & Quiñónez-Skinner, J. (2009). Academic libraries. In M.J. Bates & M.N. Maack (Eds.), *Encyclopedia of Library and Information Sciences* (3rd ed.) (11-22). http://dx.doi.org/10.1081/E-ELIS3-120043263

Das, A. (2013). *Information-seeking among pregnant women: A mixed method approach* (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses Global. (Order No. 3596481).

Davenport, T. H., & Prusak, L. (1997). *Information ecology: Mastering the information and knowledge environment*. Oxford, UK: Oxford University Press.

Dickenson, D. (2006). How students and faculty use academic libraries differently. *Fast facts—Recent statistics from the Library Research Service*, No. 242. Retrieved from http://www2.cde.state.co.us/artemis/edserials/ed311010internet/ed311010242internet.pdf

DiRamio, D., & Jarvis, K. (2011). Special issue: Veterans in Higher Education--When Johnny and Jane come marching to campus. *ASHE Higher Education Report*, *37*(3), 1-144.

Du, J. T., & Evans, N. (2011). Academic library services support for research information seeking. *Australian Academic & Research Libraries*, *42*(2), 103-120.

Dunn, K. (2010). *Toward an understanding of the epistemic values of biological scientists as expressed in scholarly publication*. (Doctoral dissertation). Retrieved

from Dissertations & Theses @ Rutgers University. (Order No. 3418758).

Earp, V.J. (2008). Information source preferences of education graduate students. *Behavioral & Social Sciences Librarian, 27*(2), 73-91.

Edmunds, A. O. (2010). *An examination of the likelihood of persistence of students with discrepant high school grades and standardized test scores.* (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses Global. (Order No. 3423016).

Educause. (2012). 7 things you should know about flipped classrooms. Retrieved from https://library.educause.edu/resources/2012/2/7-things-you-should-know-about-flipped-classrooms

Ellis, D. (1993). Modeling the information-seeking patterns of academic researchers: A grounded theory approach. *The Library Quarterly, 63*(4), 469-486.

Evaluate, v [Def. b]. (2017). OED Online. Oxford University Press. Retrieved from http://www.oed.com/view/Entry/65181?redirectedFrom=evaluate#eid.

Farradane, J. (1979). The nature of information. *Journal of Information Science*, *1*(1), 13-17.

Fisher, S., & Oulton, T. (1999). The Critical Incident Technique in Library and Information management research. *Education for Information*, *17*(2), 113-25.

Flanagan, J. (1954). The critical incident technique. *Psychological Bulletin, 51*(4), 327.

Fleming-May, R., & Yuro, L. (2009). From student to scholar: the academic library and social sciences Ph.D. students' transformation. *portal: Libraries and the Academy*, *9*(2), 199-221.

Folster, M. B. (1995). Information seeking patterns: Social sciences. *The Reference Librarian*, *23*(49-50), 83-93.

Ford, N. (2015). *Introduction to information behaviour*. London, UK: Facet Publishing.

Forman, S. W. (2009). *Characteristics of Successful Community College Students*. (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses Global. (Order No. 3396401).

Frade, P. A., & Washburn, A. (2006). The university library: The center of a university education?. *portal: Libraries and the Academy*, *6*(3), 327-346.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74*(1), 59-

109.

Fulton, C., & Henefer, J. (2010). Information practice. In M.J. Bates & M.N. Maack (Eds.), *Encyclopedia of Library and Information Sciences* (3rd ed.) (2519-2525). http://dx.doi.org/10.1081/E-ELIS3-120043263

Furrer, C., & Skinner, E. (2003). Sense of relatedness as a factor in children's academic engagement and performance. *Journal of Educational Psychology, 95* (1), 148–162.

Gardner, C. C., & Gardner, G. J. (2016). Fast and furious (at publishers): The motivations behind crowdsourced research sharing. *College & Research Libraries*, crl16-840.

Gardner, S. K. (2009). Student and faculty attributions of attrition in high and low-completing doctoral programs in the United States. *Higher Education, 58*(1), 97-112.

Garson, G.D. (2014). *Logistic regression: Binary & multinomial*. Asheboro, NC: Statistical Associates Publishers.

