Abstract

CASSIDY R. SUGIMOTO: Mentoring, collaboration, and interdisciplinarity: An evaluation of the scholarly development of Information and Library Science doctoral students
(Under the direction of Dr. Gary Marchionini)

This study evaluated the development of scholars within the field of information and library science (ILS) with an emphasis on mentoring, collaboration, and interdisciplinarity in the process of doctoral education. Using methodological triangulation of more than 200 questionnaires, 30 interviews, and the bibliometric analysis of 97 dissertation bibliography and curriculum vitae pairs, this study provides a description of the process of educating ILS doctoral students. Main findings from the study show that advisors serve as the most dominant mentor in the doctoral process and provide guidance and support of the student to prepare them for a career in research. Committee members serve a similar function, although to a lesser degree. Doctoral student colleagues provide emotional support and role-modeling. However, although there are multiple individuals providing support and guidance, the doctoral process is largely driven by the student. Collaboration of some form occurs in the majority of the advising relationships, however, slightly less than 50% of advisees co-publish with their advisors. The doctoral dissertation is not considered to be collaborative, although the advisor and committee members provide guidance and support. The dissertation bibliographies display a core in serial and conference literature, with interdisciplinary borrowing of research methods and subject literature from fields such as communication, computer science, linguistics, psychology and sociology.
To Thomas, Anastasia, and Madeleine, with love
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Table of Contents

1. Introduction ........................................................................................................................................... 1
   1.1. Research questions ....................................................................................................................... 3

2. Literature review .................................................................................................................................... 1
   2.1. ILS doctoral education .................................................................................................................. 6
       2.1.1. Historical background ......................................................................................................... 6
       2.1.2. Surveys of ILS dissertations and doctoral programs .......................................................... 8
       2.1.3. Summary ............................................................................................................................ 11
   2.2. Mentoring ....................................................................................................................................... 12
       2.2.1. Background of mentoring .................................................................................................. 13
       2.2.2. Definition of the term “mentor” .......................................................................................... 15
       2.2.3. Graduate mentoring ........................................................................................................... 18
           2.2.3.1. Value of mentoring ...................................................................................................... 18
           2.2.3.2. Negative impacts of mentoring .................................................................................. 20
           2.2.3.3. Advisors as mentors .................................................................................................... 21
           2.2.3.4. Committee members as mentors ................................................................................ 24
       2.2.4. Developing a framework ...................................................................................................... 25
           2.2.4.1. Existing metrics, frameworks, theories, and models .................................................. 25
           2.2.4.2. Positive mentor behavior ............................................................................................. 30
       2.2.5. Disciplinary differences in graduate study ............................................................................. 31
3.2.1. Questionnaire .......................................................................................................... 63
3.2.2. Interview ................................................................................................................. 64
3.2.3. Bibliometric analysis .............................................................................................. 65
3.3. Questionnaires ................................................................................................................ 65
  3.3.1. Data collection ........................................................................................................ 66
  3.3.2. Data analysis ........................................................................................................... 66
3.4. Interviews ....................................................................................................................... 66
  3.4.1. Data collection ........................................................................................................ 67
  3.4.2. Data analysis ........................................................................................................... 68
3.5. Bibliometric analysis of bibliographies and curriculum vitae ....................................... 69
  3.5.1. Data collection ........................................................................................................ 69
  3.5.2. Data analysis ........................................................................................................... 70
  3.5.2.1. Interdisciplinarity index .......................................................................................... 70
4. Results I ................................................................................................................................ 62
  4.1. Mentoring ....................................................................................................................... 74
    4.1.1. Mentors in the doctoral process .............................................................................. 74
    4.1.2. Initiation .................................................................................................................. 77
    4.1.3. Cultivation ............................................................................................................... 85
      4.1.3.1. Meetings and proximity ................................................................................... 85
      4.1.3.2. Channels of communication ............................................................................ 91
      4.1.3.3. Levels of initiative ........................................................................................... 92
      4.1.3.4. Topics of conversation ..................................................................................... 99
      4.1.3.5. Psychosocial .................................................................................................. 103
4.1.3.6. Pedagogical ................................................................. 104
4.1.3.7. Individual needs of students ........................................... 107
4.1.3.8. Career preparation and acculturation ................................. 108
4.1.3.9. Summary ................................................................. 116
4.1.4. Separation ................................................................. 117
4.1.5. Redefinition .................................................................. 121
4.1.6. Dissertation committee as a mentoring constellation .......... 123
  4.1.6.1. Roles ........................................................................... 124
  4.1.6.2. Relationships ............................................................. 128
  4.1.6.3. Outside member ........................................................ 132
  4.1.6.4. Changes in committee composition .............................. 135
  4.1.6.5. Continued relationships .............................................. 136
  4.1.6.6. Summary ................................................................. 136
4.1.7. Peer mentoring ............................................................. 137
4.1.8. Summary ..................................................................... 139
4.2. Collaboration .................................................................. 140
  4.2.1. Collaboration with advisors ............................................ 140
  4.2.2. Disadvantages of collaboration ...................................... 146
  4.2.3. Collaboration with other individuals ................................. 148
  4.2.4. Dissertation as collaboration ........................................ 149
  4.2.5. Summary ................................................................. 157
4.3. Interdisciplinarity ................................................................ 157
  4.3.1. Degrees and dissertations .............................................. 158
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.3.2.</td>
<td>Programs</td>
<td>160</td>
</tr>
<tr>
<td>4.3.3.</td>
<td>Summary</td>
<td>162</td>
</tr>
<tr>
<td>4.4.</td>
<td>Program differences</td>
<td>163</td>
</tr>
<tr>
<td>4.4.1.</td>
<td>Coursework</td>
<td>163</td>
</tr>
<tr>
<td>4.4.2.</td>
<td>Annual reviews</td>
<td>166</td>
</tr>
<tr>
<td>4.4.3.</td>
<td>Comprehensive exams</td>
<td>167</td>
</tr>
<tr>
<td>4.4.4.</td>
<td>Proposal</td>
<td>170</td>
</tr>
<tr>
<td>4.4.5.</td>
<td>Dissertation</td>
<td>172</td>
</tr>
<tr>
<td>4.4.6.</td>
<td>Funding</td>
<td>175</td>
</tr>
<tr>
<td>4.4.7.</td>
<td>Academic models</td>
<td>177</td>
</tr>
<tr>
<td>4.4.8.</td>
<td>Summary</td>
<td>180</td>
</tr>
<tr>
<td>5.</td>
<td>Results II</td>
<td>73</td>
</tr>
<tr>
<td>5.1.</td>
<td>Description of references</td>
<td>73</td>
</tr>
<tr>
<td>5.1.1.</td>
<td>Types of references</td>
<td>182</td>
</tr>
<tr>
<td>5.1.2.</td>
<td>Authors</td>
<td>189</td>
</tr>
<tr>
<td>5.1.4.</td>
<td>Summary</td>
<td>192</td>
</tr>
<tr>
<td>5.2.</td>
<td>Mentoring and collaboration</td>
<td>193</td>
</tr>
<tr>
<td>5.3.</td>
<td>Interdisciplinarity</td>
<td>196</td>
</tr>
<tr>
<td>5.3.1.</td>
<td>LC class</td>
<td>196</td>
</tr>
<tr>
<td>5.3.2.</td>
<td>Interdisciplinarity index</td>
<td>201</td>
</tr>
<tr>
<td>5.3.3.</td>
<td>Summary</td>
<td>205</td>
</tr>
<tr>
<td>6.</td>
<td>Discussion</td>
<td>206</td>
</tr>
<tr>
<td>6.1.</td>
<td>Mentoring</td>
<td>206</td>
</tr>
</tbody>
</table>
6.1.1. Application of Kram’s mentoring model .............................................................. 206
6.1.2. Visualizing Kram’s model for doctoral education .............................................. 212
6.1.3. Mentoring constellation ..................................................................................... 214
6.1.4. Best practices ..................................................................................................... 216
6.2. Collaboration ........................................................................................................... 217
6.2.1. Co-publishing with advisors and committee members ..................................... 217
6.2.2. Idea sharing ....................................................................................................... 219
6.2.3. Big Science and grant funding ......................................................................... 220
6.2.4. The dissertation as a collaborative product ..................................................... 221
6.3. Interdisciplinarity .................................................................................................... 222
6.3.1. Disciplines of influence .................................................................................. 222
6.3.2. Impacts on research methods .......................................................................... 224
6.3.3. Core literature and disciplinary identity ........................................................... 224
6.4. Limitations ............................................................................................................. 226
7. Conclusions and Future Research ............................................................................. 230
Appendices .................................................................................................................. 234
Cited References .......................................................................................................... 276
List of Tables

Table 1. Phases of mentoring according to different scholars ...................................................... 29

Table 2. Frequency of responses to advisor question about number of students to whom they considered themselves mentors ..................................................................................................... 74

Table 3. Frequency of responses to advisee question about individuals who they considered mentors .......................................................................................................................................... 76

Table 4. Frequency of advisor responses to question regarding importance of advisee characteristics ................................................................................................................................. 80

Table 5. Frequency of advisee responses to question regarding importance of advisor characteristics ........................................................................................................................................ 81

Table 6. Frequency of advisor/advisee responses to questions about meeting frequency ............ 85

Table 7. Frequency of advisor/advisee responses to questions regarding group meetings .......... 86

Table 8. Frequency of advisor responses to question regarding communication channels ....... 91

Table 9. Frequency of advisee responses to question regarding communication channels ....... 92

Table 10. Frequency of advisor/advisee responses to question about who initiates instances of information exchange........................................................................................................... 93

Table 11. Frequency of advisor responses to question regarding topics of discussion .......... 99

Table 12. Frequency of advisee responses to question regarding topics of discussion .......... 100

Table 13. Distribution of advisor/advisee responses to question regarding topic sufficiency.... 101

Table 14. Frequency of advisor responses to question about general topics of discussion ...... 102

Table 15. Frequency of advisee responses to question about general topics of discussion ...... 102

Table 16. Frequency of advisee responses in response to question about pedagogical preparation ........................................................................................................................................ 104

Table 17. Frequency of advisee responses to question regarding conference attendance ....... 115

Table 18. Frequency of advisor/advisee responses to question about post-graduation relationship .............................................................................................................................................. 121

Table 19. Frequency of advisor responses to question about publishing with advisees .......... 142
Table 20. Mode of advisor and advisee response to question regarding contributions to the dissertation ................................................................. 150

Table 21. Mode of advisee and advisor responses to question about significant contributions. 150

Table 22. Frequency of advisor respondents serving on dissertation committees outside of ILS ................................................................. 158

Table 23. Frequency of advisee responses to type of method used in dissertation .......... 160

Table 24. Descriptive statistics for references ......................................................................................... 182

Table 25. Number and percentage of references by publication type ................................................. 183

Table 26. Monograph source and the number of dissertations in which they are cited .......... 184

Table 27. Serial sources and the number of dissertations in which they are cited ............ 185

Table 28. Conference sources and the number of dissertations in which they are cited .... 186

Table 29. Dissertations/theses cited by at least two dissertations .................................................. 188

Table 30. Authors and the number of dissertations in which they are cited ......................... 189

Table 31. Descriptive statistics for mean difference in age of references ................................. 191

Table 32. Number of dissertations by number of citations to self, advisor, and committee .... 193

Table 33. Descriptive statistics regarding number of citations to self, advisor, and committee 194

Table 34. Number of instances of co-authorship with advisor and committee before and after graduation ................................................................. 195

Table 35. Descriptive statistics regarding co-authorship with advisors and committee before and after graduation .......................................................... 195

Table 36. Number of references for which an LC class could be identified by source type .... 196

Table 37. Number of classes for references of each source type ................................................. 196

Table 38. Number of dissertations including references classed by general and secondary LC classes .............................................................................. 197

Table 39. Most frequently cited LC classes by source type ............................................................ 200

Table 40. Descriptive statistics for the interdisciplinarity index .................................................. 201

Table 41. Interdisciplinarity index means and standard deviations by school ......................... 204
Table of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Distribution of advisor responses in response to question about collaborating with advisees</td>
<td>140</td>
</tr>
<tr>
<td>Figure 2</td>
<td>Distribution of advisee responses to question on publishing with advisors</td>
<td>142</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Distribution of advisor responses regarding co-authorship on advisee dissertation work</td>
<td>152</td>
</tr>
<tr>
<td>Figure 4</td>
<td>Disciplinary classifications of dissertations by advisees</td>
<td>159</td>
</tr>
<tr>
<td>Figure 5</td>
<td>Distribution of dissertations by number of references contained</td>
<td>182</td>
</tr>
<tr>
<td>Figure 6</td>
<td>Distribution of source by the number of dissertations in which they are cited</td>
<td>187</td>
</tr>
<tr>
<td>Figure 7</td>
<td>Percentage of unique titles within each source type</td>
<td>188</td>
</tr>
<tr>
<td>Figure 8</td>
<td>Distribution of references by age of references and source type</td>
<td>192</td>
</tr>
<tr>
<td>Figure 9</td>
<td>Number of dissertations by number of citations to self, advisor, and committee</td>
<td>194</td>
</tr>
<tr>
<td>Figure 10</td>
<td>Distribution of dissertations by interdisciplinarity index scores</td>
<td>202</td>
</tr>
<tr>
<td>Figure 11</td>
<td>Regression analysis on interdisciplinarity index and year of graduation</td>
<td>203</td>
</tr>
<tr>
<td>Figure 12</td>
<td>Boxplot of interdisciplinarity index by school</td>
<td>205</td>
</tr>
<tr>
<td>Figure 13</td>
<td>Doctoral mentoring process/actor model</td>
<td>213</td>
</tr>
<tr>
<td>Figure 14</td>
<td>Graph depicting frequency and sufficiency of topics of conversation</td>
<td>216</td>
</tr>
</tbody>
</table>
1. Introduction

The goal of this study is to evaluate the development of scholars within the field of information and library science (ILS) with an emphasis on mentoring, collaboration, and interdisciplinarity in the process of doctoral education. The doctoral process is deeply situated within the current disciplinary framework—students receive degrees in specific disciplines and are trained to work within the same disciplinary affiliation at other institutions or corporations (Turner, 2000). However, there is considerable debate over the actual definition of a discipline. One definition calls disciplines ways in which to “describe and differentiate knowledge, institutional structures, researchers, and resources in the working world of scholarship and science” (Palmer & Cragin, 2008, p. 172). Becher (1989) and Turner (2000) focus on the disciplinary identity created by organizational structure and content area, but Becher (1989) cites Price’s admonition that: “we cannot and should not artificially separate the matter of substantive content from that of social behavior” (as cited in Becher, 1989, p. 20).

Numerous constructs have been explored with an emphasis on the social behaviors of disciplines, including the concept of invisible colleges (Price & Beaver, 1966), academic tribes (Becher, 1989), communities of practice (Lave & Wenger, 1991), paradigms (Kuhn, 1996), discourse communities (Hyland, 2004), and epistemic cultures (Knorr Cetina, 2007). A common theme across these constructs is that disciplines are intellectual spaces characterized by certain norms and accepted behaviors—especially in terms of what can be studied within the domain and how that information can be communicated. This act of communicating is paramount for many definitions of disciplinarity. Hyland (2004) states the importance of the act of academic
writing in particular by stating: “writing, therefore, is not simply marginal to disciplines, merely an epiphenomenon on the boundaries of academic practice…[o]n the contrary, it helps to create those disciplines by influencing how members relate to one another, and by determining who will be regarded as members, who will gain success and what will count as knowledge” (p. 5). This sentiment is echoed by Montgomery who noted: “There are no boundaries, no walls, between the doing of science and the communication of it; communicating is the doing of science” (as cited in Cronin, 2005, p. 7). It is therefore perhaps not unexpected that the formal texts produced by this communication are often the unit of analysis when exploring disciplinary structures and practices.

One element that is often overlooked is the context in which scholars learn the communicative behaviors of their discipline. One potential context is the doctoral education process and, in particular, the relationship between doctoral students and their advisors. Faculty advisors have been called the “gate keepers to the scholarly profession” and the “socializing agents of the discipline” (Girves & Wemmerus, 1988, p. 171). This relationship, cited as the most critical element in doctoral education (Heinrich, 1991, 1995; Heiss, 1970; Zhao, Golde, & McCormick, 2007), begs further investigation in the way in which it is used to impart the communicative norms and expectations of the discipline.

Two particular communicative practices will be investigated here in light of the mentoring relationship: collaboration and interdisciplinarity. Collaboration between advisors and students is seen as a vital aspect of mentoring (Busch, 1985; Cameron & Blackburn, 1981; Jacobi, 1991; Lipschutz, 1993) that “can directly aid the new doctoral student’s productivity, success, and competence” (Green & Bauer, 1995, p. 542) and serve as one of the most powerful learning experiences for doctoral students (Ashford, 1996). This form of mentoring may be
especially important in those fields such as ILS where collaborative research is becoming more prevalent.

Interdisciplinarity has been called “the watchword of our times...a ‘mantra’ of contemporary science policy...and an ‘imperative’” (Feller, 2006, p. 5) of current scientific endeavors. Interdisciplinarity has been heavily promoted by funding agencies and academic institutions (Bordons et al., 1999; Haythornthwaite, 2006; Porter et al., 2007) and studies show an increasing level of interdisciplinarity across many areas of research (e.g., Morillo, Bordons, & Gómez, 2003). However, despite the growing prominence of interdisciplinarity in funding initiatives and research studies, “there is no agreed upon definition of interdisciplinary research, nor are there widely recognized, valid, and reliable measures of [interdisciplinary] activity or output” (Porter, Roessner, & Heberger, 2008). It is therefore necessary to provide indices for measuring interdisciplinarity and investigate how interdisciplinary behavior is incorporated into doctoral education.

1.1. Research questions

This study attempts to address these issues, with a particular focus on the following sets of questions: 1) What are the mentoring behaviors and practices of ILS faculty? How is information exchanged between faculty advisors and student advisees? 2) What is the extent of collaboration between ILS advisors/advisees? To what extent can the dissertation itself be considered a collaborative product? 3) What are the interdisciplinary influences on the ILS dissertation process? To what degree do ILS doctoral students engage in interdisciplinary behaviors?

This study will triangulate data from three different methods in order to answer these questions: electronic questionnaires, interviews, and bibliometric analysis of dissertation
bibliographies and curriculum vitae (CV). The population of the study will focus on one type of successful graduates—those who have received their degree in ILS and are currently working in an ILS institution as a faculty member.

The following sections will outline the background literature on doctoral education, mentoring, collaboration, and interdisciplinarity; describe the methods employed in this study; describe the results of the study; discuss the implications of the findings; and make observations on future studies based upon these findings.
2. Literature review

This research is informed by a number of previous studies in multiple disciplines. To situate the current research, a review of the existing literature was conducted. This literature review is divided into four broad sections: information and library science (ILS) doctoral education, mentoring, collaboration and interdisciplinarity. The section on ILS doctoral education begins by describing the background of the doctorate of philosophy degree and the rise of graduate education in ILS. It will then describe the various surveys of doctoral education. The research in this area is directly applicable to the research at hand as it will provide historical comparisons for the current survey.

The section on mentoring provides a general overview of mentoring literature and various treatments of the term “mentor.” A more detailed look at the literature pertaining to graduate mentoring will follow. The last parts of this section will focus on the development of a mentoring framework and the need for discipline specific studies. This literature will provide the research with a framework and definition of mentoring to apply to the ILS domain.

The section on collaboration focuses on the literature of authorship and collaboration, where authorship is defined as appearing on the byline of an article and collaboration refers to the instance in which more than one author appears in the byline of an article. Particular attention in this section is paid to the collaborations between the doctoral advisor and advisee and the extent to which the dissertation itself could be considered a collaborative product.

The final section on interdisciplinarity begins with a theoretical description of the terms disciplinarility and interdisciplinarity, then proceeds to discuss various measurements and metrics
that have been proposed for these terms. It concludes with a review of literature on interdisciplinary collaboration, with an emphasis on collaboration in ILS.

2.1. ILS doctoral education

This section begins with a broad overview of the rise of the doctorate of philosophy degree and the beginning of graduate education in information and library science (ILS). It then describes the various survey analyses of doctoral education and a need for further research in this area.

2.1.1. Historical background

The doctor of philosophy is a relatively recent phenomenon, compared to the awarding of other professional doctorates, such as those in medicine, law, and theology. This degree was first awarded in Germanic lands in the late eighteenth century and was only gradually adopted throughout the rest of Europe. The first doctor of philosophy in the United States did not appear until the middle of the nineteenth century; the degree was awarded by Yale University in 1861 (Clark, 2006). The doctorate of philosophy, coupled with the modern research dissertation, marked a new era of higher education—that is, “the professionalization of the professors of arts and sciences” in which professors of arts and sciences finally attained the status and benefits of the professional faculties (Ibid., p. 192).

The doctor of philosophy in information and library science (ILS) originated within a complex space as a research degree within a professional school—creating from the beginning the perpetual argument of whether information and library science is primarily a practicing profession or a researching discipline. The professionalization of library science arguably occurred in the latter part of the nineteenth century, marked by the formation of the American Library Association and the establishment of Library Journal in 1876 (Brough, 1972). This was
followed in 1887 by the founding of the School of Library Economy at Columbia College by Melvil Dewey. Further formalization of library science as a discipline occurred during the early twentieth century with the organization of the Association of American Library Schools (1915), the formation of the Board of Education for Librarianship by the American Library Association (1923), and the foundation of the Graduate Library School at the University of Chicago (1926) (Houser & Schrader, 1978).

The Graduate Library School at the University of Chicago heralded a new standard in graduate library education. Prior to the opening of this school, degrees were defined by the number of years of given programs; for example, the Board of Education for Librarianship defined a Bachelor of Arts degree plus one year of study as a professional degree, and a Bachelor of Arts degree plus two years of study as a graduate degree. There was also considerable debate over the need for the professional degrees of Bachelor of Library Science, Master of Library Science, and Doctor of Library Science (Ibid.). The Graduate Library School was chartered in order to provide what some claimed had not been previously provided:

facilities for development of the cultural, literary, bibliographical, and sociological aspects of librarianship as a learned profession built upon ideals and charged with responsibilities as definite and as vital in their implications as those of any other learned profession, and requiring similar academic preparation to ensure its highest development…[this school]…should be an organic member of a university group, with the background, atmosphere, resources, and equipment afforded by such affiliation. (Lester, 1940)

As this was the first graduate school for library science, none of the founding faculty held doctoral degrees in librarianship. Instead, their backgrounds included degrees in higher
education, history, and theology (Houser & Schrader, 1978). However, they all stressed the need for research in the graduate education of librarians—one faculty remarking that “graduate work means research, and research means the extension of the boundaries of knowledge” (p. 42). Another faculty member asserted that “the most important single responsibility of the School is to meet the standards of scholarship and research maintained by other graduate departments of the University” (Ibid., p. 42-43). In this way, the Graduate Library School championed the idea that research and a theory-based education could serve the needs of practicing professionals and would be a necessary component of professionalization (Ibid.).

The Graduate Library School at the University of Chicago, which was established in 1926 and began instruction in 1928 (Carroll, 1970), offered doctoral degrees from its inception and was the only source of doctoral degrees in library science until the opening of doctoral programs at Illinois and Columbia in 1948. As of 2009, 38 total schools have offered more than 3,000 doctoral degrees in ILS (Sugimoto, Russell, & Grant, 2009). However, many of the original schools offering doctoral degrees have since closed (including The Graduate Library School at the University of Chicago) and new schools now dominate the doctoral landscape of ILS.