Gatten, J. N. (2004). Measuring consortium impact on user perceptions: OhioLINK and LibQUAL+™. *The Journal of Academic Librarianship*, *30*(3), 222-228.

George, C., Bright, A., Hurlbert, T., Linke, E. C., St. Clair, G. & Stein, J. (2006). Scholarly use of information: Graduate students' information seeking behaviour. *Information Research, 11*(4), paper 272. Retrieved from http://informationr.net/ir/11-4/paper272.html

Gessner, G. C., Jaggars, D. E., Rutner, J., & Tancheva, K. (2011). Supporting humanities doctoral student success: A collaborative project between Cornell University Library and Columbia University Libraries. Retrieved from https://clir.org/pubs/ruminations/02cornellcolumbia/report.pdf

Gilstrap, D. L., & Dupree, J. (2008). Assessing learning, critical reflection, and quality educational outcomes: The critical incident questionnaire. *College & Research Libraries*, *69*(5), 407-426.

Gratch-Lindauer, B. (2002). Comparing the regional accreditation standards: Outcomes assessment and other trends. *The Journal of Academic Librarianship*, *28*(1), 14-25.

Green, R. (2010). Information illiteracy: Examining our assumptions. *The Journal of Academic Librarianship, 36*(4), 313-319.

Green, R., & Macauley, P. (2007). Doctoral students' engagement with information: An American-Australian perspective. *portal: Libraries and the Academy, 7*(3), 317-

332.

Greenhill, K., & Wiebrands, C. (2012). No library required: The free and easy backwaters of online content sharing. In Proceedings from VALA2012: emPowering eFutures, 6-9 February 2012, Melbourne, Australia. Retrieved from http://vala.org.au/direct-download/vala2012-proceedings/456-vala2012-session-11-greenhill-paper/file

Greifeneder, E. (2014, December). Trends in information behaviour research. In Proceedings of ISIC: The information behaviour conference (No. Part 1), 2-5 September, 2014, Leeds, UK. Retrieved from http://www.econ.ku.dk/ansatte/emeriti/?pure=files%2F137513587%2FTrends_in_information_behaviour_research.htm

Green, R., & Macauley, P. (2007). Doctoral students' engagement with information: an American-Australian perspective. *portal: Libraries and the Academy*, *7*(3), 317-332.

Haddow, G. (2013). Academic library use and student retention: A quantitative analysis. *Library & Information Science Research*, *35*(2), 127-136.

Hamlin, A. T. (1981). *The university library in the United States, its origins and development* (p. 11). Philadelphia: University of Pennsylvania Press.

Harris, C. S. (2011). The case for partnering doctoral students with librarians: a synthesis of the literatures. *Library Review*, *60*(7), 599-620.

Heinstrom, J. (2014). The emotional valence of information experience: Relation to personality and approach to studying. In Bruce, C., Partridge, H., Davis, K., Hughes, H., & Stoodley, I. (Eds.), *Information experience* (275-294). Bingley, UK: Emerald Publishing Limited.

Heller, D.E. (2003). Federal funds for higher education. In J.W. Guthrie (Ed.), *Encyclopedia of Education* (2nd ed.) (861-864). New York, NY: Macmillan Reference.

Horlings, E., & Gurney, T. (2013). Search strategies along the academic lifecycle. *Scientometrics, 94*(3), 1137–1160.

Hoy, M. B. (2017). Sci-Hub: What librarians should know and do about article piracy. *Medical Reference Services Quarterly, 36*(1), 73-78.

Iannuzzi, P. A., & Brown, J. M. (2010). ACRL's standards for libraries in higher education: Academic library directors weigh in. *College & Research Library News*, *17*(9), 2.

IBM. (2017). K-Means cluster analysis. Retrieved from https://www.ibm.com/support/knowledgecenter/SSLVMB_20.0.0/com.ibm.spss.statistics.help/idh_quic.htm

Indiana University Center for Postsecondary Research. (2017). Carnegie Classification of institutions of higher education. Retrieved from http://carnegieclassifications.iu.edu/

Inger, S., & Gardner, T. (2013). Library technology in content discovery–Evidence from a large-scale reader survey. *Insights, 26*(2), 120-127.