2.1.2. Surveys of ILS dissertations and doctoral programs

One of the early comprehensive reports on doctoral education in ILS was conducted by Danton in the late 1950s (Danton, 1959). Danton reviews six doctoral programs that awarded doctorates between 1930 and 1959 and lists the 129 dissertations produced in these schools by name, title, school and year and classifies them into categories by content. Danton further examines the objectives of the programs, attrition and retention rates of ILS doctoral students,

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1 These disciplinary areas of interest (especially education and history) appear prevalent through many years of library education and bear further study, particularly in regards to influencing the interdisciplinarity of the field.
the positions held by recent doctoral graduates, and then discusses the value of the doctoral degree to the profession and the discipline. The study is a rich source of data about early ILS dissertations and doctoral studies; however, this data is sorely in need of updating as the number of doctorates in the field has gone from just over 100 in 1959 to more than 3,000 in 2008.

Abrera’s (1987) literature review on doctoral programs, dissertations and graduates uses the Danton study as a chronological anchor, studying the literature in the “pre-Danton period” (1926-1958) and the “post-Danton period” (1960-1980). Abrera classifies the contemporary literature on doctoral programs, dissertations and graduates as being either quantitative or non-quantitative. Of those studies examined in the post-Danton period, only 23% (14) of the studies were quantitative (no quantitative studies were identified in the pre-Danton period). Those quantitative studies were further categorized by type: one citation analysis, six surveys, and six examinations of lists of dissertations. Abrera noted that although “there were a number of studies on the different aspects of doctoral programs, dissertations, and graduates, no one publication covered all three aspects” (p. 51). Thus, Abrera called for further quantitative research in this area.

Houser’s (1982) literature review of the doctorate in library science provides more examples of the scarcity and brevity of literature on this subject, highlighting the lack of evidence in the various histories of ILS and then describing the bibliographic surveys of Danton (1959) as well as those by Cohen (1963) and Schlachter and Thomison (1974). However, the inclusion criteria for the latter two surveys were based on content, rather than the school at which the degree was conferred, and are thereby less useful for the examination of ILS doctoral education.
Three more recent surveys have provided broad evaluations of ILS doctoral education: the first being Bobinski’s (1986) survey and the other two being those done by Whitbeck (1991a, 1991b) conducted in 1989 and 1990. Bobinski’s (1986) survey of ILS doctoral programs in the U.S. and Canada uses school catalogs, the ALISE Statistical Reports, and the bibliographies by Schlachter and Thomison (1974) and Davis (1980) to trace the developments of doctoral education from 1930-1980, with special emphasis on the late 1970s. Using this data, Bobinski’s report provides a listing of the 24 schools offering doctoral degrees up to 1980 and discusses the number of degrees awarded, the full- and part-time enrollments, tuition, fellowships/assistantships, and admission and program requirements at these institutions. Additionally, Bobinski surveyed thirteen deans of doctoral degree-granting ILS programs. One of the questions assessed the impact of the doctoral program on the Master’s in Library Science (MLS) degree to which the plurality of the deans responded that it was a “healthy” impact with some going as far as to call the Ph.D. “a necessity since without it the program would be a small, marginal professional school on campus” (p. 711). Bobinski’s survey was able to capture the opinions of more than half of the deans at doctoral degree-granting institutions at the time. However, this survey (made of four questions) provided only a glimpse into ILS doctoral education and is now more than two decades out of date.

Whitbeck’s (1991a) original study of ILS doctoral programs surveyed sixteen doctoral degree granting schools with a wide-ranging questionnaire. The study, a follow-up to a 1970 study by Carpenter and Carpenter (1970), addressed a number of issues relating to doctoral education including: admissions criteria, the lengths of time it took students to complete major milestones in their programs (e.g., qualifying exams and graduation), institutions from which applicants had received previous degrees, time between previous degrees and entering the
doctoral program, methods for choosing doctoral committees and chair, and the positions of employment for past graduates from the programs. Whitbeck’s (1991b) follow-up study examined similar data a year later, but also incorporated data from the ALISE statistical reports and included an open-ended survey. The open-ended questions investigated the perceived problems for doctoral programs, important criteria for admissions, new curricular trends, and the employment opportunities for new graduates, among other issues.

Sugimoto, Russell, and Grant (2009) provide the most recent survey of ILS doctoral education, using data drawn from the MPACT database. The MPACT database provides a means by which academic mentoring is quantified, by using service on the dissertation committee as a proxy for mentoring (for more information on how this database is populated, see Marchionini, et al., 2006). In addition to providing multiple metrics for quantifying mentoring, this database also provides a comprehensive listing of dissertations completed within the field and an ability to draw “family trees” in the field (Russell & Sugimoto, in press). In their survey, Sugimoto, Russell, and Grant (2009) describe the number of dissertations completed in each ILS school—from the first degree awarded in 1930 to 2007. They also focus on the last decade, describing not only the number of graduates, but those doctoral graduates who are currently working in the field. Their research shows that less than 25% of doctoral graduates from the last ten years are currently holding full-time faculty positions in ILS schools in the U.S. and Canada. Their research calls for a further examination of career trajectories for ILS doctoral students.

2.1.3. Summary

Literature on ILS doctoral education is fairly scarce. The only comprehensive survey was done by Sugimoto, Russell, and Grant (2009). Previous surveys were limited to specific decades and were vastly out-of-date. In addition to the surveys, there have been a few
bibliographies on library science dissertations; however, these vary considerably in their inclusion criteria, and the most comprehensive include dissertations based on content, not the school/program in which they were completed. While a useful tool in gathering literature, these bibliographies do not provide us with an accurate portrait of doctoral education in ILS schools.

Many historical works on ILS briefly mention the rise of the advanced graduate degree, but do not treat it singularly nor discuss it beyond its inception. While these provide valuable contextual information about the progression of ILS education from a training/apprenticeship model to that of a degree-granting discipline, they do not focus with any depth on doctoral education and ILS dissertations. (For historical overviews on ILS education, see White, 1976; Berelson, 1949; and Bramley, 1969. For emphasis on graduate education in Canadian schools, see McNally, 1993.)

The remainder of the literature on ILS doctoral programs and dissertations examines singular populations (Frankin & Jaeger, 2007) or issues—such as the effects of doctoral programs on faculty productivity (Pettigrew & Nicholls, 1994), online Ph.D. programs (Klinger, 2007), citing patterns of ILS dissertations (Buttlar, 1999), and the teaching load of faculty at doctoral degree-granting institutions (Koenig & Hildreth, 2004). While these contribute to the understanding of doctoral degree programs, none of these have thoroughly addressed the ideas of mentoring, collaboration and interdisciplinarity as it pertains to ILS doctoral education. There is a need for a comprehensive evaluation of doctoral education in ILS, especially in regards to these elements of the disserting\textsuperscript{2} process.

2.2. Mentoring

\textsuperscript{2} According to the online Oxford English Dictionary (2009), the verb to dissert means 1) to discuss, examine or 2) to discourse upon a particular subject. Quotation examples provide precedent for using disserted and disserting, among other verb endings.
This review is primarily concerned with the mentoring which occurs during the doctoral dissertation process, which is defined as beginning as the doctoral student is gathering information on and being recruited to doctoral programs and ending when the doctoral student completes their dissertation. As graduate student mentoring is different from corporate, youth, and undergraduate student mentoring in many aspects (Johnson, 2007), this review will primarily focus on the literature which applies to the domain of graduate student mentoring.

This section first provides a background of general literature on mentoring and the various definitions of the concept of mentoring. It then focuses on mentoring in graduate education, including the benefits and the negative impacts of mentoring in this domain. The review proceeds to discuss the concept of equating the dissertation committee and advisor with the role of mentor. Existing frameworks for mentoring are discussed, followed by a discussion regarding positive mentoring behavior. Wherever possible, this review discusses relevant literature for the field of information and library science (ILS). The conclusion discusses the ways in which this research can be used to understand the extent to which mentoring occurs between ILS doctoral students and their dissertation advisors and committee members.

2.2.1. Background of mentoring

Although many scholars trace the origins of mentoring to Homer’s The Odyssey (in which Odysseus leaves the care of his son Telemachus to his friend Mentor (Allen & Eby, 2007; Heinrich, 1995; Monaghan & Lunt, 1992)), scholarly literature on mentoring is noted as a relatively recent phenomenon of the late 20th century (Kartje, 1996; Maack & Passet, 1994). The majority of the research in this area has been conducted by scholars in business and adult development/education (Kartje, 1996) and has concentrated on mentoring of youth, student-faculty mentoring relationships and mentoring within the workplace (Allen & Eby, 2007). The
The scholar most frequently credited with beginning this line of research is Daniel Levinson, who interviewed 40 successful corporate men regarding their mentors (Levinson & Darrow, 1978). In the resulting seminal work, *The Seasons of a Man’s Life*, Levinson and his colleague provide a framework for the role of the mentor-protégé relationship in terms of adult development theory (Kartje, 1996). The study defines a mentor as teacher, sponsor, host and guide, counselor, role model and facilitator. Additionally, Levinson and Darrow (1978) propose the concept that the mentor plays a key role in facilitating the “realization of the Dream” (p. 98), that is, helping the protégé to “articulate and realize the vision he holds for his life” (Kartje, 1996, p. 116).

Levinson and Darrow (1978) conclude by discussing the critical role played by a mentor, equating it with parenting and noting that not having a mentor or having poor mentoring is equivalent to the damage caused by having poor parenting in childhood (cf. Allen & Eby, 2007). This concept of mentoring has dominated the psychosocial concept of mentoring, typically used in educational and counseling areas.

In business literature, there is a trend to see the organization and career functions of the mentor, rather than the psychosocial functions of the “life mentor” as conceived by Levinson and Darrow (Monaghan & Lunt, 1992, p. 249). In this vein of organizational mentoring research, the historical origins of mentoring have been linked to the apprenticeship system, regarding the modern mentor-protégé as similar in function as the master-apprentice relationship seen in the European trade guilds of the sixteenth and nineteenth century (Clutterbuck, 1985; Clawson, 1985, cf. Monaghan & Lunt, 1992). This focus on career mentoring over psychosocial mentoring has been credited with rise of the Human Resource Development Movement in the 1970s (Monaghan & Lunt, 1992).
Academic mentoring can be seen to contain elements of both psychosocial mentoring, in which the mentor helps the protégé to “articulate and realize the vision he holds for his life” (Kartje, 1996, p. 116) and career mentoring, in which the mentor instructs the protégé on the proper models of the discipline and prepares them for a career in the field. Several reviews of literature on academic mentoring provide a good groundwork for work in this area: Allen & Eby’s (2007) synthesis of literature from business, youth, and student mentoring; Jacobi’s (1991) review of mentoring in academe; Merriam’s (1983) review of mentoring in adult development, business, and academic environments; and Pascarella’s (1980) review of the literature about informal student-faculty relationships. Within this literature, there is also considerable specialized literature, which focuses on particular aspects or issues of academic mentoring: for example, studies and reviews on race and underrepresented groups (i.e., Davidson & Foster-Johnson, 2001; Dixon-Reeves, 2003; Johnson, 2007; Turban, Dougherty, & Lee, 2002) and gender (i.e., Heinrich, 1991, 1995; Johnson, 2007; Turban, Dougherty, & Lee, 2002) and how these variables affect outcomes of mentoring.

2.2.2. Definition of the term “mentor”

Given the diverse contexts in which the term mentor is employed and the various strains of literature regarding this concept, there is considerable variation in the definition of the word “mentor” (Allen & Eby, 2007; Garvey & Alred, 2003; Hall, 2003; Jacobi, 1991). In fact, Stein (1981) identified 27 distinct phrases used to define mentor, including Levinson and Darrow’s (1978) oft quoted list of “teacher, sponsor, exemplar, counselor, provider of moral support, and facilitator of the mentee’s dream” (Busch, 1985, p. 258). Since a bulk of the literature on mentoring is derived from interviews in which mentees describe their mentors, many of the definitions are metaphors for the roles the mentor plays, such as “coaches, kinfolk (mother,
father, older siblings), gurus, enablers, sponsors, fairy godmothers, godfathers, rabbis, hosts, guides, exemplars, or teachers” (Kartje, 1996, p. 115).

Some scholars use the term role model interchangeably with mentor (Crow & Matthews, 1998; Dixon-Reeves, 2003; Phillips, 1979). However, other authors argue that role modeling is very different from academic mentors—role models are someone you wish to emulate (and may or may not have a personal relationship with), while mentors are a more personal relationship with an individual, particularly useful for career advancement (Johnson, Rose, & Schlosser, 2007). Additional researchers support the idea of a continuum to understand mentoring—placing mentor at the extreme end of a scale, which contains apprenticeship, friendship, and peer support (Monaghan & Lunt, 1992).

One well-cited definition of mentoring comes from O’Neil and Wrightman (2001), who propose the following definition of mentoring:

We propose that mentoring exists when a professional person serves as a resource, sponsor, and transitional figure for another person (usually but not necessarily younger) who is entering that same profession. Effective mentors provide mentees with knowledge, advice, challenge, and support as mentees pursue the acquisition of professional competence and identity. The mentor welcomes the less experienced person into the profession and represents the values, skills, and success that the neophyte professional person intends to acquire someday. (p. 113)

O’Neil and Wrightman’s definition seems particularly well-suited for the domain of doctoral education, in which advisors serve as a role model for the disciplinary values that the student must learn to emulate in order to find a place in the academic community.
Other literature reviews have defined mentoring by the characteristics which must be present in order to constitute a mentoring relationship. In Jacobi’s (1991) review of the literature, she identified four facets to an academic mentoring relationship: it must be (a) focused on achievement; (b) include emotional and psychological support, direct assistance with career and professional development, and role modeling; (c) a reciprocal relationship; and (d) relative to the protégé, mentors must have greater experience, influence, and achievement within a particular organization or environment (cf. Kartje, 1996, p. 119-120). Johnson’s (2007) review of the academic literature also resulted in a list of distinct components of mentoring, calling it an enduring personal relationship, which is increasingly reciprocal and mutual; defining mentors as having greater achievement and experience than mentees; calling for mentors to provide career assistance, social support, emotional support, and to serve as role models, offering a safe environment for the protégé to engage in self-exploration; and finally results in an identity transformation in the protégé with positive career and personal outcomes (Johnson, 2007). The two shared components of these definitions, mutuality of the relationship and the psychosocial element, are issues which need to be further explored in doctoral mentoring.

However, for perhaps one of the more comprehensive and lasting definitions of mentor, one could return again to Levinson, who said the following about the roles of a mentor:

He may act as a teacher to enhance the young man’s skills and intellectual development. Serving as sponsor he may use his influence to facilitate the young man’s entry and advancement. He may be host and guide, welcoming the initiate into a new occupational and social world and acquainting him with its values, customs, resources and cast of characters. Through his own virtues, achievements and ways of living, the mentor may be an exemplar that the protégé can admire
and seek to emulate. He may provide counsel and moral support in time of stress.

(p. 14)

Levinson’s concept of the mentor and the realization of the Dream, where the Dream “consists essentially of very long-range, deeply held, and sometimes poorly articulated ends-in-view” (Bargar & Duncan, 1982) can be easily applied to the idea of doctoral student mentoring and the dissertation process.

While mentoring does not occur in every advisor-doctoral student relationship, the ideal mentoring situation between these parties could be defined as one which is initiated with mutual selection, followed by a cultivation period in which the advisor provides psychosocial support and instructs the student as to the disciplinary practices of the field. The shared goal of both parties is that the student becomes familiar and established with disciplinary practices—the display of which is the dissertation.

2.2.3. Graduate mentoring

This section provides a review of both positive and negative aspects of graduate mentoring. It also addresses the issue of whether or not an advisor should be considered synonymously with the term mentor and the degree to which committee members serve as doctoral mentors.

2.2.3.1. Value of mentoring

Numerous scholars have noted the vital role that faculty mentoring plays in terms of the student’s overall experience, degree progress, and professional development (Austin, 2002; Clark, Harden, & Johnson, 2000; Dixon-Reeves, 2003; Girves & Wemmerus, 1988; Kartje, 1996; Pascarella, 1980). Informal student-faculty interactions have been particularly well-studied and positive experiences in these relationships have been linked to students’ intellectual
and personal development, academic achievement, career aspirations, and academic and personal
self-image (for reviews, see: Allen & Eby, 2007; Jacobi, 1991; Pascarella, 1980; for studies, see:
Astin, 1977; Chickering, 1969; Wilson et al., 1975). Graduate student mentoring has also been
cited as “the most effective tool against attrition” (Hesli, Fink, & Duffy, 2003, p. 458).

The intimate nature of graduate mentoring sets it apart from other forms of mentoring.
As Lyons et al. (1990) noted, “While mentoring can lead to success in business and the
professions, having a mentor is absolutely essential for success in graduate school…Graduate
school mentors and their protégés share a comradeship of such extraordinary intensity that it
transcends the normal teacher-student relationship” (p. 279). This extraordinary relationship is
seen as the essential part of the graduate student’s experience and is largely credited for the
student’s success or failure within a discipline and profession (Allen & Eby, 2007). In his
comprehensive review of the literature, Johnson (2007) identified nine main positive outcomes
associated with graduate student mentoring, including: academic outcomes, scholarly
productivity, professional skill development, networking ability, initial employment, professional
confidence and identity development, career eminence, satisfaction with program and institution,
and psychological health benefits.

The graduate student-faculty mentoring experience is also highlighted for its mutual
benefits for both the mentor and mentee (Busch, 1985; Kartje, 1996). While the benefits to the
mentee are the most visible, many also cite the benefits to the mentor, calling mentoring “a
process in which the protégé develops confidence, knowledge, and abilities and the mentor
receives a return on his or her investment” (Kartje, 1996, p. 120). The benefits to the doctoral
student advisor include the support they receive by having the student as a teaching or research
assistant, the added visibility of their research when the student takes a lead in publishing or
presenting the work of the faculty member’s lab or research team, the innovative ideas that the mentee may bring to the advisor’s work, and the growth of the mentor’s reputation due to the student’s success (Busch, 1985; Kartje, 1996).

A final value of graduate student mentoring, especially within the dissertation process, is the idea of creating a “common experience” among members of a discipline (Isaac, Quinlan, & Walker, 1992, p. 242). As Gehrke (1988) noted:

Thus, among mentors and protégés we see something like families arise. In academia we see generations of scholars who trace their communal roots to the same source. In that tracing they find others with whom they immediately feel a kinship because they share a world view that has been transmitted across the generations. (p. 193)

As faculty members are the “gate keepers to the scholarly professions” and the “socializing agents of the discipline” (Girves & Wemmerus, 1988, p. 171), they provide a sense of continuity as they impart the norms and expectations of the discipline to their students.

2.2.3.2. Negative impacts of mentoring

Positive correlates with mentoring have been fairly well-studied in the literature; however, very few studies have addressed the negative impacts of mentoring (typically because the studies focus on the idealized concept of mentoring, in which it is a positive relationship). One notable exception to this is Johnson and Huwe (2002) who examined potential problems between faculty members and their students, such as mentor neglect, relational conflict, and exploitation. Of these, mentor neglect is probably the most highly noted, with studies showing a link between a lack of mentoring from faculty and high levels of attrition (Hesli, Fink, & Duffy, 2003). In addition, studies have shown that, when students are not provided with information
such as “what graduate education entails, what is formally and informally required of them to obtain a graduate degree, the academic culture (norms, rules, and values) of their particular discipline, and what accomplishments are necessary in order to be considered successful,” they tended to “interact less effectively with colleagues, to be less committed to their programs, and to be less productive” (Campbell, Fuller, & Patrick, 2005, p. 155). As this information should arguably come from a faculty mentor, this can be interpreted as a form of mentor neglect.

In terms of relational conflict, many of the causes for graduate student attrition are due to the fact that doctoral students cannot find someone to support their area of particular interest (especially in the instances of novel/cutting-edge research or “popular” research). When a mutual relationship cannot be found within the department, the student will often leave the program in search of a mentor who can both support them in their own research agenda and instruct them as to the cultural norms of the discipline. This is the reason that many schools place the match of the student’s research to that of the faculty advisor’s expertise as one of their main criteria for entrance in the school. In addition, many schools require the student to assess their level of fit with the faculty when applying for the program.

2.2.3.3. Advisors as mentors

The review of the literature provides evidence that positive graduate mentoring is significant. Within the general realm of graduate mentoring, the relationship between a doctoral student and their dissertation advisor has been cited as the most critical element in doctoral education by many scholars (i.e., Heinrich, 1991, 1995; Heiss, 1970; Zhao, Golde, & McCormick, 2007). Phillips (1979) called this relationship a “comradeship of extraordinary intensity” (p. 339) and noted the power and the responsibility of an advisor, writing:
Without the support of the mentor-professor, students cannot advance. They cannot complete their program nor can they enter the profession…The professor has the responsibility to initiate the student into the lore and mysteries of the profession. Students learn about local (university) politics and national (disciplinary) operations. They learn who should be respected, who opposed and who ignored. They learn how judgments of scholarly quality are made. (p. 342)

This powerful relationship has been noted in other studies, which have found positive correlations between good advisor quality and doctoral student retention (Girves & Wemmerus, 1988), doctoral student satisfaction (Andersen, 1986; Carter, 1983; Daniels-Nelson, 1983; Girves & Wemmerus, 1988; Heinrich, 1991), positive departmental environment (Hartnett, 1976), successful socialization of the student into the department and discipline (Gerholm, 1990; Weiss, 1981), student development (Green & Bauer, 1995), doctoral degree progress and timely completion of the degree (Girves & Wemmerus, 1988; Long, 1987; Lovitts, 2001), professional development (Green & Bauer, 1995; Jacobi, 1991; Merriam, 1983; Phillips, 1979) and productivity, before and following graduation (Green & Bauer, 1995; Heinrich, 1991). As noted earlier, poor advising relationships have been implicated with higher attrition rates (Jacks, Chubin, Porter, & Connolly, 1983; Lovitts, 2001).

Research on doctoral advisors often equates mentor with advisor (i.e., Bargar & Duncan, 1982; Neumark & Gardecki, 1998; Phillips, 1979) and research has noted the similarities between positive advising relationships and mentoring relationships (Johnson, 2007; Schlosser & Gelso, 2001, 2005; Zhao, Golde, & McCormick, 2007). Some scholars have commented on the inevitability of advisor acting as a mentor (Ross, 2002):
The most obvious candidate to mentor a young scientist is that person’s advisor. The advisor has an obligation to mentor his or her students and postdocs because by accepting them into the lab, he or she has made a commitment to their education and training. Students and postdocs are trainees and although they will hopefully contribute to their advisor’s productivity, they are also entitled to guidance that will help them move on to the next step of their careers. On the other hand, it would be almost impossible for an advisor to fail to be a mentor to members of his or her lab because much of mentoring occurs through following a more experienced person’s example. Students learn an enormous amount simply from observing how their advisor goes about the daily business of doing science. (n.p.)

However, the research is not consistent on whether an advisor is always a mentor. Heinrich (1991) found that while advising was ubiquitous, mentoring relationships were “rare and precious” and did not occur in every advising relationship (p. 519). Likewise, Gilbert (1985), in his study of faculty role models, found that the dissertation chair was identified as a role model for only 24% of the respondents (cf. Schuckman, 1987). On the other hand, in their study of female library educators, Maack and Passet (1994) found that the majority of the women in their study described their doctoral advisor as their primary mentor.³ In terms of expectations, Green and Bauer (1995) asked department heads, faculty members, and doctoral students: “Are faculty advisers expected to mentor Ph.D. students they advise?” This was answered with 96% answering in the affirmative.

³ It is interesting to note that these respondents also reported returning to their dissertation advisor for advice when they went up for tenure—noting that the advice and research guidance of these individuals continued to be important.
Much of the discrepancy may be accounted for in the various definitions of the word mentor and how this is operationalized in the research on mentoring—with some researchers providing a definition to their respondents and others allowing the respondents to interpret the word idiosyncratically (Johnson, Rose, & Schlosser, 2007). There is also disagreement about other relationship forms (such as role model) and the extent to which these forms can be equated with the traditional mentor-protégé relationship (for a full literature review on these issues, see Johnson, Rose, & Schlosser, 2007). Further research on the mentoring impact of dissertation advisors needs to clarify the definition and operationalization of the term mentor and define the extent to which mentoring is occurring within the advisor-advisee relationship.

2.2.3.4. Committee members as mentors

Mentoring research has also examined the concept of relationship constellations or developmental networks, that is, the idea that mentoring is not concentrated in a single entity, but spread through a system of different individuals (Higgins & Kram, 2001; de Janasz & Sullivan, 2004; Kram, 1983). This concept could be most readily applied to the structure of the doctoral dissertation committee; however, very few studies have explicitly included committee members when discussing mentoring (for an example of one such study, see: Heinrich, 1991, 1995). The critical function of this constellation idea of mentoring in regards to the doctoral committee was implied by Girves and Wemmerus (1988) when they remarked: “two or three faculty members can determine whether or not a student graduates, where the student is employed (particularly for doctoral candidates), and what the specific area of specialization will be, even for a student’s entire professional career” (p. 170). Other authors have encouraged doctoral students to seek out a network of mentors (Campbell, Fuller, & Patrick, 2005; Monaghan & Lunt, 1992). However, very few studies have examined the network of faculty mentoring that occurs within a
dissertation committee. Although the chair of the committee may remain the primary mentor, the committee as a secondary mentoring function is an area that should be examined when examining mentoring in the disserting context. Additional “group mentoring” (Ritchie & Genoni, 2002) situations may also be found in the context of doctoral student colleagues. One possible source of information for this are dissertation acknowledgements, in which a student typically thanks a host of individuals, including advisors, committee members, friends, and families. Future research needs to survey doctoral students as to the degree to which mentoring is provided by each of these types of people and how the mentoring is directly related to the their process through the doctoral program and their eventual maturation into the field.

2.2.4. Developing a framework

This section will provide an overview to existing metrics, frameworks, theories and models of mentoring. It will additionally examine the current “checklists” of positive behavior that have been developed in regards to mentoring.

2.2.4.1. Existing metrics, frameworks, theories, and models

Very few quantitative measures have been developed to assess academic mentoring (Johnson, Rose & Schlosser, 2007). Those metrics which have been developed (such as Noe’s (1988) mentoring scale (cf. Green & Bauer, 1995), Schlosser and Gelso’s (2001, 2005) working alliance construct, and Rose’s (2003, 2005) “Ideal Mentor Scale” have yet to be widely operationalized and validated in a number of contexts. The majority of the studies in academic mentoring have either created surveys based on existing theories and definitions of mentoring (such as Busch’s (1985) transformation of O’Neil’s theory of mentoring into a set of Likert-type scales) or created their own definitions of mentoring and created survey instruments based on those definitions. This reinforces the “most frequent criticism of student-faculty mentoring”
(Johnson, Rose, & Schlosser, 2007, p. 49), that is, the need for a “widely accepted operational
definition of the mentoring construct” (Johnson, Rose, & Schlosser, 2007, p. 49; see also: Jacobi,
1991; Merriam, 1983; Mertz, 2004).

In their comprehensive literature review on theoretical and methodological issues in
academic mentoring, Johnson, Rose, and Schlosser (2007) identified four major
theories/frameworks which have shaped much of the discussion of mentoring within academe:
Levinson and Darrow, Kram, Hunt and Michael, and O’Neil and Wrightsman. Johnson, Rose,
and Schlosser (2007) cite Levinson and Darrow (1978) as “launch[ing] modern interest in
mentoring research” (p. 52). Levinson and Darrow (1978) studied 40 corporate men through
interview-based research and identified various stages in a man’s life to develop a theory of life
structure and the type of mentoring needed during each phase. Levinson identified preadulthood,
early adulthood, middle adulthood, and late adulthood as the stages in a man’s life and tied these
with the various balances of work and family.

Kram’s (1983) framework has been widely cited in the literature for its identification of
mentor functions, classifying the functions as either career or psychosocial functions. For career
functions, Kram identified: sponsorship, exposure-and-visibility, coaching, protection, and
challenging assignments. She defined these functions as “those aspects of the relationship that
primarily enhance career advancement” (p. 614). For psychosocial functions, Kram identified:
role modeling, acceptance-and-confirmation, counseling, and friendship. She defined these
functions as “those aspects of the relationship that primarily enhance sense of competence,
clarity of identity, and effectiveness in the managerial role” (p. 614). This framework has been
tested on academic mentoring by Tenenbaum (and colleagues) (2001), who argued that a third
function (networking) should be added. Kram’s model is a good fit for the doctoral mentoring
domain as it is inclusive of both the career and psychosocial dimension of mentoring necessary in this space.

Hunt and Michael’s framework identified five elements of the mentoring relationship: a) contextual or environmental factors, b) mentor characteristics, c) protégé characteristics, d) stage and duration of the mentorship, and e) outcomes for mentor, protégé, and organization. This framework could easily be taken in the context of other frameworks, such as Kram’s, in that it provides a list of the broad factors which determine the nature of the mentoring relationship.

Lastly, O’Neil and Wrightsman proposed a “Sources of Variance Theory” which “incorporates mentorship factors, parameters, correlates, and tasks” (Johnson, Rose, & Schlosser, 2007, p. 53). This theory was tested on graduate mentoring by Busch (1985). Busch’s (1985) research confirmed many of O’Neil’s components of mentoring. However, this theory still needs more empirical research to be validated within the academic context. (For a more detailed description of these theories and other methodological issues in mentoring research, see Johnson, Rose, & Schlosser, 2007.)

Similar to Hunt and Michael’s contextualized framework, Cummings (1996) identified another conceptual model for graduate mentoring which he labeled the “Philosophy of Involvement” (p. 147). In this framework, Cummings describes the various factors which are involved in his level of involvement with a graduate student. This framework incorporates the mood, interests, initiative, and capacity of the student, with the mood, interests, other commitments, and relations to other faculty of the advisor. It additionally takes into account what he calls “dimensions for development”: namely, the “facts of the discipline”, professional behaviors, “skills of the discipline”, and personal values, standards, and beliefs. This model reinforces the idea of a holistic view of mentoring, in which variables of the student’s
personality, the faculty member’s personality and commitments, and the values of the discipline are combined to determine the level of interaction for that given relationship. This idea of the individual construct of each mentoring relationship is echoed in Allen and Eby (2007) who call the graduate mentoring relationship idiosyncratic and Monaghan and Lunt (1992) who describe mentors as being “constructed” as their “roles are open to negotiation” (p. 261).

Cummings (1996) further identified the degree to which this involvement impacts the health of a mentoring relationship. He identified the following levels of involvement, from minimum to maximum involvement:

- “Giving technical answers and advice
- Assisting in intellectual guidance concerning formulating and specifying research questions, hypotheses, designs, and analysis
- Giving support and affirmation when appropriate on intellectual issues
- Being a personal friend to a student when the student needs personal advice or a friendly listener on emotional, value, and interpersonal issues
- Sponsoring the student to those in public arenas, particularly outside of our home university
- Accepting the personal friendship offered by the student to me
- Controlling the student, intellectually and emotionally
- Psychologically owning the student (“This student is mine—keep away”.”)

(p. 147-148)

Cummings’ theory is that the health of the advisor-student relationship peaks during a middle level of involvement, after which the mentoring relationship becomes increasingly more negative.
Although mentoring models like Cummings’ envision mentoring as a continuum of activities and behavior, many of the models of mentoring are comprised of four linear stages or phases. These go by different names depending on the author (see Table 1), but typically always involve a linear flow from phase one through phase four.

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Phase 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wallas</td>
<td>1926</td>
<td>Preparation</td>
<td>Incubation</td>
<td>Illumination</td>
<td>Verification</td>
</tr>
<tr>
<td>Hall</td>
<td>1976</td>
<td>Exploration</td>
<td>Advancement</td>
<td>Maintenance</td>
<td>Withdrawal</td>
</tr>
<tr>
<td>Kram</td>
<td>1983</td>
<td>Initiation</td>
<td>Cultivation</td>
<td>Separation</td>
<td>Redefinition</td>
</tr>
<tr>
<td>Hunt &amp; Michael</td>
<td>1983</td>
<td>Initiation</td>
<td>Protégé</td>
<td>Break-up</td>
<td>Lasting friendship</td>
</tr>
<tr>
<td>Merriam &amp; Thomas</td>
<td>1986</td>
<td>Initiation</td>
<td>Duration</td>
<td>Termination</td>
<td>Assumption of a leadership role</td>
</tr>
<tr>
<td>Kochan &amp; Trimble</td>
<td>2000</td>
<td>Groundwork</td>
<td>Warmup</td>
<td>Working</td>
<td>Long-term</td>
</tr>
</tbody>
</table>

Van Dyne (1996) similarly describes informal mentoring using a linear flow model. In this flow, Van Dyne (1996) describes how the relationship begins with physical proximity and shared interests; moves on through recognition of mutual interest and willingness to invest; is sustained by mutual investment of time and energy; and then undergoes a transition which results in an ongoing mentoring relationship; ending in a more equal relationship or the termination of the relationship (for a comprehensive review on informal mentoring, see Mullen, 2007).

The doctoral dissertation process can be easily identified in Kram’s model (Table 1), in which initiation can be seen as the process of selecting an advisor, cultivation can be interpreted as the disserting phase, and separation occurs at the point when the student completes the doctorate or decides to withdraw from a particular program (Maack & Passet, 1994). The redefinition phase could be seen in terms of Van Dyne’s chart—an ongoing mentoring relationship is often continued (such as was the case in the doctoral students studied by Maack & Passet, 1994), the student could now become the colleague of the faculty member and enjoy a collegial relationship, or the relationship could be terminated. Kram’s four phase model, and
inclusion of the career and psychosocial dimensions of mentoring, may make it an appropriate framework to describe doctoral mentoring in ILS.

2.2.4.2. Positive mentor behavior

Much of the literature does not explicate a framework or model for mentoring, but relates positive mentor qualities and characteristics. In addition, some mentoring frameworks have been condensed down to a list of mentoring behaviors, such as Busch’s (1985) treatment of O’Neil and Wrightman’s (2001) “Sources of Variance theory,” in which Busch created a list of 69 behaviors and definitions for her survey instrument.

Although the literature is replete with various lists of good advisor behaviors, there are some which are most frequently mentioned:

- assistance in networking (Maack & Passet, 1994; COSEPUP, 1997; Illes, 2002),
- grant-writing experience (Maack & Passet, 1994; Dixon-Reeves, 2003; Benderly, 2003),
- high levels of interaction (including accessibility and frequent informal interactions) (Gerholm, 1990; Girves & Wemmerus, 1988; Hartnett, 1976; Weiss, 1981; Ashford, 1996; Benderly, 2003),
- imparting the norms and expectations of the discipline (Maack & Passet, 1994; COSEPUP, 1997; Phillips, 1979; Austin, 2002; Lipschutz, 1993; Illes, 2002),
- opportunities to engage in research (including opportunities to present research at conferences and through written submissions) (Clark et al., 2000; Maack & Passet, 1994; Dixon-Reeves, 2003; Benderly, 2003),
- personal and professional support and encouragement (Clark et al., 2000; Maack & Passet, 1994; Dixon-Reeves, 2003; Kartje, 1996; Heinrich, 1991; Long, 1987; Ashford, 1996),
- sponsorship for desirable post-graduation positions (COSEPUP, 1997; Clark et al., 2000; Lipschutz, 1993),
- timely and constructive feedback on products and progress (Lipschutz, 1993; Heiss, 1970; Lovitts, 2001; Hartnett, 1976), and
- treating the student as a junior colleague (including opportunities for collaboration) (Maack & Passet, 1994; Lipschutz, 1993; Kartje, 1996; Girves & Wemmerus, 1988; Bargar & Duncan, 1982).

Although these behaviors have all been identified, there is still little research that has distilled these numerous behaviors and mentor characteristics into an operationalizable framework which can be used for instrument development.

2.2.5. Disciplinary differences in graduate study

When developing a framework for mentoring, it is important to consider the disciplinary differences that exist. Many scholars have used anthropological metaphors to describe differences in disciplinary cultures (Becher, 1989; Becher & Trowler, 2001; Clark, 1977; Donald 2002; Huber & Morreale, 2002), writing that “disciplinary communities can be seen as cultures, in which norms and habits of interaction are taken for granted and [are] invisible to insiders” (Zhao, Golde, & McCormick, 2007, p. 265). Zhao, Golde, and McCormick (2007) describe the ways in which these cultural differences “manifest themselves in the policies and practices of doctoral education, for example, how research is funded, and what the dissertation looks like, how a dissertation topic is selected, and how students and faculty interact” (p. 265). In a study
across 4114 doctoral students and eleven disciplines, Zhao, Golde, and McCormick (2007) tested their theory of disciplinary differences in advisor behavior and student satisfaction. Their findings reinforce the idea of disciplinary communities:

There are pronounced disciplinary differences in the way doctoral students approach the choice of an advisor, and also in the way the advising relationship is conducted. Moreover, both the strategies doctoral students use in selecting their advisor and actual advisor behaviors influence their satisfaction with the advising relationship. Even after taking these into account, however, disciplinary differences in satisfaction remain. (p. 276-277)

Other scholars have noted that faculty commitment to each area of the traditional triad of scholarship (teaching, research, and service) varies by discipline (Biglan, 1973; Girves & Wemmerus, 1988). As “socializing agents of the discipline” (Girves & Wemmerus, 1988, p. 171), faculty advisors impart these values and expectations to their students, thereby propagating the norms of the discipline.

As the dissertation (both as process and product) can be “viewed as reflecting much of our academic and intellectual culture” (Isaac, Quinlan, & Walker, 1992, p. 242), it is important to recognize the disciplinary differences which govern the “conceptual development, preferred approaches, common practices, and expectations…of the doctoral dissertation” (p. 244). These findings reinforce the need for studies specifically aimed at particular disciplines. In addition, previous large scale analyses of doctoral education have not included ILS (e.g., Bowen & Rudenstine, 1992; Walker, et al., 2009). ILS makes for a particularly interesting avenue of study as it is often cited as an interdisciplinary field, incorporating elements from humanities, social sciences, and natural sciences.
2.2.6. Summary

The majority of the research in academic mentoring has identified disciplinary areas by broad categories, such as humanities, social sciences, physical sciences, and biological sciences (i.e., Zhao, Golde, & McCormick, 2007). Through factor analysis, these scholars have shown that there are strong disciplinary differences. However, very few scholars have looked specifically at the discipline of information and library science (ILS) to identify what may be unique characteristics of mentoring within this field. One of the few studies to do this was Maack and Passet’s (1994) study of 100 female library educators in the United States. Using open-ended interview questions, focus group interviews, and telephone interviews, they gathered data on three groups of women: a) 35 women graduating from college in 1955 or earlier, b), 32 women graduating from college between 1956 and 1965, and c) 33 women graduating from college in 1966 or later (p. 23). This study examined the quality and quantity of mentoring these women received throughout their careers (both before and after the doctoral dissertation). Although the study did not target the doctoral advisor, the majority of the women interviewed named their dissertation advisor as their most influential mentor in their careers (p. 72). In addition, this study highlighted the large degree of contact that many of these women (two-thirds of those who completed their degrees in the United States) kept with their doctoral study mentors (p. 60).

As Golde and Dore (2004) noted, it is important to think in “discipline-specific ways in all matters related to doctoral education—in this case, the preparation of new faculty…the nature of doctoral education differs among disciplines, and not surprisingly, the preparation of new faculty also differs among disciplines” (p. 41). These findings reinforce the need for ILS to be examined individually to identify the mentoring frameworks and theories underlying the training.

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4 It should be noted that this study looked exclusively at female graduates who had both male and female advisors.
and education of doctoral students within this discipline. One particular area for exploration is the application of current mentoring models, such as the one developed by Kram (1983) to the discipline of ILS. Specifically, work needs to be done to examine doctoral mentoring in terms of initiation, cultivation, separation, and redefinition. By examining doctoral education in this framework, an understanding of the current modeling metric within the discipline may be identified.

2.3. Collaboration

This section will review the concepts of authorship and collaboration, with particular emphasis on research in information and library science. Although many definitions for these concepts exist, this paper will primarily focus on the production of works of academic research. Therefore, authorship will be defined as appearing on the byline of an article and collaboration will refer to the instance in which more than one author appears in the byline of an article.

2.3.1. Authorship

In Cronin’s (2001b) brief history of authorship, he presents the idea of an author, imbued with the contemporary sense of ownership and entitlement, as a modern figure—quoting Barthes (1977, p. 142-143) as saying that authorship emerged “from the Middle Ages with English empiricism, French rationalism and the personal faith of the Reformation” (c.f. Cronin, 2001b, p.559). Authorship, Cronin (2001b) argues, is the “undisputed coin of the realm in academia” and is “absolutely central to the operation of the academic reward system, whether one is a classicist, sociologist, or experimental physicist” (p. 559). However, authorship changed form in the mid-20th century as issues of multi-authorship challenged the contemporary view of authorship. Issues of ownership and ethics became more complex as the number of authors and
people acknowledged in scientific publications continued to increase. Also, various metrics for evaluating individuals based on these new forms of productivity emerged.

2.3.1.1.Ownership and ethics

One dividend of publishing information is that, in exchange for sharing/creating the information, the author gains the right to that knowledge (Merton & Zuckerman, 1973a). When other scholars wish to use that information/knowledge, they pay the author(s) through citations (Garfield, 1982). By means of this process, academics are able to claim and acknowledge ownership of knowledge. Ownership and the rewards of ownership (visibility and acknowledgement via citation counts, in particular) are particularly important given today’s academic climate of the “publish or perish” model, where the currency of publication and citation counts are necessary to “buy” tenure and promotion.

However, author ownership becomes complicated in the presence of multiple authors. The presence of more than one author on the byline of a paper introduces questions of ownership of the knowledge, contribution of each author to the paper, and the way in which credit should be assigned and acknowledged. In addition to complicating the issue of credit, multiple authorship also complicates issues of responsibility for the content of the work (Cronin, 2001b; Birnholtz, 2006). As Merton (1973) noted, “the growth of team work not only makes problematic the recognition of individual contributions by others; it also makes problematic the evaluation of contributions by themselves” (p. 332) (italics in the original).

In many fields, the order in which the names appear assists in assigning credit; however, there is considerable difference in the naming schemes and the codes for interpreting the order of names (Rudd, 1977; Price & Beaver, 1966; Page, 1964; Hagstrom, 1965; Zuckerman, 1967). For example, in many fields, the first author is considered the one with the highest level of
contribution (Engers, Gans, Grant & King, 1999; Laband & Tollison, 2000). However, in fields such as High Energy Physics, the authors are listed in alphabetical order—implying equal levels of contribution to the work (although equal contribution is rarely the case) (Birnholtz, 2006; 2007). In fields such as neuroscience and chemistry, there is value in appearing as either the first- or last-named author on the byline—the first author typically being the lead researcher on that particular project and the last author being the “senior author,” or principal investigator at the laboratory (Birnholtz, 2007). This makes it highly problematic to ascertain contribution based on order in scientific articles.

2.3.1.2 Hyperauthorship

The issues surrounding multiple authorship have increased as the number of authors on a given work has steadily increased. In 1963, Price predicted that “by 1980 the single-author paper will be extinct” and scholarly publications will “move steadily toward an infinity of authors per paper” (p. 89). While this may be a bit of an overstatement, the trend is definitely tending toward multi-authored papers. In fact, in Anderson’s (1992) evaluation of the world’s most prolific researchers, Anderson found that the 20 most prolific average at least one paper every 11.3 days, with the most prolific of these individuals publishing every 3.9 days for the last ten years. These intense publication rates would not be possible without large teams of researchers and multiple authors on each publication. This has given rise to the phenomenon Cronin (2001b) calls hyperauthorship, in which an extraordinary number of authors are appearing on single papers, with no explicit recognition of the contributions of each author.

Recent studies have shown that the average number of authors per paper indexed in the Science Citation Index has risen from 1.83 in 1955 (Cronin, 2001b) to 4.16 in 2000 (Glänzel & Schubert, 2004). In addition, certain fields (such as biomedicine and high-energy physics) are
beginning to place hundreds of authors in a byline, with no explicit contribution of credit (Cronin, Shaw, & La Barre, 2003; Birnholtz, 2006). Price anticipated this problem in 1964, when he noted that “authorship should be considered a privilege rather than a right, a recognition of a distinctive contribution rather than acknowledgement of membership on a team” (c.f., Harsanyi, 1993).

While many scholars advocated for stricter editorial policies to combat what some consider “author inflation” (Garfield, 1982), the issue came to the fore with a certain incident in 1991, when the *New England Journal of Medicine* received a paper with more than 200 authors, including departmental secretaries (International Committee of Medical Journal Editors, 1991, as cited in Harsanyi, 1993). The editors of this journal issued authorship policies that defined authorship as substantial contribution in three areas (quoted from Syrett & Rudner (1996)): 1) to the conception and design, or analysis and interpretation of data, or both; 2) to drafting of the manuscript or revising it critically for intellectual content; and 3) on final approval of the version of the manuscript to be published. Syrett and Rudner (1996) explicitly note: “Participation solely in the acquisition of funding or the collection of data does not merit authorship status” (para. 5). Despite this and other authorship policies, the number of authors on a paper continues to increase, with no explicit allocation of credit or responsibility for each member.

2.3.1.3. Subauthorship

Subauthorship has paralleled multiple authorship’s increase over the last century (Heffner, 1979, 1981; Harsanyi, 1993; Cronin, 2001a; Cronin, Shaw, & La Barre, 2003; 2004). Subauthorship is the acknowledged assistance of an individual, listed in the footnotes or the official acknowledgement section of a work. Patel (1973) defined subauthorship as those notes which acknowledge “any person who has rendered service in some capacity toward the research
outcome” (c.f. Harsanyi, 1993, p. 337). Patel (1973) studied sociology research between 1895 and 1965 and found no consistency in criteria for allocating credit via authorship or subauthorship.

Many studies have evaluated acknowledgements in an attempt to classify them into types of contributions acknowledged, such as moral, financial, resource, clerical, or technical support (Cronin, McKenzie, and Rubio, 1993) and various correlates with acknowledgement type, such as funding level and its correlation with the presence of technical acknowledgements (Heffner, 1979).

Of all the types of acknowledgements, the one which may raise the biggest issues in terms of authorship ownership is the peer interactive communication (PIC) acknowledgement (McCain, 1991), which is an acknowledgement recording cognitive influence, as opposed to financial, emotional, clerical, or routine technical support (Cronin, 2001a). PIC acknowledgements have formed the focus of many studies, such as the ones conducted on the information science field from 1970-1999, to explore issues of authorship/subauthorship (Cronin, 1991; Cronin, McKenzie & Stiffler, 1992; Cronin, 2001a). Cronin, McKenzie, and Stiffler (1992) and Cronin (2001a) also investigated the correlation between those scholars who are highly cited and those who are highly acknowledged and found a positive correlation. PIC introduces a significant problem in that those acknowledged as subauthors for one author could easily be defined as authors for another.

Cronin (2001a) suggests that the increase in subauthorship may be due to the “growing cognitive, social and structural complexity of much contemporary research” (p. 432). This complexity brings another level of authorship into the issues of ownership and ethics, especially as there is no consistency across (or within) fields as to what constitutes authorship level as
opposed to subauthorship level contributions. These conflated levels of authorship have motivated some to advocate for the elimination of authorship altogether, to be replaced with contributorship—in which each contributor is listed along with their contribution to the paper (akin to the credits of a movie or theatrical production) (Rennie, Yank, & Emanuel, 1997). This would combine subauthorship and authorship into one explicit list of individuals and their contributions. While this is a conceptually attractive model, it still has problems in operationalization, as academic contributions are often blurred and marred by individual perceptions.