Input, n [Def. 2]. (2015). In *OED Online*. Oxford University Press. Retrieved from http://www.oed.com/view/Entry/96482

Invisible, adj. and n, [Def. A.1.d.]. (2017). OED Online. Oxford University Press. Retrieved from http://www.oed.com/view/Entry/99129?redirectedFrom=invisible+college#eid9352

Jamali, H. R., & Asadi, S. (2010). Google and the scholar: the role of Google in scientists' information-seeking behaviour. *Online information review*, *34*(2), 282-294.

Johnson, P. C., & Simonsen, J. E. (2015). Do engineering master's students know what they don't know? Exploring abstracting & indexing service use and non-use. *Library Review*, *64*(1/2), 36-57.

Julien, H., Pecoskie, J. J., & Reed, K. (2011). Trends in information behavior research, 1999–2008: A content analysis. *Library & Information Science Research*, 33(1), 19-24.

Kaplan, R. S., & Norton, D. P. (1992). The balanced scorecard: measures that drive performance. *Harvard Business Review, January/February*, 71-80.

Kelly, L. J. (1996). Implementing Astin's IEO Model in the study of student retention: A multivariate time dependent approach. Annual Forum of the Association for Institutional Research, 5-8 May, 1996, Albuquerque, NM, Retrieved from http://files.eric.ed.gov/fulltext/ED397732.pdf

Kerr, P. A. (2010). *Conceptions and practice of information literacy in academic libraries: Espoused theories and theories-in-use. (Doctoral dissertation).* Retrieved from Dissertations & Theses @ Rutgers University. (Order No. 3418770).

Kerins, G., Madden, R., & Fulton, C. (2004). Information seeking and students studying

for professional careers: The cases of engineering and law students in Ireland. *Information Research, 1*(1), paper 272. Retrieved from http://InformationR.net/ir/10-1/paper208.html

Khosrowjerdi, M., & Iranshahi, M. (2011). Prior knowledge and information-seeking behavior of PhD and MA students. *Library & Information Science Research, 33*(4), 331-335.

Kim, S. J., & Jeong, D. Y. (2006). Analyzing the status of theoretical framework by subfields in Library and Information Science research articles. *Journal of the Korean Society for Information Management, 23*(2), 21-37.

King, D. W., & Tenopir, C. (2013). Linking information seeking patterns with purpose, use, value, and return on investment of academic library journals. *Evidence Based Library and Information Practice*, *8*(2), 153-162.

Kingma, B., & McClure, K. (2015). Lib-value: Values, outcomes, and return on investment of academic libraries, phase III: ROI of the Syracuse University Library. *College & Research Libraries, 76*(1), 63-80.

Kjelgaard, M. M., & Guarino, A. J. (2012). Assessing clinical and academic performance in a Master's level speech language pathology program: A path analysis. *Creative Education*, *3*(1), 145-148.

Ko, Y. M., Shim, W., & Pyo, S. H. (2016). Factors affecting users' assessment of the economic value of university library services. *Journal of Librarianship and Information Science, 48*(3), 223-235.

Korobili, S., Malliari, A., & Zapounidou, S. (2011). Factors that influence information-seeking behavior: The case of Greek graduate students. *The Journal of Academic Librarianship, 37*(2), 155-165.

Kuh, G. D., & Gonyea, R. M. (2003). The role of the academic library in promoting student engagement in learning. *College & Research Libraries*, *64*(4), 256-282.

Kyrillidou, M (2010). The ARL library scorecard pilot: Using the Balanced Scorecard in research libraries. *Research Library Issues: A Bimonthly Report from ARL, CNI, and SPARC*, 33-35.

Larson, K. A. (2011). *Negotiating romantic and sexual relationships: Patterns and meanings of mediated interaction* (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses Global. (Order No. 3460489).

Leech, N.L., Barrett, K.C., & Morgan, G.A. (2011). *IBM SPSS for intermediate statistics: Use and interpretation* (4th ed.). New York, NY: Routledge.

Leung, S. O. (2011). A comparison of psychometric properties and normality in 4-, 5-, 6-, and 11-point Likert scales. *Journal of Social Service Research, 37*(4), 412-421.

Lewis, V., Hiller, S., Mengel, E., & Tolson, D. (2013). Building scorecards in academic research libraries: Performance measurement and organizational issues. *Evidence Based Library and Information Practice*, *8*(2), 183-199.

Libutti, P., & Kopala, M. (1995). The doctoral student, the dissertation, and the library: A review of the literature. *The Reference Librarian*, *22*(48), 5-25.

Light, R. J. (2001). *Making the most of college: Students speak their minds*. Cambridge, MA: Harvard University Press.

Lin, K. T. (2009). *Maintaining a news perspective remotely through online information retrieval: Task-based web experiences of foreign news correspondents* (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses Global. (Order No. 3366490).

Lindauer, B. G. (1998). Defining and measuring the library's impact on campuswide outcomes. *College & Research Libraries*, *59*(6), 546-570.

Line, M. B. (2000). Social Science information--The poor relation. *IFLA Journal, 26*(3), 177-179.

Maddison, T. (2015). A matter of size: Flipping library instruction in various engineering classrooms. *Issues in Science & Technology Librarianship*. Retrieved from http://istl.org/15-fall/refereed2.html.

Maddison, T., Beneteau, D., & Sokoloski, B. (2014). Breaking ground: Improving undergraduate engineering projects through flipped teaching of literature search techniques. *Issues In Science & Technology Librarianship*. Retrieved from http://www.istl.org/14-fall/refereed2.html.

Mark, A. E., & Boruff-Jones, P. D. (2003). Information literacy and student engagement: What the national survey of student engagement reveals about your campus. *College & Research Libraries*, *64*(6), 480-493.

Markey, K. & Atherton, P. (1978). ONTAP: Online training and practice manual for ERIC data base searchers. Retrieved from http://files.eric.ed.gov/fulltext/ED160109.pdf

Matell, M. S., & Jacoby, J. (1971). Is there an optimal number of alternatives for Likert scale items? Study I: Reliability and validity. *Educational and Psychological Measurement, 31*(3), 657-674.

Mathews, B.S. (2008). Preemptive reference: Coming out from behind the desk. In S.K.

Steiner & M.L. Madden (Eds.), *The desk and beyond: Next generation reference services* (91-98). Chicago, IL: ACRL.

Matteson, M. L. (2013). The whole student: Cognition, emotion, and information literacy. *College & Research Libraries*, crl13-533.

Matthews, J. (2006). The Library Balanced Scorecard: Is It in Your Future? *Public Libraries-Chicago-Public Library Association*, *45*(6), 64.

Matthews, J. R. (2007). *The evaluation and measurement of library services* (132-133). Westport, CT: Libraries Unlimited.

Matthews, J. R. (2012). Assessing library contributions to university outcomes: The need for individual student level data. *Library Management*, *33*(6/7), 389-402.

Maughan, P. D. (1999). Library resources and services: A cross-disciplinary survey of faculty and graduate student use and satisfaction. *The Journal of Academic Librarianship, 25*(5), 354-366.

Melo, L. B., & Pires, C. P. (2011). Measuring the economic value of the electronic scientific information services in Portuguese academic libraries. *Journal of Librarianship and Information Science, 43*(3), 146-156.

Mengel, E., & Lewis, V. (2012). Collaborative assessment: North American academic libraries' experiences using the Balanced Scorecard to measure performance and show value. *Library Management*, *33*(6/7), 357-364.

Michie, S., van Stralen, M. M., & West, R. (2011). The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implementation Science*, *6*(1), 42.

Middle States Commission on Higher Education. (2015). Standards for accreditation and requirements of affiliation: Thirteenth edition. Retrieved from http://www.msche.org/publications/RevisedStandardsFINAL.pdf

Mikitish, S. E., & Radford, M. L. Initial impressions: Investigating how future faculty value academic libraries. ACRL 2013: Imagine, Innovate, Inspire, 10-13 April 2013, Indianapolis, Indiana (USA). Retrieved from http://www.ala.org/acrl/sites/ala.org.acrl/files/content/conferences/confsandpreconfs/2013/papers/MikitishRadford_Initial.pdf

Miles, M.B., Huberman, A.M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). Thousand Oaks, CA: Sage.