2.3.1.4. Measurement

In order to compensate for the issues of multiple authorship, various quantitative methods of counting and assigning credit for authorships have been proposed. Some authors have advocated that each article should maintain a weight of one, that is, the total count for all the authors cannot equal more than one—making it equal to a solely authored publication (Price & Beaver, 1966; Narin, 1976; Crane, 1967). Other authors have argued that each author should receive a full credit for the publication, a counting procedure called “normal counts” (Long & McGinnis, 1982). In stricter proposals, Cole and Cole (1971) suggested that only the first author (or sole author) receive credit. On the other side of this proposal is the idea of adjusted counts: where the authors receive various credit based on factors such as total number of authors (Narin, 1976; Lindsey, 1982; Rousseau, 1992), name order on byline (Lindsey, 1980), and number of total pages (Trenchard, 1992).

However, studies evaluating these metrics have found them to not be compatible with the value of the work as assessed by colleagues. For example, Nudelman and Landers (1972) surveyed sociologists to assess the value they gave to multi-authored articles. Nudelman and
Landers established 100 points as the credit to be given to a single authored paper. They found that the modal response was to assign 100 points to each author; that the first author averaged more; and that two-authored articles averaged 151 points, while three-authored articles garnered 196 points on average (Harsanyi, 1993). Vinkler (1993) did a similar investigation with chemists about their own contributions to papers over a given year and found that each paper received well over 100% total contributions. This implies that more work is necessary to find an adequate metric to calculate authorship contribution in a way which is fair, honest, and acceptable to the scientific community.

2.3.2. Collaborative Authorship

In their seminal 1966 work, Price and Beaver describe the phenomenon of the “Invisible College.” Historically derived from a group of mid-seventeenth century British scholars who met informally (outside of the conventional academic “Colleges”) and later formally organized themselves into the Royal Society of London, the term later became used to denote groups of scientists working within a given specialty. Price and Beaver (1966) describe the qualities of such a group as being an international network of individuals who meet for conferences, circulate scholarly material, act as a power structure in that area, and collaborate in research. Their work investigated the collaborative network of a group of 500 scientists and concluded that “it is by working together in collaboration that the greater part of the research front communication occurs” (p. 1017). They also note that the collaboration may be on the rise due to the increased mobility of scientists and due to “an effort to utilize larger and larger quantities of lower-level research manpower” (p. 1017). On a more humorous note, they suggest that “part of the social function of collaboration is that it is a method for squeezing papers out of the rather large population of people who have less than a whole paper in them” (p. 1015).
2.3.2.1. Definitions of collaboration

Patel (1973) defined collaboration as “a process of functional interdependence between scholars in their attempt to coordinate skills, tools, and rewards.” Sonnenwald (2007) similarly described scientific collaboration as “interaction taking place within a social context among two or more scientists that facilitates the sharing of meaning and completion of tasks with respect to a mutually shared, superordinate goal” (p.645). In her extensive ARIST review, Sonnenwald (2007) describes the various types of settings of scientific collaboration as disciplinary, geographic, or organization/community and describes the four stages of scientific collaboration as: foundation (in which participants weigh factors for considering whether or not to engage in collaborative behavior), formulation (in which scientists initiate and plan the collaboration), sustainment (in which work has begun but effort is needed to continue and motivate the collaboration), and conclusion (in which the collaboration ends with the production of results or the termination of the product (due primarily to the end of funding or other resources). This collaboration model of foundation-formulation-sustainment-conclusion could be examined in comparison with the mentoring models outlined above, such as Kram’s (1983) mentoring model of initiation-cultivation-separation-redefinition.

2.3.2.2. Correlates with collaboration

Studies have supported the fact that there are many positive correlates with collaboration, including scores on quality metrics (Lawani, 1986), productivity as measured by research output (Price & Beaver, 1966; Reskin, 1977; Fox, 1983; Pao, 1992), acceptance for publication (Presser, 1980; Gordon, 1980; Hernon, Smith & Croxen, 1993; Bahr & Zemon, 2000), impact as measured through citations (Oromaner, 1974; Smart & Bayer, 1986; Goldfinch, Dale, & DeRouen, 2003), and higher amounts of funding (Price, 1981; Heffner, 1981; Hart, Carstens,
LaCroix, & May, 1990). Cronin (1995) provides a list of these and other motivations for collaboration (p. 7).

In measuring the learning outcomes of collaboration, Haythornthwaite (2006) identified learning relations that exist in collaborative research environments. From her interviews with three different interdisciplinary teams, she isolated nine types of informational relations that are exchanged: “Fact, Process, and Method knowledge; joint Research; learning about computing Technology; Idea Generation; Socialization; Networking; and Administration” (p. 1083). These results suggest an added positive benefit of collaborative scholarship—that is, the knowledge and social capital gained from such an experience.

To understand motivation to collaborate, Birnholtz (2007) studied “collaboration propensity”—that is, “the likelihood of an individual researcher engaging in collaboration at a particular point in time and with regard to current research interests” (p. 2227). Birnholtz surveyed researchers in three disciplines—High Energy Physics, Earthquake Engineering, and Neuroscience—in order to assess what factors motivate researchers to collaborate. Birnholtz found no apparent relationships between scientific competition or collective attribution and collaboration propensity. Positive relationships were found between degree of focus, resource concentration, and perceived agreement on quality, and need for/availability of help and collaboration propensity. Birnholtz’s findings, however, are limited to three unique science fields.

2.3.2.3. Collaboration evaluation metrics

In addition to Birnholtz’s (2007) model of collaboration propensity, various other methods have been proposed for evaluating collaboration. There are the strict counting models (such as those discussed above), which propose various methods of assigning credit and
contribution for authors. Qualitative behavior models, such as Morris and Goldstein’s (2007) growth model, present ways of simultaneously explaining author productivity and collaboration.

There are also models to evaluate on the journal level, such as Coleman’s (2007) model of journal affinity and associativity, which measure the number of foreign authors/total number of authors and the number of authors/number of articles for a given period. These values provide the researcher with a sense of the global impact and collaborative nature of given journals.

Models to evaluate international collaboration have also arisen. Yamashita and Okubo (2006) proposed a Probabilistic Partnership Index (PPI) to measure the scientific linkages between countries. Their pattern is similar to other collaborative linkage indices, such as the Jaccard Index, Salton-Ochiai Index, and Probabilistic Affinity Index (Yamashita & Okubo, 2006).

Social network analysis methods have also emerged as a useful method for evaluating collaboration (Haythornthwaite, 2006). Hara, Solomon, Kim, and Sonnenwald (2003) developed a framework of collaboration from an intensive qualitative research study. Their research, which utilized methods and techniques from social network analysis, identified several factors which influence collaboration. These factors fell into four categories: compatibility, work connections, incentive, and socio-technical infrastructure. In addition, their construction placed collaboration on a continuum: one end of which was complementary work (in which each researcher works independently on a discrete task) and integrative work (where the researchers work together on all tasks) (c.f. Palmer & Cragin, 2008).

Other models argue that all authorship is collaborative, using the idea of distributed cognition to propose that all intellectual activity is situated in a complex sociocultural world and that all academic writing is intrinsically collaborative (Cronin, 2004; see also, Hutchins, 1995).
This model calls for more explicit listings of contributions and better examination/evaluation of “para-textual elements of scholarly publications” when evaluating authorship (Cronin, 2004). Models of collaboration from the social network perspective (Hara, Solomon, Kim & Sonnenwald, 2003; Haythornthwaite, 2006) and Cronín’s (2004) model of distributed cognition are particularly attractive models when evaluating the compilation of a doctoral dissertation—in which the student works within a complex network of peers and mentors.

2.3.2.4. Disciplinary differences in collaboration practices

Numerous studies have shown that collaboration is increasing across all disciplines; however, the rate of increase and amount of collaboration is not the same across disciplines (Cronin, 2004). For example, in a study of chemistry, psychology, and philosophy, Cronin, Shaw, and La Barre (2003) found that the rate of co-authored articles for each discipline over the course of the 20th century was 88, 26, and 2% (respectively). These percentages increased to 99, 71, and 4% by the end of the 1990s (Cronin, Shaw, & La Barre, 2003). In a similar vein, Larivière, Gingra, and Archambault’s (2005) study of Canadian research found that nearly all publications in the natural sciences and engineering were collaborative, that 2/3 of all publications in the social sciences were collaborative, and that 10% of publications in the humanities were collaborative. Pao’s (1982) research on computational musicologists reinforces the idea that humanities scholars are less collaborative. Pao found that nearly 85% of musicologists were non-collaborative.5

Larivière, Gingras, and Archambault (2005) surmise that social sciences should no longer be grouped with humanities in terms of publication/research models, and suggest that the social

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5 However, those who did collaborate saw increased levels of productivity.
sciences are displaying a trend toward the “Big Science” model of productivity (Cronin, 2001b). More research is needed to identify the other factors and disciplinary models of these fields which may encourage or discourage collaborative behaviors.

2.3.2.5. Collaboration in ILS

Research in the field of information and library science is following similar patterns of increased collaboration as other social science fields. In a study of information systems research, Cunningham and Dillon (1997) identified 62% of the research as collaborative, with 6 as the maximum number of authors. Ding, Foo, and Chowdhury (1998) found that 48% of information retrieval research was collaborative (with the majority of papers being two- and three-authored papers). Lipetz’s (1999) evaluation of five decades of the *Journal of the American Society for Information Science (JASIS)* found that collaboration had increased to more than 50% of the most recent publications. A subsequent study of *JASIS&T* (Liu, 2003) reinforced these findings.

Williams and Winston (2003) evaluated the type of collaboration that occurred with library science—particularly collaboration among academic librarians, ILS faculty members, and others. In the five library science journals they examined, they found that slightly less than half of the articles were co-authored and that for every type of position analyzed, the authors were most likely to collaborate with a colleague in a similar position (librarians with librarians, faculty with faculty, etc.). Bahr and Zemon (2000) found similar patterns in their evaluation of the collaboration patterns of college and university librarians—they found that university librarians were most likely to work with university librarians and college librarians with college librarians.

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6 Borgman (2007) describes “Big Science” as having two definitions—one that focuses on the large-scale nature of the science under investigation and the other which refers to the maturation of a given field (p. 28).
The same did not hold true for gender, however: they found that cross-sex collaboration was the most typical pattern of collaboration (and in the case of same-sex collaboration, women were more likely to collaborate with women than men were with men).

Overall, the field shows a similar trend toward the social science model of multi-authorship, with slightly more collaboration occurring in the information science journals than the library science journals (Bahr & Zemon, 2000). As with other social science disciplines, ILS may be moving toward a model of “Big Science” productivity. More research needs to be done to establish or discount this trend.

2.3.2.6. Advisor/Advisee collaborations

This section will consider the extent to which the dissertation can be seen as a collaborative product and other collaborative relationships that occur in the doctoral process.

2.3.2.6.1. The dissertation as a collaborative product

The dissertation is often revered as the single-authored monograph, in which the doctoral student displays his/her originality and independent thinking. In fact, the Council of Graduate Schools declares the principles of independence and originality to be the cornerstone of the disserting experience (Isaac, Quinlan, & Walker, 1992). However, dissertation advisors often facilitate the disserting process with “theory guiding the research, forming the research questions, designing the study, interpreting the results, or any other difficulties the student may encounter” (Barger & Duncan, 1982, p. 19-20). This leads one to wonder whether or not the dissertation may be in fact a much more collaborative product than is typically assumed. In the words of Barger and Duncan (1982):

In the practical world of Ph.D. scholarship it seems a gross oversimplification to propose that the Ph.D. student take sole responsibility for her own research. In
reality, the student works under a mentor (sometimes of her own choice, sometimes not), meets the expectations of a reading committee, and conforms to the standards of the graduate school. Typically the student is in continuing interaction with some small community of scholars including her graduate student peers. And perhaps most important for our discussion here is the deep concern the major advisor often has for the substantive nature of the research problem, the methods employed to solve it, and the quality of the research effort as a whole.

Whose scholarly reputation is on the line during the final, oral defense? (p. 21-22)

This idea of shared ownership and responsibility for the dissertation (Bargar & Duncan, 1982) was tested in terms of topic selection in a study of faculty members and doctoral students from various disciplines. In their study, Isaac, Quinlan, and Walker (1992) asked faculty members and students to assess their degree of involvement in selecting dissertation topics from 1=the student alone makes the final selection, to 5=the adviser alone makes the final selection (p. 261). Their findings (shown in full in Appendix A) show the variability between disciplines and also between faculty and student perceptions of ownership (p. 262). However, it is notable that the overall mean was 2.5 (from faculty) and 2.7 (from students), showing that although the responsibility for topic selection was on the student end of the continuum, both parties recognized the collaborative nature of the selection process (and neither party thought that the student was the sole decision maker for this step of the dissertation).

Golde and Dore (2004) further investigated the degree to which students chose their dissertation topics and found large variance based on discipline. In their study of Chemistry and English doctoral students, they found that 43.2% of the chemistry students and 95.6% of the English students agreed or strongly agreed that their dissertation topics were of their own
choosing (p. 35). However, 28.9% of the English students reported that their dissertation research was done “in close collaboration with a faculty member” (p. 33) indicating that although they may have taken ownership for topic selection, there was a degree of collaboration in subsequent phases of disserting.

Another large disciplinary difference noted by Golde and Dore (2004) was the “dissertation as monograph” compared to the “dissertation as compilation”: in their survey, 70.5% of the chemistry students reported that their dissertation would include work from several products, while 82.5% of the English students reported that their dissertation would reflect the work of a single project (p. 29, 35). These findings may be in large part a reflection of the work environments of the two disciplines—the English students noting the library as the primary setting for their work and the chemistry students reported the laboratory as their primary setting (p. 29, 35).

These work settings have increased attention to the collaborative nature of research teams, especially in the sciences and engineering. Ziolkowski (1990) noted that the expectations for dissertations in science and engineering disciplines have changed as the research model of these disciplines has moved toward larger research groups. As graduate students in the sciences work in a laboratory setting, with a research team under the direction of their advisor, the student’s dissertation often emerges from the work of the laboratory (Isaac, Quinlan, & Walker, 1992). In addition, much of the work forming the actual dissertation may be in the form of previously published work (often collaborative), thus blurring the boundaries again between the traditional definitions of independent and original work.

The idea of including previously published work is still in debate within academe. In a survey of 956 faculty members from diverse disciplines, Isaac, Quinlan, and Walker (1992)
found that 28.6% of respondents did not believe that previously published work should be eligible for verbatim inclusion. However, 62.3% indicated that single-authored articles (with the student as author) should be considered for inclusion. There were also notable differences in opinion between disciplines; for example, in the biological sciences, 90.2% were comfortable with the inclusion of previously published work, whereas in the arts only 36.8% indicated previously published work should be eligible (Isaac, Quinlan, & Walker, 1992, p. 244-245).

In some institutions, the practice of the inclusion of previously published, collaborative work is supported explicitly. For example, the Faculty of Graduate Studies at York University states: “Some disciplines also view as appropriate and normal the practice of allowing a thesis or dissertation to include published or unpublished material that is co-authored or multi-authored…This is particularly important in disciplines where collaboration and co-operation are necessary if graduate students are to undertake research at the frontiers of knowledge” (York University, 2008). At other schools, such as the University of North Carolina at Chapel Hill, the use of collaborative and previously published work is left to the discretion of each department (UNC: The Graduate School, 2008). However, if the author no longer retains copyright to that work, they may be required to obtain permission from the publisher to include the work in a largely unchanged form in their dissertation or must claim the work to be “fair use.” It appears that the issue of inclusion of previously published work, especially when the work is derived from a large research team, is still very much under debate and determined by individual committees and departments. Further research needs to be done to find appropriate disciplinary and institutional practices for the use of collaborative materials in the dissertation.

2.3.2.6.2. Collaborations outside the dissertation
One positive mentoring behavior that is linked to higher doctoral satisfaction is treating the student as a junior colleague (Girves & Weemerus, 1988). One such aspect of “collegial” mentorship is the publication of articles or books together (Heinrich, 1991; Maack & Passet, 1994). Collaboration between advisors and students is seen as a critical aspect of mentoring (Busch, 1985; Cameron & Blackburn, 1981; Jacobi, 1991; Lipschutz, 1993) that “can directly aid the new doctoral student’s productivity, success, and competence” (Green & Bauer, 1995, p. 542) and serve as one of the most powerful learning experiences for doctoral students (Ashford, 1996). This form of mentoring may be especially important in those fields where collaborative research is the current model of scholarship. As faculty mentors are expected to “impart the norms and expectations” (Girves & Wemmerus, 1988, p. 171) of the discipline, it is important that they teach their students how to engage in collaborative authorship (if that is the norm within their discipline). The best way for students to learn these skills is to engage in them while in the doctoral process. More research needs to examine the degree to which collaboration (in terms of co-authorship) occurs within the doctoral process and the extent to which this training prepares the student for collaborative research in their post-dissertation careers. It may also be important to see not only how these models differ on the discipline level, but also the degree of variation between individual schools and committees.

2.3.3. Summary

Authorship has been complicated in recent decades by the exponential increase of multiple authorship. Definitions of authorship and issues of ownership, ethics, rights, and responsibilities to intellectual content need to be redefined in response to these phenomena of hyperauthorship. Collaboration, as defined by the presence of more than one author on a given byline, has increased and changed the way in which academic production occurs. The increasing
degree of collaboration, especially in the social sciences, may indicate a move to the “Big Science” model of research productivity.

Future work needs to evaluate new theories and models for evaluating collaboration, particularly interdisciplinary collaboration. Combining methodologies from social network analysis with bibliometric techniques would be a good direction for future research (Hara, Solomon, Kim, & Sonnenwald, 2003; White, Wellman, & Nazer, 2004; Haythornthwaite, 2006; Morris & Goldstein, 2007). In addition to sociometric and bibliometric techniques, Birnholtz (2007) suggests the use of psychometric techniques to evaluate researcher attitudes towards collaboration.

2.4. Interdisciplinarity

Interdisciplinarity has been called “the watchword of our times…a ‘mantra’ of contemporary science policy…and an ‘imperative’” (Feller, 2006, p. 5) of current scientific endeavors. Interdisciplinarity has been heavily promoted by funding agencies and academic institutions (Bordons et al., 1999; Haythornthwaite, 2006; Porter et al., 2007) and studies show an increasing level of interdisciplinarity across many areas of research (e.g., Morillo, Bordons, & Gómez, 2003) and strong incentives for interdisciplinary research (e.g., Moti, 1997). However, despite the growing prominence of interdisciplinarity in funding initiatives and research studies, “there is no agreed upon definition of interdisciplinary research, nor are there widely recognized, valid, and reliable measures of [interdisciplinary] activity or output” (Porter, Roessner, & Heberger, 2008). Porter, Roessner, and Heberger (2008) also identify the problem of having no universally accepted conceptualization for the construct of a discipline, arguably a foundational step for defining interdisciplinarity.

2.4.1. Theoretical background
In order to understand the concept of interdisciplinarity, one must first define disciplinarity. The term “discipline” is defined by some as a way in which to “describe and differentiate knowledge, institutional structures, researchers, and resources in the working world of scholarship and science” (Palmer & Cragin, 2008, p. 172). Turner’s (2000) definition of a discipline focuses on the identity of a shared name for a specialization and the exchanging of students trained within specialties. Becher (1989) notes the identity created by an organization structure, but cites Price’s admonition that: “we cannot and should not artificially separate the matter of substantive content from that of social behavior” (as cited in Becher, 1989, p. 20).

Numerous constructs have been explored with an emphasis on the social behaviors of disciplines, including invisible colleges (Price & Beaver, 1966), academic tribes (Becher, 1989), communities of practice (Lave & Wenger, 1991), paradigms (Kuhn, 1996), discourse communities (Hyland, 2004), and epistemic cultures (Knorr Cetina, 2007). One common theme across these constructs is that disciplines are intellectual spaces characterized by certain norms and accepted behaviors—especially in terms of what can be studied within the domain and how that information can be communicated.

This act of communicating forms the foundation of many definitions of disciplinarity. Hyland (2004) states the importance of the act of academic writing by stating: “writing, therefore, is not simply marginal to disciplines, merely an epiphenomenon on the boundaries of academic practice…[o]n the contrary, it helps to create those disciplines by influencing how members relate to one another, and by determining who will be regarded as members, who will gain success and what will count as knowledge” (p. 5). This sentiment is echoed by Montgomery who notes: “There are no boundaries, no walls, between the doing of science and the communication of it; communicating is the doing of science” (as cited in Cronin, 2005, p. 7).
It is perhaps not unexpected therefore, that the formal texts produced by this communication are often the unit of analysis when exploring disciplinary structures and practices.

In a classical deconstruction of the term, one might assume *interdisciplinarity* to be activity that happens *between* or *among* disciplines. Although this is arguably the most common definition, the idea of “cross-breeding networks” (Collins, 1998) or interaction between disciplines incorporates only one aspect of interdisciplinarity. Interdisciplinarity is also seen as a characteristic of a single discipline or unit within a discipline. Hyland (2004) discusses the balance between “interdisciplinary diversity” and “intradisciplinary homogeneity” (p. 10) within a single disciplinary culture, by noting that “[c]ommunities are frequently pluralities of practice and beliefs which accommodate disagreement and allow subgroups and individuals to innovate within the margins of its practices in ways that do not weaken its ability to engage in common actions” (p. 11). The third conceptualization of interdisciplinarity is as activity in “uncharted areas” and argues that territorial metaphors (such as Becher’s conception of “adjoining territories” (1989, p. 36)) may be “obsolete” in describing the work that happens in this unknown territory (Klein, 2000, p. 8). However, within this conception, Klein (2000) also acknowledges that the “space of interdisciplinary work is not just *out* there” but may “be *in* the heart of disciplinary practice” (p. 8).

These various conceptions of interdisciplinarity give rise to the question of the situatedness of interdisciplinarity—is it something that occurs between, among, within, or outside of disciplines?7 One similarity of these conceptions is that they rely on the structure of

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7 In addition to challenges in understanding the philosophical and situational definitions of interdisciplinarity, there is also the challenge of the various synonyms, derivatives and nomenclature used to describe these phenomenon—most notably multi-, cross-, and trans-disciplinarity. While some scholars see these terms as separate concepts (Porter, et al., 2007; Holland, 2008), other scholars see interdisciplinarity as the umbrella term under which the rest of these terms fall (Morillo, Bordons, & Gomez, 2003). Beghtol (1995) also brings “pluridisciplinarity” and “syndisciplinarity” into the discourse (p. 34).
disciplines and the difference/relationship between disciplinarity and interdisciplinarity (and the implicit separateness yet connectedness of these two constructs (Beghtol, 1995)). Weingart (2000) refers to this problem as the “paradoxical discourse” of interdisciplinarity (p. 25). These issues are critical for exploring and creating measurements of interdisciplinarity.