Miller, K. (2013). Flipping out: Reflections upon landing. Retrieved from http://acrlog.org/2013/03/28/flipping-outreflections-upon-landing/

Miller, K. (2014). Undergraduate use of library databases decreases as level of study progresses. *Evidence Based Library and Information Practice*, *9*(3), 98-100.

Monroe-Gulick, A., & Petr, J. (2012). Incoming graduate students in the social sciences: How much do they really know about library research?. *portal: Libraries and the Academy*, *12*(3), 315-335.

Mu, X., Dimitroff, A., Jordan, J., & Burclaff, N. (2011). A survey and empirical study of virtual reference service in academic libraries. *The Journal of Academic Librarianship, 37*(2), 120-129.

Nelson, S.D. (2003). Federal funding for academic research. In J.W. Guthrie (Ed.) *Encyclopedia of Education* (2nd ed.) (853-861).New York, NY: Macmillan Reference.

Nelson, W.N. (2009). Library standards in higher education. In M.J. Bates & M.N. Maack (Eds.) *Encyclopedia of Library and Information Sciences* (3rd ed.) (3449-3459). http://dx.doi.org/10.1081/E-ELIS3-120043263

Nicholas, D., Watkinson, A., Abdullah, A., Boukacem-Zeghmouri, C., Bravo, B.R., Świgoń, M., et al. (2016). *Early career researchers: The harbingers of change?: Year one (2016)*. Retrieved from http://ciber-research.eu/download/20161120-ECR_Year_1_final_report_071116.pdf

Niu, X., & Hemminger, B. M. (2012). A study of factors that affect the information-seeking behavior of academic scientists. *Journal of the American Society for Information Science and Technology, 63*(2), 336-353.

Niu, X., Hemminger, B. M., Lown, C., Adams, S., Brown, C., Level, A., et al. (2010). National study of information seeking behavior of academic researchers in the United States. *Journal of the American Society for Information Science and Technology, 61*(5), 869–890.

Norusis, M. (2017). Cluster analysis. Retrieved from http://www.norusis.com/pdf/SPC_v13.pdf

Oakleaf, M. (2010). *Value of academic libraries: A comprehensive research review and report*. Chicago, IL: Association of College and Research Libraries.

O'Brien, H. L., & Toms, E. G. (2008). What is user engagement? A conceptual framework for defining user engagement with technology. *Journal of the American Society for Information Science and Technology, 59*(6), 938-955.

Okahana, H., Feaster, K., & Allum, J. (2016). *Graduate enrollment and degrees: 2005 to 2015*. Washington, DC: Council of Graduate Schools. Retrieved from

http://cgsnet.org/ckfinder/userfiles/files/Graduate%20Enrollment%20%20Degree
s%20Fall%202015%20Final.pdf

Ondrusek, A. (2008). Information literacy. In M.L. Radford & P. Snelson (Eds.)
Academic library research: Perspectives and current trends. Chicago, IL:
Association of College & Research Libraries.

Ortega, J. L. (2015). Disciplinary differences in the use of academic social networking
sites. *Online Information Review, 39*(4), 520-536.

Ory, J. C., & Braskamp, L. A. (1988). Involvement and growth of students in three
academic programs. *Research in Higher Education*, *28*(2), 116-129.

Output, n [Def. 2]. (2015). In *OED Online*. Oxford University Press. Retrieved from
http://www.oed.com/view/Entry/133846

Ovadia, S. (2014). ResearchGate and Academia. edu: Academic social networks.
Behavioral & Social Sciences Librarian, 33(3), 165-169.

Page, J. D. (2010). Activism and leadership development: Examining the relationship
between college student activism involvement and socially responsible leadership
capacity. Retrieved from ProQuest Dissertations & Theses Global. (Order No.
3426286).