2.4.2. Measurements and metrics

Much of the discussion of disciplinarity and interdisciplinarity has occurred within philosophical discourses and there is a scarcity of explicit definitions of these constructs in the empirical literature. The majority of the literature assumes an understanding of the terms or provides only implied definitions. One notable exception is the inclusion in some studies of the definition from the COSEP report, which defines interdisciplinary research as: “a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or area of research” (as cited in Porter, Roessner, & Heberger, 2008). This definition encapsulates one of the key elements of the definition of interdisciplinarity for many scholars—integration.\(^8\) Collaboration is another important aspect of the definition: although it

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\(^8\) Szostak (2008) emphasizes the integration of theory, method and phenoma as critical in interdisciplinary research. Other researchers focus on the interaction element—Sanz-Casado et al. (2004) classify these interdisciplinary interactions as scientist-to-scientist, scientist-to-information, and information-to-information; and the dependence element—do Espirito Santo and Walker (1978) classify interdisciplinarity in terms of intra-, inter-, homo-, and hetero-dependence.
acknowledges that collaborative activity can occur in interdisciplinary research, it does not require collaboration as a necessary element for interdisciplinary research.\(^9\)

Pierce (1999) identified two other means of interdisciplinary information transfer in addition to collaboration, *borrowing*: importing theories or methods from other disciplines into the literature of your own discipline (typically through the use of citations) and *boundary crossing*: the publishing of work in a discipline different from the affiliation of the author, thereby exporting theories and methodology from one discipline to another. These concepts (integration, collaboration, borrowing, and boundary crossing) are implied in many of the measurements of interdisciplinarity.

Although some of the research in interdisciplinarity has utilized qualitative techniques such as interviews and questionnaires (e.g., Haythornthwaite, 2006; White, Wellman, & Nazer, 2004; Palmer, 1999; Qin, Lancaster, & Allen, 1997), the majority of interdisciplinarity studies utilize bibliometric techniques, with an emphasis on citation analysis. De Bellis (2009) provides a historical justification for the use of citation analysis in interdisciplinary studies by analyzing the evolution of citation analysis from Merton’s (1973) normative structure of science, Kuhn’s (1996) paradigm theory, and Small’s (1978) idea of the citation as a concept symbol to the new visualization techniques employed by scholars such as Chaomei Chen (2003).\(^{10}\)

In essence, if science is created through scholarly writing, then we can identify documents as the carriers of disciplinary understanding and structure. The network of documents is explicitly created through references and citations—a reference engaging in an importing behavior and a citation indicating the exportation of ideas. By classifying the inter-

\(^{9}\) However, collaboration is a common feature of interdisciplinary research and has been studied by numerous researchers (e.g., Palmer, 1999; Qin, Lancaster, & Allen, 1997; Bordons et al., 1999).

\(^{10}\) These connections, particularly situating bibliometrics in the Kuhnian and Mertonian senses, are also explored by Griffith (1990).
citations into disciplines or subject areas, scholars can describe and understand the exchange of ideas across disciplinary boundaries. In addition to identifying connections between and among disciplines, scholars have utilized citations to detect new research fronts and research developing at the “frontier” (e.g., Leydesdorff & Schank, 2008; Shibata et al., 2009; Wallace, Gingras, & Duhon, 2009). Mapping work has also been done to look at relationships between scientific fields and provide visualizations of the entire field of science (e.g., Boyack, Klavans, & Börner, 2005; Klavans & Boyack, 2006; Klavans & Boyack, 2009; Leydesdorff & Rafols, 2009).

The majority of methods for studying interdisciplinarity using bibliometric techniques have followed three general stages: choose a corpus of documents, obtain citation data for the documents and classify the documents/citations into disciplines or subject areas. Nearly all studies have relied on ISI tools for accessing documents and citation data, particularly the Science Citation Index, Social Sciences Citation Index, and the Journal Citation Reports. Appendix B lists citation measurements that have been applied in empirical interdisciplinarity studies and examples of works that have utilized these measurements. Inter-citation data appears to be frequently utilized; in most cases this involves the creation of a journal inter-citation matrix for a field or set of fields, but can also involve raw citation counts of references and citations. Appendix C lists some classification systems that have been used in empirical studies of interdisciplinarity. These systems are used to assign a given unit (most frequently a citing or cited journal) to a discipline or field of study. Frequent ways for assessing disciplinarity include author affiliations and ISI subject categories.

The majority of the works do not focus specifically on assessing and measuring degrees of interdisciplinarity between given units. Notable exceptions which have explored measurement include Leydesdorff’s (2007b) work on ascertaining interdisciplinarity through
centrality measures; Morillo, Bordons, and Gómez’s (2003) work on using multi-assignation of ISI subject categories as indicators of interdisciplinarity; and Porter, Roessner, and Heberger’s (2008) measurements of integration or “cognitive distance”\(^{11}\) (p. 274), measured by the “spread of references in a given paper to gauge the degree of integration across ‘bodies of specialized knowledge or research practice’ reflected in the span of SCs\(^{12}\) cited” (p. 277) and specialization\(^{13}\), calculated by the number of subject categories in which an author publishes.

While these works provide valuable contributions to the literature on measurement, they share similar limitations, such as high computational intensity and software requirements, environment dependency and instability (the degree to which the data are dependent upon other data in the network and the reproducibility of the results), and a dependency on communicative units that are currently indexed.\(^{14}\) This provides an opportunity for investigations of interdisciplinarity that define, operationalize and provide measurements for degrees of interdisciplinarity that are computationally accessible and are non-contextually dependent. Additionally, future indexes for interdisciplinarity must be flexible enough to apply to a diverse set of communicative genres and bibliometric units.

\(^{11}\) Porter, Roessner, and Heberger’s (2008) concept of “cognitive distance” mirrors in construct Becher’s (1989) idea of adjoining territories and Leydesdorff’s (2007a; 2007b) measurements of centrality. In sum, Porter, Roessner, and Heberger are trying to describe those disciplines which are most similar in terms of content, methods, and theories as the discipline under study. Something with lower cognitive distance would be more similar; something with less cognitive distance would represent less similarity to the given discipline. An author who imports ideas from higher similar disciplines would therefore be more interdisciplinary.

\(^{12}\) Subject categories

\(^{13}\) In Porter et al. (2007) they present three separate measures called integration, specialization, and reach. However, finding a high degree of correlation between reach and integration in the first study, they abandon reach in favor of integration in subsequent studies (Porter, Roessner, & Heberger, 2008).

\(^{14}\) An additional limitation is the common practice of eliminating journals from analysis that are “considered inherently interdisciplinary” (Morillo, Bordons, & Gómez, 2003, p. 1239). This is a strategy undertaken by other scholars who have eliminated those journals which they consider to be of higher interdisciplinarity (i.e., Science and Nature) (e.g., Qin, Lancaster, & Allen, 1997; Liu and Wang, 2005). It may be argued that instead of removing such journals/categories, authors should investigate the cited and citing behaviors of these units, which may serve as indicators or “gold standards” for interdisciplinary research.
2.4.3. Interdisciplinary collaborations

Collaboration is a common and important feature of interdisciplinary work (Palmer, 1999). While some research has examined the extent of collaboration across institutional and geographic boundaries (Moed & de Bruin, 1990; Cunningham & Dillon, 1997; Melin & Persson, 1998; Goldfinch, Dale, & DeRouen, 2003; Glänzel & Schubert, 2004; Yamashita & Okubo, 2006; Anuradha & Urs, 2007), fewer articles have examined the extent to which researchers from various disciplines are collaborating and what motivates and sustains these collaborations. In the literature on collaboration, the term “interdisciplinary” is used to describe collaborations between scientists from different backgrounds (Bordons et al., 1999). More specifically, Qin, Lancaster, and Allen (1997) operationalized this definition by considering collaboration to be interdisciplinary when the departmental affiliations of the authors reflected the involvement of different disciplines. As Palmer noted, “hybrid research interests” do not necessarily fit in to a single academic department nor are these spaces always the best for promoting interdisciplinary work (p. 243). In Palmer’s (1999) study of a group of interdisciplinary scientists, she found that the resources of the interdisciplinary research center with which these scientists were employed motivated interdisciplinary work. In ILS, we have faculty holding degrees from multiple disciplines, but it is unclear whether the presence of individuals from differing disciplinary backgrounds is in itself enough of a component to promote interdisciplinarity. Additionally, Palmer’s (1999) observation from interview data suggests that differences were “not aligned with scientists’ fields of study but with their approach to research” (p. 247).

One prominent theme across the literature on interdisciplinarity and interdisciplinary collaboration is the motivation for interdisciplinarity—that is, to advance fundamental understanding or to solve problems which cannot be addressed satisfactorily using single
methods or approaches (Marzano, Carss, & Bell, 2006; Porter et al., 2007). However, interdisciplinary research is not without its limitations and challenges. One of these limitations is the time and energy it takes to understand the requisite knowledge in a discipline outside of the one in which you were educated. As Palmer (1999) commented:

Interdisciplinary research requires a balance between established core knowledge and the infusion of new knowledge. As researchers explore new problem areas, they do not necessarily abandon their disciplinary concentrations. Most have dual or multiple agendas, building on a core research specialization as they transit into a newer hybrid area. Core maintenance can keep a career intact and sustain funding while a researcher begins to learn the content and the social norms of a new scientific community. (p. 250)

Some scientists engaged in new knowledge base development find the work slow and have a more difficult time maintaining their production of scholarly output (Palmer, 1999). However, these limitations seem to be outweighed by the motivation to create a new knowledge domain and the learning and knowledge transfer that occur in such situations (Sonnenwald, 2007).

Although ILS has been called an interdisciplinary field (Cunningham & Dillon, 1997), very little research has been done to explore how and why interdisciplinary collaboration occurs in our field. In an analysis of information retrieval literature, Ding, Foo, and Chowdhury (1998) used SSCI journal categories to determine the interdisciplinarity of information retrieval publications. They found that psychology, computer science, and medicine were areas of cross-disciplinary work within the information retrieval literature. However, their research did not capture the disciplines of the authors—merely the disciplines associated with the journals of publication.
Hart, Carstens, La Croix and May (1990) investigated authors in their study of ILS literature from 1986. They noticed considerable numbers of individuals from non-ILS disciplines publishing ILS literature, but did not examine the level of interdisciplinarity in the collaborations. It appears there is a great need to examine ILS research use and dissemination for levels of interdisciplinary collaboration, perhaps both at the authorship and subauthorship levels.

The need for increased interdisciplinarity in science was mentioned as early as 1929 (Balsiger, 2004; MacMynowski, 2007). However, despite the rise in interdisciplinary collaborations and the community support for interdisciplinarity (White, Wellman, & Nazer, 2004), there is still a consistent trend in the literature for people to collaborate with those within their own research area (Birnholtz, 2007), a phenomenon which White, Wellman, and Nazer (2004) called “disciplinary homogeneity” (p. 115).

Information and library science (ILS) research needs particular attention in the area of interdisciplinary collaborations. Although multiple studies have evaluated variables of collaboration in ILS research (such as gender, occupation, and geographic location), very few have analyzed the extent to which authors of ILS publications collaborate with non-ILS authors. In this analysis, it could be fruitful to examine not only the institutional affiliations of these authors, but also their disciplinary background, such as discipline in which they received their highest level degrees. Understanding interdisciplinary collaboration, borrowing and boundary crossing (Pierce, 1999) within our field will provide explanatory power for the historical progression of our field and possibly predictive power for the direction in which our field is headed.

2.4.4. Summary
Interdisciplinary research is heavily promoted and supported, yet there are no standards for measurement and evaluation of interdisciplinary research. One major problem is the lack of consensus in defining interdisciplinarity and distinguishing interdisciplinary research from our current disciplinary structure. Current metrics for assessing and evaluating interdisciplinarity have relied on large corpuses and computationally intensive methods. There is a need for evaluation metrics that can be applied to single documents or groups and do not rely on the relationship of these documents with scientific texts as a whole. ILS is considered a highly interdisciplinary field and would provide a valuable lens from which to explore interdisciplinary research behaviors.
3. Methods

This study uses multiple data collection methods in order to provide a variety of lenses with which to examine the research questions: 1) What are the mentoring behaviors and practices of ILS faculty? How is information exchanged between faculty advisors and student advisees? 2) What is the extent of collaboration between ILS advisors/advisees? To what extent can the dissertation itself be considered a collaborative product? 3) What are the interdisciplinary influences on the ILS dissertation process? To what degree do ILS doctoral students engage in interdisciplinary behaviors?

Specifically, this study uses questionnaires, interviews, and bibliometric analyses in order to explore the development of doctoral students within the field of ILS. This section will describe the data collection and analysis techniques used within each of these methods.

3.1. Triangulation

Triangulation is defined as the use of several different kinds of methods or data in a research study and can be categorized as data, investigator, theory, methodological or interdisciplinary triangulation (Janesick, 1994). The primary purpose of triangulation is to “minimize the risk of overlapping methodological biases” and “ease validation” by combining different data or methods to address a particular research problem or question (Brewer & Hunter, 2006).

ILS literature has utilized methodological triangulation to assess and validate findings with a variety of different combinations of methods, including: surveys and content analysis (of chat reference transactions) (Hall, 2008); surveys, interviews, and focus groups (Smith &
Hepworth, 2007); surveys, interviews, and controlled studies (Cheng, 2004; Doyle, 1995); surveys, interviews, and participant observation (Aytac, 2005; Williams & Gunter, 2006); and surveys, interviews, content analysis (of online messages), and participant observation (Valaitis, 2005). This research will provide another application of multimethod ILS research by triangulating the data collected from three different methods (questionnaires, semi-structured interviews, and bibliometric analysis) in order to answer the proposed research questions.

3.2. Population

The samples from this study are drawn from the population of all faculty members from ALA-accredited schools\(^\text{15}\) in the United States and Canada. An initial list of these faculty members was taken from an online directory.\(^\text{16}\) This list was then checked against the school websites to validate that each individual was still a current faculty member and that no new faculty members were omitted.\(^\text{17}\) In addition, this study limited the population to those who were full-time faculty members, which meant eliminating adjunct professors, doctoral candidates, lecturers, instructors, and emeriti professors from the list. Visiting professors were also eliminated. The resulting list contained 815 full-time faculty members from 56 ALA-accredited schools in the United States and Canada. By rank, there were 311 assistant professors, 273 associate professors, and 231 full professors in this population.

3.2.1. Questionnaire

From this initial population, two sub-populations were chosen for inclusion in the electronic questionnaire, called the “advisors” and the “advisees.” The advisors were defined as

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\(^{15}\) That is, schools with ALA-accredited masters program (as accreditation by the ALA does not happen at the doctoral level). It should be taken into account that this excludes iSchools that do not have ALA accredited programs, such as Penn State, Berkeley, and Georgia Tech.

\(^{16}\) [no longer available online]

\(^{17}\) This validation was done in August 2008.
those tenured professors (at the rank of associate or full) from doctoral degree-granting ALA-accredited schools. Of the 56 ALA-accredited schools, 32 offered a doctoral degree in 2008. Within those 32 schools, there were 374 tenured professors. It was assumed that these professors had the highest potential for serving as advisors to doctoral students.

The advisees were comprised of all assistant professor faculty members from any of the ALA-accredited schools described above. As noted above, there were 311 assistant professors in this category. It was assumed that these faculty members were most recently in the doctoral process and would be best able to provide accurate reflections on their experiences. It should be noted that these faculty members represent one kind of “successful” doctoral experience—that is, they successfully completed their degrees and were hired to serve as faculty members in an ALA-accredited school. This study does not examine those who did not successfully graduate or those who did not become faculty members in these select schools. However, this study should provide a baseline of data against which future studies of different doctoral student populations can be measured.

As noted above, 311 “advisees” and 374 “advisors” were initially selected for participation in the questionnaires. However, during the course of the study, many of these participants were removed due to two main factors: 1) they indicated they no longer served in that position (due to retirement or job relocation) and 2) they served as members of this dissertation committee. The removal of these participants resulted in 294 advisees and 354 advisors, for a total of 648 potential participants in the questionnaire phase of the study.

3.2.2. Interview

The final question on the questionnaires asked individuals if they would be willing to be contacted for a follow-up interview. From that question, contact information for 23 advisees who
had received degrees within the field of ILS (as identified in the questionnaire) and 33 advisors was received. These 56 faculty members were emailed individually on March 31, 2009 with a request to participate in a 30-minute follow-up interview. The first 30 individuals to respond to the request were selected for the interview phase of the study (although these individuals were split equally between the advisor and advisees, no explicit stratification was done during recruitment/selection).

3.2.3. Bibliometric analysis

A separate sub-population of the original list of faculty members from ALA-accredited schools was selected for inclusion in the bibliometric analysis phase of the study. Three criteria were required for inclusion in this phase of the study, in addition to serving as a faculty member in one of the 56 ALA-accredited schools: 1) the faculty member must have graduated from an ALA-accredited school; 2) the faculty member must have a full dissertation available online (through ProQuest’s Dissertation and Theses Database); and 3) the faculty member must have a full and complete CV available online. Ninety-seven faculty members met these criteria and were included in the bibliometric analysis phase of the study.¹⁹

3.3. Questionnaires

Two separate, but parallel, questionnaires were created for this study, one for the “advisees” and one for the “advisors” (see Appendices D and E for the full text of the questionnaires). The questionnaires were informed by a review of the literature and were guided by the research questions (for a full table linking the survey questionnaires to specific literature and research questions, please see Appendix F). In addition, the questionnaires were pilot-tested

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¹⁸ This excluded CVs that had not been updated in 2009 and that contained “selected” publication lists.

¹⁹ Some limitations of this method were that individuals selected for the bibliometric analysis were not equally spread across years or schools.
with several faculty members and revised based on the feedback received. The final questionnaires were built using Qualtrics\textsuperscript{20} survey software.

3.3.1. Data collection

The questionnaires were made electronically available and the link to the questionnaire was embedded in an email message sent individually to all 648 potential faculty members in the sample. The full text of this recruitment email is shown in Appendix G. The questionnaires were opened on January 29, 2009 and were closed on March 4, 2009. As all respondents were emailed individually, the solicitation email was sent over a series of days. However, each respondent had at least four weeks to respond. No reminder emails were sent.

3.3.2. Data analysis

The quantitative data from 215 questionnaires were exported to Excel and SPSS for further analysis. In the case of the advisee surveys, only those respondents self-identifying as graduates from ILS programs were included in further analysis.\textsuperscript{21} The quantitative data was analyzed predominately by means of descriptive statistics. As this was exploratory research, no causality was investigated. The open-ended questions from the questionnaires were exported to NVivo for analysis. These were coded to group similar and identical answers and counts of these answers were reported in the results.\textsuperscript{22}

3.4. Interviews

\textsuperscript{20} \url{www.qualtrics.com}

\textsuperscript{21} In the original design of the study, it was hoped that survey results between ILS and non-ILS graduates could be compared. However, due to the low response rate of non-ILS graduates, this comparison was not possible.

\textsuperscript{22} Inter-coder reliability was not assessed for these responses.
Thirty semi-structured phone interviews were conducted, each lasting approximately thirty minutes. Twenty-one interviews were conducted between April 13 and 17, 2009 and the remaining 9 interviews were conducted between April 27 and May 1, 2009.

3.4.1. Data collection

As noted in the population section, 56 potential interview participants were identified through the final question on the electronic questionnaires. These individuals were emailed on March 31, 2009 (after the electronic questionnaire was closed) and a reminder email was sent to all those who had not yet responded on April 5, 2009. The full text of the recruitment email is shown in Appendix H.

Participants were emailed one day before their scheduled interview and were given a list of three themes that would guide the interview conversation. Two themes were consistent across both groups: the difference between an advisee-driven vs. advisor-driven relationship and the extent of collaboration in both the dissertation and products/activities outside of the dissertation. The advisors were additionally asked how they ascertained the individual needs of each advisee and advisees were asked about managing multiple mentors.

Each interview began with a notification that the interview was being recorded. After that, the interviewees were asked whether they had received and reviewed the three questions which would be used to guide the conversation. They were then instructed that although those questions would help guide the conversation, they should feel comfortable to discuss any aspects of doctoral education that interested them. They were also told that they were able to end the conversation at any point, but, at the thirty minute mark, the interviewer would end the conversation. Then, to initiate the conversation, they were asked to begin describing the doctoral process where they received their doctoral degree (for the advisees) or at their current institution
(for the advisors). This rhetorical device helped ease the participants into the interview and find relevant anchors for launching into the three questions. All interviews were conducted over telephone and were recorded using an Olympus TP-7 telephone recording device and an Olympus DS-40 digital recorder.

3.4.2. Data analysis

Recordings of the telephone interviews were downloaded and imported into NVivo for transcription and analysis. Coding followed a mixed inductive and deductive approach. In terms of deductive coding, the four elements of Kram’s mentoring model (initiation, cultivation, separation, and redefinition) as well as the concepts of interdisciplinarity and collaboration were chosen as concepts around which to organize the verbal statements. These topics were therefore established before analysis of the interviews. Additional inductive open coding was also conducted, in which “codes are suggested by the researcher’s examination and questioning of the data” (Kelly et al., 2007, p. 1037). The inductive analysis yielded additional concepts around which to organize the data, namely: career goals, committeeships, grants, social, pedagogy, peer mentoring, program requirements, proposal, and the uniqueness of each advisee. As these concepts arose out of the data itself, it required iterative listening and (re)coding of the recordings to ensure that each transcript was fully coded across all concepts. As Strauss (1987) describes, coding is used to “fracture data, rearrange it into categories, and facilitate the comparison of data within and between categories” (c.f. Kelly et al., 2007). This process is complete when “saturation has been reached and all relevant utterances have been classified” (Kelly, et al., 2007, p. 1037).
The data were then organized in an Excel spreadsheet in which each column represented a distinct concept, each row represented a distinct participant, and each cell represented the relevant utterance. Therefore, when writing up the results, all utterances in a column were evaluated, in order to provide a balanced report of the opinions and themes across all participants.

3.5. Bibliometric analysis of bibliographies and curriculum vitae

As noted above, 97 dissertation bibliography and curriculum vitae pairs met the inclusion criteria and were included in the bibliometric analysis phase of the study. Full curriculum vitae were downloaded from the Internet between July 7 and 20, 2009. Dissertation bibliographies were downloaded on July 20 and 21, 2009 from ProQuest’s *Dissertations and Theses* database.

3.5.1. Data collection

Curriculum vitae were searched in order to calculate the number of times the faculty member co-authored with their advisor or any member of their committee 1) up to and before graduation and 2) following graduation. Advisor and committee information was taken from the MPACT database. Year of graduation was determined by either the CV or from the dissertation itself. All information was entered into an Excel spreadsheet for analysis.

All references from the 97 dissertation bibliographies were coded with the following information: 1) unique ID for each dissertation; 2) year reference was published; 3) source type (monograph, serial, conference, etc.); 4) source title for the reference (book title, journal title, etc.).

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23 All individuals were re-checked against the inclusion criteria in July, 2009.


25 It should be noted that publication do not always indicate the time frame in which the work was completed—some activity happening in the pre-graduation phase could manifest itself later in the post-graduation phase as a publication.
conference title, etc.; and 5) author(s). This information was manually collected and entered into an Excel spreadsheet. Once all references had been coded, the references were grouped into the three largest categories: monographs, serials, and conferences. The references in these three categories were then individually searched in WorldCat and an LC class was assigned to each.²⁶

3.5.2. Data analysis

After all references had been coded, the data were manually cleaned in order to aggregate all name variations and misspellings of the same source titles and authors. Cleaning for sources was done by searching WorldCat and/or Ulrich’s Periodical Database to ascertain whether the source had any name variations (such as previous names). Authors were searched manually and names that looked similar were examined using the Web and citations. However, it should be noted that the authors were not individually searched in a biographical database, so name variations (such as name changes due to marriage) were not all aggregated. In addition, a conservative approach was taken for homonymic names, which means that everyone who appeared on the “most cited” lists should be accurate, but it is possible that there are some who do not appear although they should. After cleaning, data were exported to Access for sorting and counting. Descriptive statistics for the data were calculated using Excel and Access. Additional analyses were conducted using SPSS.