Parsons, M.D. (2003). Accreditation in the United States: Higher education. In J.W.
Guthrie (Ed.) *Encyclopedia of Education* (2nd ed.) (28-35)*.* New York, NY:
Macmillan Reference

Partridge, H. & Yates, C. (2014). Researching information experience: Object and
domain. In Bruce, C., Partridge, H., Davis, K., Hughes, H., & Stoodley, I. (Eds.),
Information experience (19-32). Bingley, UK: Emerald Publishing Limited.

Pascarella E.T., & Terenzini, P. T. (1991). *How college affects students*. San Francisco,
CA: Josey-Bass.

Pettigrew, K. E., Fidel, R., & Bruce, H. (2001). Conceptual frameworks in information
behavior. *Annual Review of Information Science and Technology, 35*, 43-78.

Poll, R. (2001). Performance, process, and costs: Managing service quality with the
Balanced Scorecard. *Library Trends*, *49*(4), 709-17.

Poll, R., & Payne, P. (2006). Impact measures for libraries and information services.
Library Hi Tech, 24(4), 547-562.

Pritchard, S. M. (1996). Determining quality in academic libraries. *Library Trends*, *44*(3),
572-594.

QSR International. (2017). What is NVivo?. *NVivo*. Retrieved from
     http://www.qsrinternational.com/nvivo-product

Qualtrics. (2017). *Qualtrics* [computer software]. Retrieved from
     https://www.qualtrics.com/

Radford, M. L. (1993). *Relational aspects of reference interactions: A qualitative
     investigation of the perceptions of users and librarians in the academic library.*
     Retrieved from ProQuest Dissertations & Theses Global. (Order No. 9333442).

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.

Rempel, H. G. (2010). A longitudinal assessment of graduate student research behavior
     and the impact of attending a library literature review workshop. *College &
     Research Libraries, 71*(6), 532-547.

Research Information Network. (2011). The role of research supervisors in information
     literacy. Retrieved from
     http://www.rin.ac.uk/system/files/attachments/Research_supervisors_report_for_s
     creen.pdf

Rockinson-Szapkiw, A. J., & Spaulding, L. S. (2014). *Navigating the doctoral journey: A
     handbook of strategies for success*. New York, NY: Rowman & Littlefield.

Roethlisberger, F. & Dickson, W. (1939). *Management and the worker*. Cambridge, MA:
     Harvard University Press.

Rooney, P. (1992). On values in science: Is the epistemic/non-epistemic distinction
     useful? PSA: Proceedings of the Biennial Meeting of the Philosophy of Science
     Association, 1992, (13-22). Chicago, IL: University of Chicago Press. Retrieved
     from https://www.jstor.org/stable/192740?item_view=read_online

Rose, S. (2013). The value of a college degree. *Change: The magazine of higher
     learning, 45*(6), 24-33.

Rowlands, I., Nicholas, D., Williams, P., Huntington, P., Fieldhouse, M., Gunter, B., et
     al. (2008). The Google generation: The information behaviour of the researcher of
     the future. In *Aslib proceedings 60*(4), 290-310.

Rutgers University Libraries. (2017). *Social sciences*. Retrieved from
     http://www.libraries.rutgers.edu/indexes/subjects/indexes_social_sciences

Sadler, E., & Given, L. M. (2007). Affordance theory: a framework for graduate students'
     information behavior. *Journal of Documentation, 63*(1), 115-141.

Sandeen, A. (2003). *Enhancing student engagement on campus*. Lanham, MD: University Press of America.

Saracevic, T., & Kantor, P. B. (1997). 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.

Savolainen, R. (2007). Information Behavior and Information Practice: Reviewing the "Umbrella Concepts" of Information-Seeking Studies 1. *The Library Quarterly, 77*(2), 109-132.

Schullery, N. M., Reck, R. F., & Schullery, S. E. (2011). Toward solving the high enrollment, low engagement dilemma: A case study in introductory business. *International Journal of Business, Humanities and Technology, 1*(2), 1-9.

Searing, S. E., & Greenlee, A. M. (2011). Faculty responses to library service innovations: A case study. *Journal of Education for Library and Information Science*, *52*(4), 279-294.

Senteio, C. R. (2015). *Investigating psychosocial factors: Supporting clinical decisions for outpatient diabetes care* (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses Global. (Order No. 3746092).

Shernoff, D. J. (2013). *Optimal learning environments to promote student engagement*. New York, NY: Springer.

Shoaf, E. C. (2003). Using a professional moderator in library focus group research. *College & Research Libraries, 64*(2), 124-132.

Shreeve, S., & Chelin, J. (2014). Value and impact of librarians' interventions on student skills development. *New Review of Academic Librarianship, 20*(2) 204-232.

Simon, H. A. (1955). A behavioral model of rational choice. *The Quarterly Journal of Economics, 69*(1), 99-118.

Sinha, S. (2013). *Exploring student engagement and transfer in technology mediated environments* (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses Global. (Order No. 3606559).

Snyder, J. A. (2008). *An exploration of the effects of student characteristics and engagement practices on academic success for low-income students* (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses Global. (Order No.

3301775)

Social science, n. (2017). OED Online. Oxford University Press. Retrieved from
http://www.oed.com/view/Entry/183756?redirectedFrom=social+science#eid.

Soria, K. M., Fransen, J., & Nackerud, S. (2013). Library use and undergraduate student
outcomes: New evidence for students' retention and academic success. portal:
Libraries and the Academy, 13(2), 147-164.

Sowell, R., Bell, N., & Kirby, S.N. (2010). *PhD completion and attrition: Policies and
practices to promote student success*. Washington, DC: Council of Graduate
Schools.

Spady, J. (2002). Outcome based education. In J.W. Guthrie (Ed.) *Encyclopedia of
Education* (2nd ed.) (1827-1831). New York, NY: Macmillan Reference.

Spezi, V. (2016). Is information-seeking behavior of doctoral students changing?: A
review of the literature (2010–2015). *New Review of Academic Librarianship,
22*(1), 78-106.

Sprow, A. H. (2011). The role of faculty-student interactions in student leadership
development and engagement based on varying levels of faculty scholarship of
engagement (Doctoral dissertation). Retrieved from ProQuest Dissertations &
Theses Global. (Order No. 3487122).

Standard, n and adj [Def. II, 12]. (2015). In *OED Online*. Oxford University Press.
Retrieved from http://www.oed.com/view/Entry/188962

Steffy, C. (2013. October 7). The flipped classroom in an information literacy session
[Web log post]. Retrieved from
http:// crdpala.org/2013/10/07/theflippedclassroom-in-an-information-
literacysession/

Stein, J. L. (2007). Peer educators and close friends as predictors of male college
students' willingness to prevent rape. *Journal of College Student Development*,
48(1), 75-89.

Stevens, M., & Kirst, M. (Eds.). (2015). *Remaking College: The Changing Ecology of
Higher Education*. Palo Alto, CA: Stanford University Press.

Stimpson, C.R. (2012). Graduate education: The nerve center of higher education. In E.C.
Lagemann & H. Lewis (Eds.), *What is college for?: The public purpose of higher
education* (132-156). New York, NY: Teachers College Press.

Swab, M., & Romme, K. (2016). Scholarly sharing via Twitter:# icanhazpdf requests for
health sciences literature. *Journal of the Canadian Health Libraries*

Association/Journal de l'Association des bibliothèques de la santé du Canada, 37(1), 6-11.

Switzer, A., & Wynn Perdue, S. (2011). Dissertation 101: a research and writing intervention for education graduate students. *Education Libraries, 34*(1), 4.

Talja, S., Tuominen, K., & Savolainen, R. (2005). " Isms" in information science: constructivism, collectivism and constructionism. *Journal of Documentation, 61*(1), 79-101.

Tenopir, C. (2013). Building evidence of the value and impact of library and information services: Methods, metrics and ROI. *Evidence Based Library and Information Practice*, *8*(2), 270-274.

Tenopir, C. (2014). Scholarly reading patterns of US graduate and undergraduate students. Presented at 2014 Library Assessment Conference: Building effective, sustainable, practical assessment, 4-6 August 2014, Seattle, Washington (USA). Retrieved from http://libraryassessment.org/bm~doc/15tenopirpanel-2.pdf

Tenopir, C., King, D. W., & Bush, A. (2004). 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.