3.5.2.1. Interdisciplinarity index

For each dissertation examined, an interdisciplinary borrowing index was calculated. The index was created in order to measure both the degree to which a document cites within the field and the number of disciplines represented in a bibliography. The index was informed by

²⁶ The LC class was chosen from the record used by the largest number of libraries.
Pierce’s (1999) conceptualization of the concept of interdisciplinarity and was designed to consider both the number of disciplines in the set of work and the degree of within field citations/references. Using Pierce’s element of borrowing, this index quantifies the degree of borrowing as an index of interdisciplinarity.\(^{27}\) To assess this, the following formula was suggested:\(^{28}\)

\[
\frac{d}{0.1 + \frac{i}{n}}
\]

where \(d=\) number of unique disciplines in addition to the core discipline, \(i=\) the number of references classified within the core discipline and \(n=\) the total number of references. For example, in the case of an ILS dissertation containing 200 references, 130 of which were classified as ILS, \(i=130\) and \(n=200\). If the remaining 70 references were split across three different disciplines (e.g., education, psychology, and history) \(d=3\).

\[
\frac{3}{0.1 + \frac{130}{200}} = \frac{3}{0.75} = 4
\]

As an indicator of degree of interdisciplinarity, a higher number would represent a higher degree of interdisciplinarity. For example, considering the example above, if the 70 remaining references had actually been classified into 7 different disciplines, the result would show:

\[
\frac{7}{0.1 + \frac{130}{200}} = \frac{7}{0.75} = 9.3
\]

\(^{27}\) The index can also be calculated using Pierce’s concept of boundary crossing, using a CV as the unit of analysis rather than a bibliography.

\(^{28}\) A pilot study of 15 dissertation completed at a single institution provided valuable refinements and insights into the proposed methods. For instance, for one ILS dissertation coded, there was not a single journal source or monograph that fell into the ILS subject category. Therefore, a constant was added to the denominator to eliminate the possibility of the denominator equaling zero.
The second figure represents a reference list with a higher degree of interdisciplinarity due to the inclusion of more disciplines. While the number of additional disciplines is therefore heavily weighted in this index, the percentage of within-field references also moderates the index. For example, in the figure above, if the denominator were 1.05, indicating that 95% of the references were from the core discipline, the total interdisciplinarity index would decrease, indicating a lower degree of interdisciplinarity. The interdisciplinary borrowing index could be generated for any unit—a single type of source in a reference list, the entire reference list of a single work, all the references from a journal, all the references in a scholar’s oeuvre, etc.

Using the data coded from the dissertation bibliographies, the interdisciplinarity index was calculated for each dissertation using the LC class where \( d \) = number of distinct secondary LC class categories exclusive of Z or ZA; \( i \) = number of references classed under Z or ZA; and \( n \) = total number of monographs, serials, and conferences to which a class had been assigned. In the case of items with multiple classes (see the results section for the counts of all these instances), the reference was counted for each LC class.

Once calculated, the interdisciplinarity index for each dissertation was entered into an Excel spreadsheet by dissertation ID and included other information such as school and year of graduation. The interdisciplinarity index and its relationship to these other variables were analyzed using Excel and exported into SPSS for further analysis.
4. Results I

The focus of this results section will be on the data gathered by means of the electronic questionnaire and the phone interviews. As stated in the methods section, questionnaires were sent to 294 advisees and 354 advisors. A total of 93 completed questionnaires were received for the advisee group, for a return rate of about 32%. Six additional partial surveys were completed by the advisees (for a total of 99 surveys). A total of 107 completed surveys were received for the advisor group, for a return rate of about 30%. An additional 33 partial surveys were also collected (for a total of 140 surveys). One of the questions on the advisee questionnaire asked respondents to indicate whether or not they had received their dissertation within the field of information and library science (ILS). In order to focus on the scholarly development of ILS students, only the 75 advisees (75%) who stated they had received their degree within the field of ILS were included in the analysis. All respondents of the advisor questionnaire were included (n=140).

As noted above, the questionnaires were utilized to identify individuals willing to be contacted for a follow-up interview. Contact information was obtained for 23 advisees (from the group of 75 ILS doctoral students) and 33 advisors. The first 30 individuals to respond to the request were scheduled for an interview, divided equally between advisors and advisees. The advisees selected represented 14 different current institutions and 10 different doctoral institutions (institutions at which they had received their degrees). The advisors selected represented 9 different current institutions and 12 different doctoral institutions. In the set of 30

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29 This division occurred naturally and was not imposed by the researcher.
interviewees, 19 unique current institutions and 19 unique doctoral institutions were represented (31 unique institutions across both groups and types).

4.1. Mentoring

This section will begin with an analysis of the degree to which various individuals serve as mentors in the doctoral process. This will be followed by four sections (initiation, cultivation, separation, and redefinition) utilizing Kram’s (1983) mentoring model as a framework to describe the mentoring relationship between advisors and advisees in ILS doctoral education (see the literature review section for more information on this model). The final sections will look at the role of committee members and peers in doctoral mentoring.

4.1.1. Mentors in the doctoral process

In order to understand the relationship between advising and mentoring, advisors were asked the following question on the questionnaire: “To how many of your advisee(s) would you consider yourself a mentor?” As seen in Table 2, 50% consider themselves a mentor to all of their students and 94% consider themselves a mentor to at least half of their students. No respondent selected “none” in response to this question.

Table 2. Frequency of responses to advisor question about number of students to whom they considered themselves mentors

<table>
<thead>
<tr>
<th>Question</th>
<th>None (0%)</th>
<th>--</th>
<th>--</th>
<th>Half (19%)</th>
<th>--</th>
<th>--</th>
<th>All (50%)</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>To how many of your advisee(s) would you consider yourself a mentor?</td>
<td>0 (0%)</td>
<td>1 (1%)</td>
<td>5 (5%)</td>
<td>20 (19%)</td>
<td>8 (7%)</td>
<td>19 (18%)</td>
<td>54 (50%)</td>
<td>107</td>
</tr>
<tr>
<td>Reflecting on your experience as a committee member (not chair/advisor), to how many of these students would you consider yourself a mentor?</td>
<td>8 (8%)</td>
<td>19 (19%)</td>
<td>14 (14%)</td>
<td>29 (29%)</td>
<td>9 (9%)</td>
<td>10 (10%)</td>
<td>11 (11%)</td>
<td>100</td>
</tr>
</tbody>
</table>

* denotes that the option was blank on the questionnaire; shading denotes plurality of responses for each question
When asked in an open-ended question to provide examples of how they had served as a mentor, the responses primarily focused on research, career, and teaching advice. Within the area of research the following areas were most noted by respondents: general research advice (n=28), publication advice (n=14), feedback on written work (n=12), help specific to the dissertation (n=12). Career advice was noted by 39 respondents; additionally, networking (n=16) and “socialization into the profession” (n=11) were frequently mentioned. Teaching advice was noted by 15 respondents. An additional form of mentoring was collaboration, with respondents noting publishing together (n=16), researching together (n=11), and presenting together (n=3) as elements of mentoring. Psychosocial mentoring was far less represented on the list of mentoring activities: 6 respondents noted mentoring on personal issues, 5 respondents indicated they provided general encouragement and support, and 4 reported mentoring on the time/life/work balance.

Advisors were also asked if they considered themselves mentors to those students on whose dissertation committees they served as committee member rather than chair (see Table 2). In this case, 11% considered themselves a mentor to all of them, with 59% considering themselves a mentor to half or more of their students. Eight respondents indicated that they did not consider themselves a mentor to any of their students. When asked for examples of mentoring for these students, the responses were very similar to those examples given for the advisees (in fact, many respondents merely noted “same as above” referring to the previous question on mentoring advisees). One noticeable difference in mentoring was that when asked how they mentored on committees, many indicated that they were the “methods” person, or the
person to whom the student goes to for methodological advice. They also indicated help specific to the dissertation more frequently\textsuperscript{30} than advisors (18 respondents, compared to 14).

Advisees were similarly asked to identify if they were mentored and examples of this mentoring. When asked if they were mentored (by any individuals or communities), 85\% (n=61) of the advisees indicated that they had been mentored. Those who answered in the affirmative were asked to select from a list of possible mentors and were allowed to select multiple choices. As shown in Table 3, the largest percentage of individuals selected the faculty advisor, followed closely by dissertation committee members. Other ILS faculty and students were also frequently mentioned.

Table 3. Frequency of responses to advisee question about individuals who they considered mentors

<table>
<thead>
<tr>
<th>Individual</th>
<th>Number of responses</th>
<th>Percentage of respondents selecting this choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty advisor</td>
<td>53</td>
<td>87%</td>
</tr>
<tr>
<td>Dissertation committee member</td>
<td>52</td>
<td>85%</td>
</tr>
<tr>
<td>Other ILS faculty (not on committee)</td>
<td>29</td>
<td>48%</td>
</tr>
<tr>
<td>Other ILS students</td>
<td>26</td>
<td>43%</td>
</tr>
<tr>
<td>Other non-ILS faculty (not on committee)</td>
<td>13</td>
<td>21%</td>
</tr>
<tr>
<td>Administrative staff</td>
<td>10</td>
<td>16%</td>
</tr>
<tr>
<td>Other non-ILS students</td>
<td>7</td>
<td>11%</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>5%</td>
</tr>
</tbody>
</table>

Advisees were also asked to provide examples of ways in which they were mentored during their doctoral program. The majority of responses dealt with research including: research advice (mentioned by 13 respondents), writing and publishing (n=8), dissertation advice (n=5), and researching with their advisor (n=2). Career advice (n=8) and general support (n=8) were also frequently mentioned. In addition, the following ways of mentoring were mentioned by at least five respondents: work/life/time management advice, networking, advice on “navigating the process” and advice on academic life and acculturation. While the advisor in particular and

\textsuperscript{30} Statistical significance not calculated.
faculty members more generally were mentioned as mentors, respondents also indicated family members and colleagues as additional sources of mentoring (within the 3 “other” responses).

4.1.2. Initiation

In the questionnaire, advisors were asked in an open-ended question to describe the practices at their institution in regards to assigning/choosing dissertation advisees. The majority of the responses (out of n=107) indicated that the choice of advisor was either entirely the choosing of the student (n=35) or “negotiated with faculty upon initiation by the student” (n=23). Some respondents indicated that it was a cooperative or mutual process (n=18) with very few (n=6) indicating that the advisor chose or that advisors were assigned to the student. However, many respondents (n=29) noted a practice of assigning an initial advisor (sometimes explicitly called a “temporary advisor” or “first-year advisor”) to guide the student upon arrival at the institution. This advisor was assigned based on a match between the student’s research statement and the faculty research area. Some respondents indicated that this advisor remained until the end of coursework or the comprehensive/qualifying exams; however, most noted that the advisee was free to choose another advisor at any given time.

The institutional differences in initiation were further explored in the follow-up interviews, with both advisors and advisees. One respondent described a two-tiered process at their institution, where all students are assigned to a single default advisor upon entering the program (ID641). The student is encouraged to choose a secondary advisor in their content area before he/she began their dissertation work, but retain the initial advisor as an administrative advisor. In another program, the students were not assigned advisors upon arrival and were not instructed to choose advisors until they were ready to “qualify” (ID506). Another respondent described the practice of sending out doctoral applications to the faculty for review, upon which
each faculty member selects one of three options: 1) reject; 2) accept and I will work with the person; or 3) accept, but I will not work with the person. The admission decision is based upon this feedback and the advisor is chosen from among the faculty members who indicated that they would work with the person. The respondent noted that “there are some cases where we’ve had people apply to come here to work with a specific faculty member, so that would be a case where it’s advisee driven” and also “we have cases where a faculty member has funding and decides he or she wants a particular person” indicating a more advisor-driven initiation of the relationship (ID398). Although the respondent noted that “there are times when people switch” he indicated that this was rare and that “by and large” the students stay with the initial selection (ID398), indicating that the matching system had been fairly successful. The success rate of a matching system was mentioned by a respondent at another institution who remarked that only “a handful, say 5-10%” change advisors during the process (ID622). However, the matching system has consequences for institutions, such as having “rejected eminently qualified students because we couldn’t figure out a match” (ID398). A similar practice and set of consequences was noted at another institution by a respondent who said, “We will not accept somebody no matter how smart they are, no matter how academically qualified they are, unless there is some faculty member who is ready to work with them” (ID497).

In the questionnaire, advisees also indicated the choice of selection was predominately their own. The majority of the respondents (n=26) indicated that they chose their advisors, 8 indicated that there was a negotiation with student initiation and 2 indicated that the choice was mutual. Of those who reported being assigned to an advisor (n=10), many indicated that the assignment was due to their funding or fellowship.
Although the results from the questionnaires indicate that the student primarily chose and
advisor, interview data suggest that initial solicitations from the students were not always
successful. One student recalled being turned down by the first faculty member she approached,
a faculty member who was already advising multiple students. The student asked a second
person and was accepted (ID86). Another interview respondent recalled the situation of
choosing an advisor who was set to retire within a year. The advisor made her aware of this, but
she still thought there was much she could gain from working with the faculty member for the
year. She recalled:

“So at about midterm of my first year going into my second semester he really highly
encouraged me to select another person—not because he wanted to be done with it, he
said, ‘I’ll continue to serve to the end of my year when I’m retired, but when I retire I
think you want to choose such and such for your chair and here’s why.’ Would I have
chosen her on my own? Perhaps, possibly. But his encouragement and his reasoning
really had a big impact on me for that selection, so yes, initially I selected totally on my
own; the second one I chose with a lot of advisement.” (ID2)

This negotiation was experienced by another respondent who said: “When I was admitted to the
program I would have been assigned to an advisor, but I asked for a particular advisor I had in
mind and she said yes, but then I switched part way through because…it just wasn’t a fit for the
kind of research I ended up doing so it ended up being a sort of three way negotiation between
my old advisor and my new advisor and me” (ID283).

Another student recalled an emotionally intense situation in which her initial advisor died
and she was adopted by another faculty member who had a personal relationship with the former
advisor (ID155). Other stories arose of students being “recruited” into the doctoral program by
their eventual advisor (ID415), recruited from the institution’s master’s program (ID234; ID155), recruited from the profession as part of a funding opportunity (ID221) or working with eventual advisors on their application (ID478). These stories suggest that, although the majority of the advisees and advisors describe the process of initializing as being driven by the student, there are exceptions to this process.

Advisors and advisees were asked to identify from among a list of characteristics on the questionnaires, which they considered important when initiating the relationship. Table 4 provides the responses from advisors, on those characteristics that are important when choosing to work with a potential advisee.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Not important</th>
<th>Somewhat important</th>
<th>Very important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student’s level of initiative</td>
<td>0</td>
<td>18</td>
<td>93</td>
</tr>
<tr>
<td>Match of the student’s intellectual interests with your own</td>
<td>2</td>
<td>21</td>
<td>90</td>
</tr>
<tr>
<td>Student is doing interesting research</td>
<td>0</td>
<td>35</td>
<td>77</td>
</tr>
<tr>
<td>You perceive the student will do a rigorous dissertation</td>
<td>3</td>
<td>34</td>
<td>75</td>
</tr>
<tr>
<td>Student’s academic record</td>
<td>15</td>
<td>55</td>
<td>42</td>
</tr>
<tr>
<td>You perceive the student will graduate in a timely manner</td>
<td>13</td>
<td>65</td>
<td>33</td>
</tr>
<tr>
<td>Reputation of the student within the department/discipline</td>
<td>18</td>
<td>63</td>
<td>32</td>
</tr>
<tr>
<td>Student’s personality</td>
<td>17</td>
<td>71</td>
<td>25</td>
</tr>
<tr>
<td>Student’s previous work experience</td>
<td>53</td>
<td>50</td>
<td>6</td>
</tr>
<tr>
<td>Student’s letters of recommendation for the program</td>
<td>61</td>
<td>42</td>
<td>10</td>
</tr>
<tr>
<td>Having money to support the student</td>
<td>65</td>
<td>44</td>
<td>4</td>
</tr>
<tr>
<td>Student’s standardized test scores</td>
<td>75</td>
<td>34</td>
<td>2</td>
</tr>
</tbody>
</table>

Note. Majority response for each characteristic shaded; characteristics ranked by level of importance.

As shown in the table above, the student’s level of initiative was ranked by the most respondents as “very important.” Other items ranked “very important” by the majority of respondents involved the research area and perceived research rigor of the student. Materials required for admission, such as standardized test scores, letters of recommendation, and previous work experience did not receive high rankings of importance. In fact, many of the respondents
indicated that since choosing (or accepting) an advisee was done later in the program (once the student had already been accepted in the program) the application material was not a known factor. Being able to financially support the student was also ranked as “not important” by the majority of the respondents. The respondents were allowed to provide additional characteristics. Of the additional responses, “curiosity” was the only characteristic mentioned by more than one individual.

Many interview respondents noted the importance of accepting students who worked in their area or were doing work that interested the advisor. One advisor noted: “the people I work with have to, in a sense, convince me of a particular idea—that it’s worthy of dissertation work” (ID398). The respondent went on to report that he typically only accepts those working in his area. Other interview respondents talked about other characteristics of a successful student. One respondent said that what makes a student successful is “being able to get involved intellectually with something you love and sticking to it; you can’t do a dissertation if you don’t love it” (ID342). Another advisor noted that students should be “hard-working, willing to work, and self-driven” (ID575); “self-motivated” was noted by another advisor (ID415).

Advisees were also asked to identify how important certain advisor characteristics are when choosing an advisor. Table 5 provides a listing of the characteristics according to the majority ranking of the respondents.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Not important</th>
<th>Somewhat important</th>
<th>Very important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intellectual interests match mine</td>
<td>1</td>
<td>18</td>
<td>53</td>
</tr>
<tr>
<td>Will make sure I do a rigorous dissertation</td>
<td>4</td>
<td>22</td>
<td>47</td>
</tr>
<tr>
<td>Reputation as a good researcher</td>
<td>5</td>
<td>20</td>
<td>47</td>
</tr>
<tr>
<td>Willing to take me</td>
<td>9</td>
<td>18</td>
<td>45</td>
</tr>
<tr>
<td>Is doing interesting research</td>
<td>8</td>
<td>21</td>
<td>44</td>
</tr>
<tr>
<td>Reputation as a good advisor</td>
<td>5</td>
<td>20</td>
<td>47</td>
</tr>
<tr>
<td>Knows the techniques and methods I will employ</td>
<td>6</td>
<td>32</td>
<td>34</td>
</tr>
<tr>
<td>Reputation for getting students</td>
<td>15</td>
<td>20</td>
<td>38</td>
</tr>
</tbody>
</table>
Those items which ranked the highest were the match of the advisor’s intellectual interests to the students, the advisor’s reputation as a good researcher and the perception that the advisor “will make sure I do a rigorous dissertation.” These items and others ranked very important by the majority of respondents align well with the advisor responses. One difference between the lists is that the advisor listing of “you perceive the student will graduate in a timely manner” as somewhat important and the advisee listing of “reputation for getting students through in a timely manner” as very important. Having money to support the student was the only category which the majority of the advisees selected as not important (having money to support the student was also ranked as not important by the advisors).

Interviews with the advisees elicited additional criteria that the students considered when choosing an advisor. One student remarked on the blend of reputation, social, and intellectual characteristics that made her advisor attractive to her saying: “I chose somebody who I knew was both pre-eminent in the field and who I got along with and who I knew was also interested in the kind of work I was interested in” (ID234). Reputation was a two-edged sword for another respondent who recalled: “In my own case I knew the person with whom I wanted to work not only because of his reputation, but because I knew he was interested in things similar to my interest. He had such an awesome reputation that I was actually terrified to ask him. I had to get another faculty member to ask him if it would be okay if I came and asked him” (ID500). However, this respondent noted that the student initiating the relationship is “an important part of
the whole process” (ID500). Learning style was another selection criteria noted by a respondent who said: “You have to find the right advisor for you; you have to find the person that is most encouraging and motivating and that you can learn from because people have different learning styles” (ID221).

Some respondents seemed to choose their advisors not just for what they could provide for them in terms of the dissertation, but also how they could help them shape their future. One noted that choosing their advisor “was as much strategy as it was a topical spin,” describing their decision to choose someone who could advise them not as much on the dissertation work itself, but “to advise me in areas that I saw as kind of future directions for the dissertation” (ID153). Another respondent made their decision almost entirely removed from the content match between their advisor’s interests and their dissertation. The advisee recalls his experience of choosing an advisor:

“In my case I had looked around the department and had identified some faculty members who were sort of emulating the kind of role that I wanted to have in the future…not their particular content or research area, but the specific kinds of activities they were engaged in as scholars and the kinds of work and lifestyle attributes that they exhibited. So in my particular case I was looking at faculty members that had [an] externally funded research program, they had students working with them on particular projects and things of that kind and so, you know, identifying a couple of those kinds of people and trying to get a sense of who would be best for me to work with to sort of emulate that kind of experience—to see if that’s the way I wanted to work in the future…my advisor’s research was really not all that close to what I wanted to do for the
dissertation, so there was a disconnect between content for the dissertation and this idea of mentoring and role modeling.” (ID74)

In the open-ended questionnaire responses, many advisees indicated how previous relationships led to the advisor-advisee relationship, such as having the advisor as an instructor (n=8) or doing research together before initializing the advisor-advisee relationship (n=6). Interview respondents reported similar experiences of working with an advisor on research or taking a course from the potential advisor (ID175) before asking the advisor to take on the formal advising role (ID217; ID69). One advisor noted the importance of working previously with students before accepting them as advisees, saying:

“In terms of the establishment of the relationship typically the advisees that I have had have worked with me on projects prior to them jumping off into their dissertation research. I usually have, you know, one or more grant funded projects and I try to hire both Master’s and Ph.D. students and it’s a way for them to understand kind of my expectations—for me to kind of see if these are people that I want to work with. Occasionally I will have people ask me if I would be their advisor and…depending on the relationship that might have been established I will say, ‘I’m not sure that I’m the right person to be your chair,’ or I’m not certain this is an area that I can provide the kind of guidance that they would be looking for from a chair…if I think of all the advisees I have right now, which I think is six or seven, most of all of them have worked with me on projects in one way or another and because of common interests they have approached me or they like the way I do my work or some relationship had already been established that I will entertain the possibility of serving as their advisor.” (ID499)
The negative aspects of students choosing an advisor from those with whom they have worked or had classes was noted by one advisor who said that students “gathered around the professor who would do their first seminar” and not seek out other faculty members (ID160). She said that this prompted her to engage in recruitment from within the program—speaking at classes, having an open-door policy and otherwise making herself available to the students. Within-program recruitment was noted by another faculty member (ID507), who also mentioned that the practice of identifying potentially good doctoral students from the Master’s program and encouraging them to apply to the doctoral program was a good practice.

4.1.3. Cultivation

This section will evaluate the way in which advisors and advisees engaged in the mentoring relationship during the doctoral process. This section will focus on meetings and proximity, modes of communication, levels of initiative, topics of conversation, psychosocial and pedagogical aspects of mentoring, individual needs of each student, and the degree to which the advisee received career acculturation.

4.1.3.1. Meetings and proximity

Two elements of cultivation which were explored in the questionnaires and interviews were the frequency of meetings and the effect of the physical proximity of the advisee. In the questionnaire, advisors and advisee were asked how frequently they met with their advisees individually before and after coursework was completed and the frequency with which they met with multiple advisees/students at once (for example, lab or team meetings). Table 6 reports the frequency with which advisors and advisees stated they met one-on-one in the period before and after the advisee completed coursework.

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Never</th>
<th>Once a year</th>
<th>Once a term</th>
<th>Once a month</th>
<th>Twice a month</th>
<th>Once a week</th>
<th>More than</th>
</tr>
</thead>
</table>

85
In all cases, the largest percentage of respondents reported meeting once a month. There is a high level of agreement between the two groups on the other categories as well, demonstrating that most respondents met either once a term or once a month before coursework and then either once a month or twice a month once coursework was completed.