Tenopir, C., King, D. W., Christian, L., & Volentine, R. (2015). Scholarly article seeking, reading, and use: A continuing evolution from print to electronic in the sciences and social sciences. *Learned Publishing, 28*(2), 93-105.

Terenzini, P. E., & Pascarella, E. T. (1991). *How college affects students: findings and insights from twenty years of research.* San Francisco, CA: Jossey-Bass.

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.

Thelwall, M., & Kousha, K. (2014). Academia. edu: social network or academic network?. *Journal of the Association for Information Science and Technology, 65*(4), 721-731.

Town, J. S., & Kyrillidou, M. (2013). Developing a values scorecard. *Performance Measurement and Metrics*, *14*(1), 7-16.

Tracy, D. G., & Searing, S. E. (2014). LIS graduate students as library users: A survey study. *The Journal of Academic Librarianship, 40*(3), 367-378.

Trustees of Indiana University. (2017). About NSSE ®. *National Survey of Student Engagement.* Retrieved from http://nsse.indiana.edu/html/about.cfm

Trustees of Indiana University. (2014). Engagement indicators. *National Survey of Student Engagement*. Retrieved from http://nsse.iub.edu/html/engagement_indicators.cfm

Twenge, J. M., Campbell, W. K., & Freeman, E. C. (2012). Generational differences in young adults' life goals, concern for others, and civic orientation, 1966–2009. *Journal of Personality and Social Psychology, 102*(5), 1045-1062.

U.S. Census Bureau. (2017). Census regions and divisions of the United States. Retrieved from https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf

Value, n [Def. 1-2]. (2017). OED Online. Oxford University Press. Retrieved from http://www.oed.com/view/Entry/221253?rskey=62qWMo&result=1#eid

Vezzosi, M. (2009). Doctoral students' information behaviour: An exploratory study at the University of Parma (Italy). *New Library World, 110*(1/2), 65-80.

Webb, K. A., Lu, T., & Black, E. L. (2008). New intersections for student engagement in libraries: A qualitative exploration of collaborative learning with multimedia technologies. *Evidence Based Library and Information Practice*, *3*(4), 34-48.

Whitmire, E. (1998). Development of critical thinking skills: An analysis of academic library experiences and other measures. *College & Research Libraries*, *59*(3), 266-273.

Whitmire, E. (2002). Academic library performance measures and undergraduates' library use and educational outcomes. *Library & Information Science Research, 24*(2), 107-128.

Williams, A. E., & Woodacre, M. A. (2016). The possibilities and perils of academic social networking sites. *Online Information Review, 40*(2), 282-294.

Williams, P., Nicholas, D., & Rowlands, I. (2010, May). The attitudes and behaviours of illegal downloaders. In *Aslib Proceedings, 62*(3), 283-301.

Wong, G., Chan, D., & Chu, S. (2006). Assessing the enduring impact of library instruction programs. *The Journal of Academic Librarianship, 32*(4), 384-395.

Wong, S. H. R., & Cmor, D. (2011). Measuring association between library instruction and graduation GPA. *College & Research Libraries, 72*(5), 464-473.

Wu, M. D., & Chen, S. C. (2014). Graduate students appreciate Google Scholar, but still find use for libraries. *The Electronic Library, 32*(3), 375-389.

You, S., DesArmo, J., Mu, X., & Dimitroff, A. (2014). Balancing factors

affecting virtual reference services: Identified from academic librarians' perspective. In *Digital Libraries (JCDL), 2014 IEEE/ACM Joint Conference* (477-478). http://dx.doi.org/10.1109/JCDL.2014.6970233

Young, V. (1993). Focus on focus groups. *College & Research Libraries News*, *54*(7), 391-394.

Yu, L., Hong, Q., Gu, S., & Wang, Y. (2008). An epistemological critique of gap theory based library assessment: The case of SERVQUAL. *Journal of Documentation, 64*(4), 511-551.

Zickuhr, K., Purcell, K., & Rainie, L. (2014). *From distant admirers to library lovers – and beyond: A typology of public library engagement in America*. Retrieved from http://www.pewinternet.org/2014/03/13/library-engagement-typology/