In regards to meeting with groups of students/advisees, the majority of respondents indicated that they had never met in this context (see Table 7). However, 30% of advisees reported meeting at least once a week in this context and 22% of advisors reported meeting at least once a week.

Table 7. Frequency of advisor/advisee responses to questions regarding group meetings

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Once a year</th>
<th>Once a term</th>
<th>Once a month</th>
<th>Twice a month</th>
<th>Once a week</th>
<th>More than once a week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advisor responses</td>
<td>32 (29%)</td>
<td>8 (7%)</td>
<td>22 (20%)</td>
<td>11 (10%)</td>
<td>13 (12%)</td>
<td>18 (17%)</td>
<td>5 (5%)</td>
</tr>
<tr>
<td>Advisee responses</td>
<td>21 (30%)</td>
<td>2 (3%)</td>
<td>11 (15%)</td>
<td>9 (13%)</td>
<td>7 (10%)</td>
<td>12 (17%)</td>
<td>9 (13%)</td>
</tr>
</tbody>
</table>

Interview respondents noted that the frequency of meetings was not a stable frequency throughout the process. One advisor noted: “the closer they get to defending…we get more and more meetings until they’re practically living in your office” (ID160). The idea of an increase in frequency as a student progressed through the program was mentioned by another advisor who noted: “once the dissertation is going we’re more or less in constant contact if they have questions” (ID415). The advisor went on to say that frequent contact is not only important for
the student, but also for the advisor: “I don’t want anyone to drop 700 pages on my head without my having had some influence on it, so I ask them to send me chunks” (ID415).

Interview data also suggests that individual faculty members have different expectations for meeting frequency. One respondent described an experience working with two faculty members with different mentoring styles:

“I had two advisors—two co-chairs—one was tenure-track and she was sort of learning to be an advisor and so she wasn’t officially my chair… the other one was my official chair and he was a full professor and so he could chair it. I had a lot more contact with the one who was tenure-track. We met almost weekly as our schedules allowed and that was kind of at her insistence because she wanted to make sure that I was on track, but at the same time I didn’t mind it at all because it gave me a deadline. So I knew, ‘Okay, I’m going to meet with her. I better have something.’ She was much more hands on in terms of my dissertation—as far as making sure that, you know, I was doing what I needed to be doing in terms of things like, I had to write stuff for my lit review, I was sticking to the methodology that we had agreed on. She was very much a line editor…she gave me back versions of everything covered in red.” (ID155)

The respondent went on to say that students who only had the full professor as an advisor “were not really satisfied with the amount of direction that they got and I think that having the co-chair, it really helped me because I knew that I was staying on track…so I think it made me finish a whole lot faster than I would have otherwise” (ID155).

An advisor reinforced this idea of holding students accountable by frequent meetings saying: “I’ve never had it be successful where I haven’t seen them pretty often, like every two weeks during the proposal and dissertation phases…that’s such an unstructured phase of life that
I find for most students, if they know they have to come in in two weeks and have to face me, they will have done something in those two weeks and so that just keeps them moving at a reasonable pace” (ID497).

Some respondents noted that frequency of meetings required was dependent upon the individual needs of the student. One advisor remarked:

“My own way of dealing with students has been to try to get to know them well enough so that I have some idea of how they prefer to operate. Probably the two extremes of good dissertations produced by very wildly different people—one was a guy with pretty extraordinary credentials, not in our field, but still, world-renowned sort of stuff he had done in another field. He needed essentially daily contact with me…he was really into the idea of, ‘Well, let’s go have coffee and sit outside and draw sketches on napkins.’ I really like doing that and it turned out that those sessions were often times when two or three other people who were maybe a term or two behind him would come along and observe the process and they’d get some idea that, ‘Oh, well, maybe I don’t have to ask permission for this step or that step, but now I know I should do w before x.’ On the other hand, I had a lovely dissertation turned out by somebody whom I used to have to call myself every eight or nine weeks to see if she was still alive, because I wouldn’t have seen her or heard from her and she would bring back absolutely lovely pages and I would make a few comments and suggestions and then she would disappear for two months and both the dissertations turned out to be quite lovely and I enjoyed both of the levels of engagement.” (ID500)

Interview responses also indicated that frequency of meetings was often dependent on other aspects of the relationship, such as whether or not the advisor and advisee were working
together on a research project or teaching together (ID497). One advisor noted that these types of relationships bring the two people in physical proximity more often because “both need something from it” but that “when you have an advisee that, you know, you just never see, I think it’s very easy to let them fall off the radar screen” (ID488).

The importance of proximity was reinforced by another faculty member who described his experience with two students, one of whom is working with him on a research project and the other who has returned to his home country to work while finishing his doctoral degree. In regards to the advisee with whom he works, he said: “So we see each other very often, we talk a lot, so we try to, I try to see what’s going on—so I think it’s a good professional relationship” (ID478). In regards to his distant student, the advisor remarked: “That’s more complicated—I try to communicate, I communicate with him as often as I can—asking him for documents—but I know he is very busy over there, so that is a different situation, more complicated” (ID478). One advisor recalled two ways in which she encouraged distant students to finish. In one case, the advisor would call the student every six months and say, “How ya doin, how are things going, remember, are you working on your dissertation?” (ID342) For another student, the advisor opened up their home as a space for the student to come for a week “to just eat and write” (ID342). This respondent said:

“I think the hardest thing for a doctoral student is to be away, particularly doctoral students who are away and have full time jobs…the further away a student is, I think the harder it is to get through the dissertation simply because you are not getting the feedback and you are not around and other things tend to assume greater importance in your life. Doctoral students aren’t supposed to have lives.” (ID342)
Another faculty noted that “if somebody is a physical presence, you know they’re there and they’re working” and went on to say that “they’re probably more likely to finish” (ID507). This respondent offered the final warning: “Don’t leave without the Ph.D. or it’s the kiss of death” (ID507).

Some advisors noted that it was up to the student to initiate the meetings. One advisor reported a meeting with a group of doctoral students in which “a lot of them talked about never seeing their advisor, you know, maybe seeing their advisor once a year and then some of the other students say, ‘Well, what do you do?’ and basically they were sitting around waiting for somebody to contact them” (ID488). The advisor said:

“I think the environment that we live in these days is such that we are all so busy that unless we are bothered by somebody coming and talking to us we are probably going to keep our nose down and keep going on doing what we have to do. So I think that there is, definitely there has got to be a two-way street. I am always happy to talk to anybody I am working with, but they are probably going to have to take the initiative. Now once a semester or so I’ll probably think of somebody and think, ‘Oh, gosh, I should get in touch with them.’ But I think we are especially bad about part-time students…we just don’t see them and unless they really put themselves in your face, you’re probably just going to say, ‘Whew, don’t have to worry about those right now’” (ID488).

The idea of the success being connected with the student’s level of initiative was noted by another respondent. However, this respondent also noted the uniqueness of each relationship:

“I think it just depends on the personal relationship and the dynamics and how busy the advisor is. Advisors who are very busy either lose their students—that is, the students just kind of drift away or they go work with somebody else—or the successful
dissertations done under those circumstances are the kind where, you know, the student camps on the professor’s doorstep or makes sure to say, ‘We're going to have weekly meetings, aren't we?’ and, you know, ‘I gave you three chapters last week—have you read them yet?’” (ID342)

The importance of student initiative in meetings and other aspects of the doctoral process will be discussed in subsequent sections.

4.1.3.2. Channels of communication

On the questionnaire, advisors and advisees were asked how frequently they communicated with each other in the following ways: in-person, e-mail, phone (voice), print correspondence, IM/Chat/Text messaging, and mediated conferences. As shown in Table 8, the most frequently used form of communication reported by advisors was e-mail: 99% used this mode at least once a month and 64% of respondents used this mode of communication at least once a week to communicate with advisees.

<table>
<thead>
<tr>
<th>Channel</th>
<th>Total</th>
<th>Never</th>
<th>Once a year</th>
<th>Once a term</th>
<th>Once a month</th>
<th>Twice a month</th>
<th>Once a week</th>
<th>More than once a week</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail</td>
<td>108</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>1 (1%)</td>
<td>13 (12%)</td>
<td>25 (23%)</td>
<td>29 (27%)</td>
<td>40 (37%)</td>
</tr>
<tr>
<td>In-person</td>
<td>105</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>12 (11%)</td>
<td>29 (28%)</td>
<td>30 (29%)</td>
<td>22 (21%)</td>
<td>12 (11%)</td>
</tr>
<tr>
<td>Phone</td>
<td>106</td>
<td>30 (28%)</td>
<td>10 (9%)</td>
<td>30 (28%)</td>
<td>21 (20%)</td>
<td>10 (9%)</td>
<td>2 (2%)</td>
<td>3 (3%)</td>
</tr>
<tr>
<td>Print</td>
<td>106</td>
<td>58 (55%)</td>
<td>19 (18%)</td>
<td>21 (20%)</td>
<td>4 (4%)</td>
<td>4 (4%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>IM/Chat/Text messaging</td>
<td>105</td>
<td>91 (87%)</td>
<td>0 (0%)</td>
<td>5 (5%)</td>
<td>4 (4%)</td>
<td>3 (3%)</td>
<td>1 (1%)</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Mediated Conf.</td>
<td>106</td>
<td>88 (83%)</td>
<td>7 (7%)</td>
<td>7 (7%)</td>
<td>3 (3%)</td>
<td>0 (0%)</td>
<td>1 (1%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

Note. Ranked by frequency; shading denotes plurality of responses (notice tie in the case of phone).

The next most frequent form of communication was in-person: 88% of respondents used this mode at least once a month to communicate with advisees. Phone was used moderately—34% used this mode at least once a month. Print, IM/Chat/Text messaging, and Mediated Conferencing were used infrequently; the majority of respondents (55%, 87%, and 83%,
respectively) indicated they never used these modes of communication to interact with their advisees.

As shown in Table 9, the responses from the advisees were similar to those of the advisors.

### Table 9. Frequency of advisee responses to question regarding communication channels

<table>
<thead>
<tr>
<th>Channel</th>
<th>Never</th>
<th>Once a year</th>
<th>Once a term</th>
<th>Once a month</th>
<th>Twice a month</th>
<th>Once a week</th>
<th>More than once a week</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail (n=70)</td>
<td>1 (1%)</td>
<td>0 (0%)</td>
<td>1 (1%)</td>
<td>11 (16%)</td>
<td>10 (14%)</td>
<td>19 (27%)</td>
<td>28 (40%)</td>
</tr>
<tr>
<td>In-person (n=71)</td>
<td>1 (1%)</td>
<td>1 (1%)</td>
<td>8 (11%)</td>
<td>18 (25%)</td>
<td>12 (17%)</td>
<td>17 (24%)</td>
<td>14 (20%)</td>
</tr>
<tr>
<td>Phone (n=70)</td>
<td>20 (29%)</td>
<td>10 (14%)</td>
<td>15 (21%)</td>
<td>12 (17%)</td>
<td>5 (7%)</td>
<td>8 (11%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Print (n=69)</td>
<td>50 (72%)</td>
<td>6 (9%)</td>
<td>6 (9%)</td>
<td>3 (4%)</td>
<td>1 (1%)</td>
<td>3 (4%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>IM/Chat/Text messaging (n=69)</td>
<td>65 (94%)</td>
<td>1 (1%)</td>
<td>1 (1%)</td>
<td>1 (1%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Mediated Conf. (n=69)</td>
<td>63 (91%)</td>
<td>3 (4%)</td>
<td>1 (1%)</td>
<td>2 (3%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

*Note.* Ranked by frequency; shading denotes plurality of responses.

E-mail was reported as the most frequent form of communication with 98% of the respondents indicating that they used this mode of communication at least once a month and 67% reporting using it at least once a week. As with the advisor responses, in-person was reported as the next most frequent mode of communication—86% of advisees reported using this mode at least once a month and 44% reported using this mode at least once a week. Similar to the advisors’ responses, 35% of advisees reported using the phone as a mode of communication at least once a month. Print, IM/Chat/Text messaging, and Mediated Conferences were reported as infrequent modes of communication with 72%, 94%, and 91% (respectively) of respondents reporting never using these modes of communication to interact with their advisors.

#### 4.1.3.3. Levels of initiative

The theme of initiative was explored in the questionnaires which asked the respondents to indicate who initiated instances of information exchange between advisor/advisees on a 7-point scale where 1=always the student, 4=equal initiation, and 7=always the advisor. As shown in
Table 10, the majority of the respondents felt that information exchanges were equally initiated (61% of advisors and 46% of advisees selected equal initiation). Of the advisors, 30% of respondents indicated that the student was more the initiator, while 8% indicated that the advisor was more of the initiator. Of the advisees, 53% of respondents indicated that the advisee was more the initiator, while 1% indicated that the advisor was more of the initiator.

### Table 10. Frequency of advisor/advisee responses to question about who initiates instances of information exchange

<table>
<thead>
<tr>
<th>Always the student</th>
<th>--</th>
<th>--</th>
<th>Equal initiation</th>
<th>--</th>
<th>--</th>
<th>Always the advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advisors (n=98)</td>
<td>1  (1%)</td>
<td>8  (8%)</td>
<td>21  (21%)</td>
<td>60 (61%)</td>
<td>6  (6%)</td>
<td>2  (2%)</td>
</tr>
<tr>
<td>Advisees (n=68)</td>
<td>9  (13%)</td>
<td>16 (24%)</td>
<td>11  (16%)</td>
<td>31 (46%)</td>
<td>1  (1%)</td>
<td>0  (0%)</td>
</tr>
</tbody>
</table>

*Note.* -- denotes that the option was blank on the questionnaire; shading denotes plurality of responses for each question.

Interview respondents were asked to indicate in which situations they believed the advisee “drove” the relationship and in which cases the advisor “drove” the relationship. The majority of the respondents indicated that the relationship was advisee-driven. One advisee recalled:

“I drove it. I mean, she gave some guidance there as far as, you know, process, but I really drove it. You know, actually it was funny—the faculty where I went laughed because I would be going down the hall to do something and I would stop at her door and say, ‘Hey, I’m going to get such and such to you by such and such time’ and I guess later the faculty asked my advisor, you know, ‘Do you have due dates for what she is supposed to do?’ and she said, ‘No, that’s just her nature—she is very self-driven.’” (ID2)

Other advisees made comments such as, “my chair kinda let me call the pace” (ID234) and “the whole relationship was sort of guided by me” (ID246). Advisors made comments such as “I’ve never really had an advisee, I don’t think, where I’ve actually had to push them” (ID497), “I think primarily doctoral work should be student driven” (ID495), and “my students pick
me…they drive the relationship” (ID415). Another advisee noted that it was “all proactive” on her part, recalling that her advisor was “gracious and helpful whenever I asked him for anything” but that he expected his students to be “adults” and, if they needed something, they needed to ask (ID86). This sentiment was echoed by another advisee who reported: “I was never denied any help or assistance, but I did have to take that initiative” (ID221). One student reported his experience of taking the initiative and the role he thought this played in the doctoral process:

“I would say that most of the initiative came from me and they were mainly there to shape the initiative that I was taking…I think it’s extremely important—in my experience doctoral students who expect a lot of affirmative guidance from faculty members often either don’t get it or they just kind of flounder. I think it’s pretty important for the doctoral students to be the one taking the initiative and trying to push the process along.” (ID283)

The idea of students taking the initiative was also reinforced by advisors who made comments such as: “I’m expecting them to rise to the challenge of being an independent researcher…too much hand-holding yields Ph.D.s who may not be as productive as faculty members, because they’ve had too much sheltering, too much hand-holding” (ID499).

However, some advisors noted the danger in having students take too much of the initiative in the relationship, especially when it comes at the cost of not listening to their committee. One advisor remarked:

“If they’re devoted to something that can’t be done or shouldn’t be done then that’s a really disastrous sort of situation. That’s a hard thing to disentangle. I’ve seen that happen, too, over the years—a student…insisting on doing what he or she wants to do against the advice of the committee and you can run afoul of the seven year limit then
really quickly, because, you know, the committee’s not going to approve the dissertation if it’s not what the committee has approved the student to do. The student could do something else, but if it’s bad science, the committee’s not going to pass it.” (ID342)

On a similar theme, another advisor noted that “some students are very independent; they are very explorative” and, while that can be a good thing, there are also “problems with those students also, because they really think they can do it and sometimes they are very unwilling to take advice” (ID575). The advisor went on to describe a student who was set on doing an impossibly large project and would not listen to the advisor’s advice to focus: “a student like that would be completely too independent and I think that is also dangerous…they are unwilling to be guided” (ID575). One respondent told a story about how his advisor was able to delay his process—they had a disagreement over “one definition” that “lasted literally for years” (ID415). Due to this disagreement, the respondent recalled that the advisor “wouldn’t let me proceed with the actual data gathering” (ID415). When asked what he did to resolve this conflict the respondent replied: “I didn’t do anything; I waited” (ID415). The conflict eventually ended when another pre-eminent person in the field heard about the disagreement and sided with the advisee. The advisor’s response was to turn to the student and say: “Alright, don’t bother me again until you are done” (ID415).

A few respondents found the relationship more mutual. One advisee reported: “I would actually characterize our advising relationship as sort of fifty-fifty—I mean, I certainly asked to continue to work with her as a GA, asked her to be my advisor, I certainly would ask to meet with her if I thought that was needed, but she also was so active in emailing me and pushing me and making sure I was submitting proposals to conferences—you know, pushing me to get articles out the door even when I didn’t think I was ready, so that relationship, I would call it
“fifty-fifty” (ID69). One advisor recalled that in her experience she was “definitely driving” half of her students and for the other half she was “just kind of carried along” (ID622). Another advisee reported that she was her advisor’s first doctoral student, “So she was, like, really into this, so I think we were both equally motivated” (ID175). One advisor called it “a mutual responsibility” saying:

“When I chair a thesis or dissertation…I needed to give gentle guidance, but I don’t want to push too much, because when the students are not ready and your advisor…drags the student, that’s not good either…so I try to be individualized in terms of guiding them, because I feel I can observe whether the person is ready or not or the person needs a push or the person needs encouragement or the person just needs time…I think a good model would be just mutual.” (ID575)

The individual needs of the student were noted by another respondent who said: “I have students that need to be nudged and I have students who need distance and somehow I perceive that…I think it’s a skill that you learn over time” (ID415). Another advisor reinforced that the perfect model would be mutual, saying:

“So, to get back to the original question of advisor driven or advisee driven, I think ideally it would be a dance and at some times the advisee leads—times such as making the choice as to who the chair would be and deciding to work with a sort of advisor personality of this type rather than that type and I personally think advisors would be, would serve themselves, most students, and the academy by making the commitment to at least contact the student somewhat regularly, say once a month, and just say, ‘How’s it going?’ Even that little amount seems to break the ice, make it easier for the student to present their work or to ask for help.” (ID500)
One advisee noted that the “role of the advisor is both really, really important and really not important—it’s important…in terms of setting expectations and…providing a space where the student can explore intellectual questions or intellectual curiosity and then they are not important in that it really should be the student who is leading that discussion” (ID246). Another advisee recalled the shifting balance of responsibility in the relationship stating: “I guess the advisor has a more important role at the beginning stage, because the student defines the problems and the methodology, then the professor needs to verify—say, this problem is new and it’s worth working on and the methodology is valid” (ID116). Other respondents indicated a variety of factors that play into when the relationship can and should be driven by a certain party: “Someone told me when I was going through my doctoral program that a Ph.D. program is a self-selection process…it is largely an advisee-driven process, so if the advisee isn’t organized enough and doesn’t have their wits about them enough, hasn’t figured out the game enough to know to at least some extent what they need to do, if they aren’t motivated enough to make it happen, then maybe that’s part of the natural selection process, maybe they wouldn’t survive as a faculty member anyway…people know what junior faculty life is like and that coddling people…isn’t necessarily helpful in the doctoral program, that people have to be organized and self-motivated enough to make it through, so to that extent I agree that it is an advisee-driven process…However, there are parts that are advisor-driven. There are lots of weird rules and regulations…and, you know, that’s where an advisor can really be a big help in helping get through and answer those sort of obscure bureaucratic questions. So that’s one area where it’s advisor-driven. Another area where it’s advisor-driven is politically. Now, politics don’t come into play with every single dissertation, but they do in some and if a dissertation is political for
whatever reason, and not the topic, it’s usually not the topic in our field, it’s more the personalities…then it can be utterly dependent on the advisor to get it through and the advisor’s good will and relationships with the other faculty members. So in that case it can be, you know, I would say mainly advisor-driven. So I can think of dissertations that would not have made it through had it not been for the politicking of the advisor to make it happen.” (ID641)

Respondents also reported how it can hurt an advisor when the relationship is not mutual. This respondent described an advisee who came in knowing exactly what she wanted to do and came in and finished quickly. The advisor spoke of how he felt the student may have gotten something out of the relationship, but it was not fulfilling for him as an advisor:

“I never really felt that I had all that much of an impact on her thinking, on her life, on her sense of scholarly endeavor…[moving quickly through the program] was great for her because that’s what she wanted to do and she knew how to do it, but that sense of being with doctoral students and talking things over and arguing back and forth and thinking about theory and thinking about conceptual frameworks and all of that never really happened with [name] and I have talked to her since about that and she said, ‘No, didn’t want that, didn’t need to go there’…but I think there, perhaps is where the advisor needs to take a little bit more control and say, ‘You know, let’s set up some regular meetings where we can just sort of talk about what you’re interested in, what your research is, what you’re thinking about and have, even if they’re fairly informal over coffee or something, just have those ongoing fairly regular meetings with doctoral students to keep them on track, to keep them thinking and to interact with them…the actual process of her growing up as a scholar, I don’t think I was all that involved in and I
felt a loss for that...there was a teaching moment there and I guess as a teacher I felt I
lost the teaching moment.” (ID495)

However, although some reported that an ideal situation would be mutual, many noted
the limitations of what an advisor can do, saying:

“The best advisor stimulates, alright, but if the advisee doesn’t have the motivation,
there’s not much you can do...So you have to recognize as an advisor your limitations—
there is only so much you can do to foster inquiry...I am always following up on students
and I’m always pushing them and so it doesn’t work. It has to come from the
individual.” (ID397)

4.1.3.4. Topics of conversation

Advisors were questioned as to which of the following topics came up in information
exchanges with their advisees. Table 12 displays the responses for each of these topics, on a
scale where 1=none of the information exchanges, 4=half of the exchanges, and 7=all of the
information exchanges with advisees (values between these anchors were left blank).

| Table 11. Frequency of advisor responses to question regarding topics of discussion |
|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| **Topic**                                             | **None** | **--** | **--** | **Half** | **--** | **--** | **All** |
| The student’s research (n=97)                          | 0 (0.0%) | 0     | 1     | 14 (14.4%) | 16 (16.5%) | 42 (43.2%) | 24 (24.7%) |
| Research in the field (n=96)                           | 0 (0.0%) | 6     | 23    | 29 (30.2%) | 15 (15.6%) | 17 (17.7%) | 6 (6.3%)  |
| The student’s classwork (n=95)                         | 1 (1.1%) | 24    | 26    | 28 (29.2%) | 9 (9.4%)   | 2 (2.1%)   | 5 (5.2%)  |
| The major people, schools, publications, etc. in the field (n=97) | 2 (2.1%) | 20    | 21    | 15 (15.5%) | 20 (20.6%) | 12 (12.4%) | 7 (7.2%)  |
| Upcoming conferences (n=96)                            | 0 (0.0%) | 16    | 25    | 14 (14.6%) | 12 (12.5%) | 20 (20.8%) | 9 (9.4%)  |
| The student’s post-graduation job opportunities (n=97)  | 1 (1.1%) | 15    | 27    | 14 (14.4%) | 14 (14.4%) | 15 (15.5%) | 11 (11.3%) |
| Your research (n=97)                                   | 3 (3.1%) | 26    | 29    | 22 (22.7%) | 8 (8.2%)   | 7 (7.2%)   | 2 (2.1%)  |
| How to prepare presentations and publications (n=96)   | 3 (3.1%) | 23    | 20    | 19 (19.8%) | 12 (12.5%) | 11 (11.5%) | 8 (8.3%)  |
| How to be a successful teacher (n=97)                  | 10 (10.3%) | 36   | 15    | 16 (16.5%) | 8 (8.2%)   | 6 (6.2%)   | 6 (6.2%)  |
| How to write a grant proposal (n=97)                    | 11 (11.1%) | 39   | 22    | 11 (11.1%) | 4 (4.1%) | 4 (4.1%) | 6 (6.2%) |
As can be seen in Table 11, research (the student’s, the advisor’s, and other research in the field), the student’s coursework, the major players in the field, upcoming conferences and career advice were items reported by the advisors to be the most frequently discussed items. Items such as how to prepare publications or grants, pedagogical instruction, administrative tasks/resources, and personal issues were reported to be infrequent topics of conversation.

Advisees were asked to rate a matching set of topics. As can be seen in Table 12, research, career advice, and the major players in the field were topics that were reported to be most frequently discussed. Similar to the advisor responses, administrative tasks, pedagogical instruction, and instruction on preparing publications and grants were reported to be items of infrequent discussion.

<table>
<thead>
<tr>
<th>Topic</th>
<th>None</th>
<th>--</th>
<th>--</th>
<th>Half</th>
<th>--</th>
<th>--</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>University resources available to the student (n=97)</td>
<td>2 (2.1%)</td>
<td>40 (41.2%)</td>
<td>19 (19.6%)</td>
<td>18 (18.6%)</td>
<td>8 (8.2%)</td>
<td>7 (7.2%)</td>
<td>3 (3.1%)</td>
</tr>
<tr>
<td>Administrative tasks (n=97)</td>
<td>12 (12.4%)</td>
<td>46 (47.4%)</td>
<td>16 (16.5%)</td>
<td>11 (11.3%)</td>
<td>6 (6.2%)</td>
<td>2 (2.1%)</td>
<td>4 (4.1%)</td>
</tr>
<tr>
<td>The student’s personal life (n=97)</td>
<td>10 (10.3%)</td>
<td>50 (51.5%)</td>
<td>17 (17.5%)</td>
<td>10 (10.3%)</td>
<td>5 (5.2%)</td>
<td>3 (3.1%)</td>
<td>2 (2.1%)</td>
</tr>
<tr>
<td>Your personal life (n=95)</td>
<td>41 (43.2%)</td>
<td>38 (40%)</td>
<td>9 (9.5%)</td>
<td>4 (4.2%)</td>
<td>3 (3.2%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

Note. Shading denotes mode.
In addition, respondents were asked if they believed the frequency with which the subjects were discussed was sufficient. Table 13 displays the advisor and advisee responses to these questions, as well as indicating the difference between the percentage of advisors responding that a topic was sufficient and the percentage of advisees indicating the same topic was sufficient.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Advisor Responses</th>
<th>Advisee Responses</th>
<th>Absolute difference between Yes %</th>
</tr>
</thead>
<tbody>
<tr>
<td>University resources available to you (n=69)</td>
<td>20 (29.0%)</td>
<td>27 (39.1%)</td>
<td>11 (15.9%)</td>
</tr>
<tr>
<td>Administrative tasks (n=69)</td>
<td>19 (27.5%)</td>
<td>19 (27.5%)</td>
<td>18 (26.1%)</td>
</tr>
<tr>
<td>How to prepare presentations and publications (n=69)</td>
<td>23 (33.3%)</td>
<td>17 (24.6%)</td>
<td>12 (17.4%)</td>
</tr>
<tr>
<td>How to be a successful teacher (n=69)</td>
<td>25 (36.2%)</td>
<td>16 (23.2%)</td>
<td>12 (17.4%)</td>
</tr>
<tr>
<td>How to write a grant proposal (n=69)</td>
<td>39 (56.5%)</td>
<td>14 (20.3%)</td>
<td>8 (11.6%)</td>
</tr>
</tbody>
</table>

Note. Shading denotes mode.

For the advisors response set, all items were perceived as receiving sufficient treatment by more than 70% of the respondents. Those items receiving the lowest percentages of sufficiency were how to write a grant proposal, university resources available to the student, and research in the
field. The percentage of advisees agreeing that the topics were discussed sufficiently were equal
to or lower than the advisor scores in every instance, with three items receiving less than 70%:
how to write a grant proposal, how to be a successful teacher, and how to prepare presentations
and publications. The largest differences between the two groups were also on these three
topics.

On a less granular level, respondents were also asked how the time spent interacting with
their advisor or their advisees was distributed across the following categories:
intellectual/academic, discipline-related/career, personal/social/emotional, administrative, and
technical/technology-related. Respondents were told to allocate 100% between those categories.
Table 14 and Table 15 show the advisor and advisee responses (respectively), divided into six
distinct groups.

<table>
<thead>
<tr>
<th>Category</th>
<th>0%</th>
<th>1-20%</th>
<th>21-40%</th>
<th>41-60%</th>
<th>61-80%</th>
<th>81-100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intellectual/Academic</td>
<td>0</td>
<td>1</td>
<td>11</td>
<td>40</td>
<td>36</td>
<td>5</td>
</tr>
<tr>
<td>Discipline-related/Career</td>
<td>3</td>
<td>82</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Personal/Social/Emotional</td>
<td>12</td>
<td>74</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Administrative</td>
<td>5</td>
<td>82</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Technical/Technology-related</td>
<td>31</td>
<td>60</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 15. Frequency of advisee responses to question about general topics of discussion

<table>
<thead>
<tr>
<th>Category</th>
<th>0%</th>
<th>1-20%</th>
<th>21-40%</th>
<th>41-60%</th>
<th>61-80%</th>
<th>81-100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intellectual/Academic</td>
<td>0</td>
<td>1</td>
<td>11</td>
<td>21</td>
<td>26</td>
<td>7</td>
</tr>
<tr>
<td>Discipline-related/Career</td>
<td>4</td>
<td>50</td>
<td>10</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Personal/Social/Emotional</td>
<td>11</td>
<td>51</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Administrative</td>
<td>19</td>
<td>44</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Technical/Technology-related</td>
<td>28</td>
<td>36</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

As can be seen, the advisor and advisee responses were fairly similar and reported that
Intellectual/Academic topics were dominant. Technical, administrative, and psychosocial
elements appear to take the least percentage of time.

The focus on research was also identified in another area. When asked what percentage
of the work that they did as a dissertation advisor is associated with one of three facets of
scholarship (research, teaching, or service), the average percentage for research was 56.20%.
Teaching received an average of 26.01% and service received an average of 9.46%.

Multiple respondents noted how constrained faculty members were by their “multiple demands” (ID397). One respondent said: “We only have 24 hours, where is the emphasis going to be? Is it going to be on your classroom teaching? Is it going to be on your research? It is going to be on your mentoring? I mean, you only have 24 hours to spare and as different pieces begin to take up pieces of those time…something has to suffer” (ID495). Another respondent noted the demands mentoring makes on academics, saying: “Being a good mentor does take time” (ID234).

4.1.3.5. Psychosocial

Although the psychosocial topics did not appear to have been the dominant themes of conversation, at least one interview respondent characterized their mentoring relationship as “very, very social” recalling that they “went to coffee several times a week, if not every day” (ID217). Another student recalled getting “really close” to their advisor, saying “sometimes it is very formal, but over long conversations there’s some sort of connection—if you don’t have that connection, I don’t think it can work, but you also have to be very careful as a faculty member, because it can get out of hand” (ID160). Another advisee described her own close relationship with her advisor saying, “I knew what was going on in her life and she knew what was going on in mine” (ID155). One advisee recalled the support that her advisor provided for her, stating: “she was a great mentor, I mean, if I had a personal situation come up or a problem or something, she was always there” (ID2).

Another advisee talked about how much her advisor instilled confidence in her and how that was critical for her development (ID155). Similarly, an advisor spoke of how all doctoral
students go through periods of insecurity and how instilling students with confidence through those “rock bottom semesters” is an important part of mentoring (ID160).

4.1.3.6. Pedagogical

The element of pedagogical preparation was explored in a question to the advisees, in which they were asked to identify from among various choices of potential pedagogical mentoring activities, which applied to them. Table 16 displays the advisee responses for this question.

Table 16. Frequency of advisee responses in response to question about pedagogical preparation

<table>
<thead>
<tr>
<th>Activity</th>
<th>Number of respondents</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>I worked as a teaching assistant for my advisor</td>
<td>27</td>
<td>39%</td>
</tr>
<tr>
<td>I received pedagogical instruction from my advisor</td>
<td>18</td>
<td>26%</td>
</tr>
<tr>
<td>I co-taught with my advisor</td>
<td>12</td>
<td>17%</td>
</tr>
<tr>
<td>None of these choices apply</td>
<td>35</td>
<td>50%</td>
</tr>
</tbody>
</table>

One theme that was prevalent throughout the interviews was the lack of pedagogical preparation for doctoral students. Many advisees remarked on being “thrown into teaching” without any preparation (ID69). One advisee recalled: “they let you loose on a class and they never come even look at you” (ID175). An advisor likened pedagogical preparation to parenting, saying:

“It’s like parenting; you know, nobody teaches us to be parents. You have to struggle and read your books and figure it out and I think teaching is fairly similar. There is never a lot of specific instruction about how to teach and how to teach well and part of that, I think, is because there’s a perception that teaching is perhaps more of an art than a science how much of it is actually teachable. Now, I’m a firm believer that you can also teach art.” (ID495)

The respondent also remarked: “I think training doctoral students to teach is probably a, should be a high priority and I don’t think it is; I don’t think it is anywhere” (ID954). This was
reinforced by another respondent who went as far as to say: “we never do that” (ID415) when asked how their institution teaches doctoral students to teach.

However, one respondent noted a great deal of pedagogical preparation that happens at their institution including a “pedagogical component” to the doctoral seminar, a required apprenticeship either taking a course or working in the content area in which you intend to teach, “a course in learning” offered outside of the department, an independent study within the department to create a syllabus, and a semester working as a grading assistant before you are allowed to teach independently (ID397).

One respondent indicated that such prescriptive models may not meet the individual needs of each student: “Some people come in with lots of teaching experience, so maybe, you know, those people need something very different from the people who have never taught anything…it’s hard to just have one set of guidelines” (ID488). The advisor also noted that requiring a teaching practicum may not be a good idea because not all students want to teach (ID488).

Some respondents commented on the extent to which doctoral students were encouraged or required to take formal pedagogy courses. Most advisees indicated that they “were encouraged but not required” to take pedagogy courses (ID69, ID283). For the most part, it seemed these courses were offered outside of the department (ID641).

Some respondents noted learning to teach through watching their advisors, guest lecturing (ID221), teaching assistantships, and co-teaching opportunities. One advisee noted: “I had excellent teachers; I learned by watching them” and noted that his own advisor was absolutely critical in teaching him how to teach (ID415). An advisor commented that pairing “students or groups of students with people who have proven track records of being a good
professor” (ID69) would be the ideal way to prepare students for teaching. One advisor suggested:

“All doctoral students should co-teach at least one class that their advisor teaches. I mean, that’s a way to get them involved. It’s a way to get constant feedback. It’s a way to expose them to teaching in a controlled environment and, you know, especially if they’re gonna teach for us as a stand-alone teacher they should have that mentoring semester, I think, prior.” (ID495)

Other advisees mentioned this model of co-teaching at their institution, saying: “we taught probably one semester with somebody or maybe two and then we were set free” (ID42).

Teaching practicum was mentioned by many respondents as part of the curriculum at their schools. However, some advisees remarked that this requirement was not particularly useful. One advisee noted: “I mainly remember being stunned at how little I was asked to do and how low the quality of the experience was” (ID283).

Advisees noted different expectations for teaching at their institutions. One student remarked: “students should be given [an] opportunity for teaching, whether it is teaching for the college or for the advisor’s course…[teaching] was not required, but I demanded…you have to demand if it’s not required otherwise people just ignore you” (ID116). Another advisee recalled a different experience in which “we taught the whole time…we were expected to teach” (ID42). At another institution, with a large undergraduate population, the doctoral students were expected to carry many of the undergraduate courses (ID575).

Regardless of expectations and preparation, many respondents indicated how invaluable teaching experience was to them. One advisee remarked: “it was enormously important to get teaching experience” (ID175). Another advisee mentioned the benefits gained from teaching
independently: “The advantage to creating your own classes when you’re a doctoral student is when you get into the real world you have no fear of it…you know how to put a syllabus together, you know what it takes for an assignment, you know how to grade, you know what the reviews need to be like” (ID42).

4.1.3.7. Individual needs of students

In answering the questionnaire, some advisors noted how difficult it was to generalize their answers as each advisee was very unique. One respondent noted that “all this varies so much by advisee” and that it was “hard to say anything ‘on average’” (ID641). Another respondent commented:

“I behave differently toward different advisees, as each needs something different. Some may need a lot of communication, another almost none. Some have personal issues they share with me, others do not. It is very hard to generalize.” (ID643)

This sentiment was echoed by an advisee who commented: “a good advisor is someone who can fit the level and amount of support she/he provides to the student needs…some students need more than others” (ID82).

These issues were also raised in the interviews. One advisor noted: “some students are better at articulating what they need than others and sometimes I think an advisor has to be astute enough to suggest things that students need, even if they don’t know they need them…I think the people who say, you know, it’s individual and every student needs something different [are] exactly right” (ID488). One advisor noted that one difference in the amount of mentoring required is due to the variety of skill and confidence levels of the students.

“Some students are just more talented than other students—require much less of my time writing, thinking about their, what they want to do. And the students who are very, very
talented and very driven, they are the ones who push me, you know, I look at what they are doing and I’m like, this is fabulous, you know and they are like, ‘Why don’t you have any critique [for] me?’ So I have to work to critique and give them some feedback. Other students need help with writing and that just takes a lot of time…sometimes it is helping the student get over the kind of difficulties that some of them have with…self-esteem issues and writing issues and other kind of personal issues…everybody is really, really different.” (ID622)

Another advisor noted that, while differences do exist, there are also patterns in behavior:

“There are some students who are more self-motivated than others…there are some people I work with where we have to meet every week and there are other people that I’ll meet with three times in a semester. It has to do in a sense with their ability and my level of trust in their ability…[However], if you spend enough time living your social life and paying attention to what’s happening around you, you see there are patterns everywhere…social life is filled with patterns. There’s no reason why doctoral education is any different and I think in the same way that when you are thinking about anything, any kind of generalization you’re going to make about social life, the closer you get to the individual person, the more variation you see. So, in that case, sure, they’re all different. Back away though…and you recognize [certain behaviors] as a pattern.”

(ID398)

4.1.3.8. Career preparation and acculturation

A variety of different career trajectories were not explored in-depth in this study as all of the respondents are currently serving as faculty members. However, many interview respondents
commented on their own expected career trajectories when beginning the doctoral program and the career trajectories their institution expects from its doctoral students.

Many respondents indicated simply that the objective of their program was to create “future faculty” (ID175; ID478; ID415). Some respondents were more specific about the types of institutions for which they should serve as faculty saying: “we were supposed to be going into R1 jobs” (ID69). One respondent explained that the size of their program was the rationale behind the type of career she expects for her doctoral students: “Because we’re so small we had to kind of keep a narrow focus and so we don’t admit anyone who does not want to be an assistant professor at some place when they finish” (ID641). However, the respondent noted that incoming students do not always know or follow-through with their stated plans:

“People sometimes say they want something, but then change their mind or sometime[s] people say they want something, but they just aren’t really cut out for it—they’re not succeeding in the things they need to do to have that sort of job, so the fact that we have that very strict admissions criteria, we ask about it in our interview, we flat out ask people about it, we have chosen not to admit good candidates, very strong candidates, who said they did not want to become an assistant professor, but it doesn’t mean we don’t have to deal with people who in the end don’t want to go into academia.” (ID641)

One advisee recalled having some ambivalence in the period before he started the program, but being dedicated to a future faculty trajectory very early on in his program:

“By the time I started, in my first semester in the program, I knew that I wanted to be a faculty member. There was a lot of time prior to that where it wasn’t clear that that was going to be the case and I did have other options, but by the time that August came around it was pretty clear, so I started thinking about, ‘How do I get to that point from
where I was starting?’ So that’s where a lot of those decisions started to be made, was, ‘Okay, if I want to be like this person down the road, what do I have to do to get there?’”

(ID74)

Many of the respondents emphasized that the objective of the doctoral program was to create strong researchers—regardless of whether or not they went into an academic position. As one respondent explained:

“I think what we do is train them to be researchers—to be critical and analytical. They have to decide whether they are going to be faculty members. You can be critical, analytical, do good work in, outside the academy. You can be a researcher, an institutional researcher in government, in non-profits, in different sectors of the economy. It’s the issue of, ‘Are we helping students become creative, good scholars?’” (ID397)

Another respondent said: “we definitely tell people we are not preparing them for administrative jobs, so I feel like we are preparing people for research oriented jobs” (ID622). The respondent indicated that, while “most of our students who have graduated are teaching,” there were opportunities in other research-oriented positions, such as government, policy, and research institution positions (ID622). One respondent agreed with the sentiment of preparing researchers, but did not share the same sense that there was a variety of career trajectories:

“There really aren’t a multitude of careers for which a Ph.D. makes sense…we are orienting towards researchers rather than practitioners as the outcome for our Ph.D….I think that’s where we are best able to educate people…essentially, we are really only training researchers—people who want to research as their primary activity.” (ID497)

Two respondents noted how the lower pay in academic positions made it hard to convince students to go into future faculty positions. One advisor noted: “what I see here is that the
people who have worked with our IR faculty are very well-positioned to compete for high paying jobs in industry and if a person is driven by money, it’s really hard not to make that choice” (ID398). Another respondent described a program that had recruited from the public library sector. The respondent noted that the success rate for graduation was high, but he found it hard to place them in faculty positions, because it was a pay-cut for many of the students (who were coming from administrative positions) (ID507). However, one respondent remarked how having students end up in higher paying jobs benefits the institution: “there’s a lot of benefit to have that sort of program, because library directors make more money; they stay politically well-connected; you can have some very good alumni” (ID641).

One respondent noted that “historically, doctoral programs in our field have not been about research; they have been about producing library directors” (ID2). Another advisee explained how she had come from working in a library and planned to return to working in a library after she finished her doctoral program. She took a one year unpaid leave to fulfill her residency requirement and then went back to work full-time while finishing the degree. She explained her motivation for the degree in this way: “I was in an academic library and when I took a job there the librarians had faculty status and, like, six months after I arrived they announced that nobody would get tenure without a Ph.D….my director at that time encouraged me to think about going for the Ph.D.” (ID86). The advisee noted that she had “no intention of becoming a faculty member” (ID86). She did return to practice after gaining the doctorate and explained: “Since I know a lot more about library and doctoral education I have to come to appreciate more and more my time at [institution], because it was very library focused and I feel that it connected me to the underlying research in my field that made me a better librarian, gave me a better perspective…I thought it was great for me and when I went back to my campus there
were things I could do because I had a doctorate…so it was a very beneficial situation” (ID86).

This connection between research and practice was discussed by another respondent:

“I actually thought I wanted to teach and a number of the people who went into that program did become academic library directors, but others were teachers…to come into that program you had to have a master’s in library science and most of them had also worked in an academic library somewhere…thinking that in a professional school that, you know, it was really important to have a feel for the profession before you either, well, obviously, before you became an administrator and, but also before you taught, because it was, you need to be out there on the front line a little bit…I think there are some people going into information science and things like that who probably are teaching on such a theoretical level that maybe it doesn’t matter if you are doing databases that you understand the environment in which they are being practiced, but I do think if you’re in the more traditional library science parts that there’s something to be said for some sort of professional experience…I think you saw a lot of the rifts that you see reflected in some of the things that American Library Association says about library education in general. I mean, the fact that they think we have deserted the practitioners. Now, I personally do not think that’s true at all, but I do think that there are some people teaching in schools that, you know, probably their courses could be shaped in a way that would be better for the students to actually prepare them for practice, because we are a professional school.” (ID488)

While the majority of the institutions seemed interested in preparing researchers and faculty members, some programs seemed more flexible. One respondent described their program as being one that prepared both library administrators and faculty members: “it was a
real open and flexible venue that...as you went along you could discover your scholarly interest and your job prospects” (ID221). Another advisor remarked that about 30% of their graduates became LIS faculty members, with the remaining going back into business, industry, librarianship, as well as what the respondent termed “non-traditional jobs” such as being an economic forecaster (ID506).

Some respondents discussed the possibility of offering different degrees for those who want to do research and for those who want to practice (ID575). One respondent noted: “I suppose the one thing about the future of doctoral education is the division between people who want to go into academia as a profession and people who want a Ph.D. for other reasons...I think all schools do this to a certain extent—that we just assume that we’re training people to be academics and that’s not the case and I don’t think we really do a very good job of training people for professions in which they just happen to need a Ph.D. for whatever reason, so we could do a much better job with that” (ID153).

Although some respondents indicated having different standards for students, based on their career trajectories (ID641), other respondents noted having the same level of expectations for all students, reinforcing the idea that the doctorate is a research degree:

“I expect the same level of quality and rigor from all my students because I see that the Ph.D. in our school, and I would hope in many other places except where they have clearly stated that it’s not a research-oriented Ph.D.—it’s meant as more certifying Ph.D. for administrative work—then I expect research rigor across the board. So, I don’t, you know, change my standards or my expectations of what the dissertation should be. Now, maybe the, and I’ve had disagreements with a previous dean, who I still dearly love here and we’re still good friends, but he called it practice research and I said, ‘it’s not practice
research’…so that was a major difference that I had never heard about because at
[institution where respondent received Ph.D.] again…to what extent did your Ph.D.
training shape your morals and values about, you know, your work as an…advisor…and
so we thought it was either a first step in a larger research program or, you know, a major
project that was going to have impact. [Institution] always pushed us to do something
that would make a difference and so many of the dissertations that came out of there were
either, you know, a solid first step in a longer research program or something that would
have some effect and so this notion of practice research, I think the practice research
should be done in projects working with faculty members as you’re going through the
program, versus, you know, your dissertation being that practice that tries to demonstrate
you can do independent research. It just doesn’t fit for me. So, so I again, bringing the
same set of standards across the board to all the Ph.D. students that I am involved with
for the sake or from the perspective, this is a research Ph.D., I am assuming they want to
continue doing research…so this is their apprenticeship time and their, you know,
moment of demonstration of research capabilities.” (ID499)

One advisee commented that “part of getting a Ph.D., I think, is really socializing into
sort of this network of academics” (ID155). One aspect of this acculturation that was explored in
the questionnaire was the participation of the doctoral student in conferences and the role the
advisor played in the advisee’s conference attendance. When asked whether or not they attended
conferences during their doctoral studies, 97% (n=70) indicated that they did attend conferences.
The main reasons stated for conference attendance were to present and disseminate research
(n=35), networking, (n=34), and personal enrichment (n=11). Advisees were asked to report on
the conferences they attended; 67 unique conferences were reported by 65 respondents. The
most frequently mentioned of these were Association for Library and Information Science Education (ALISE) annual conference (n=38), American Society for Information Science and Technology (ASIS&T) annual meeting (n=28), American Library Association (ALA) annual meeting (n=13), American Medical Informatics Association (AMIA) annual meeting (n=4), International Conference of Information Systems (ICIS) (n=4), and the Joint Conference on Digital Libraries (JCDL) (n=4). Advisees were also asked to indicate roles that their advisor played in their conference attendance. Table 17 summarizes the responses to this item.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Number of respondents</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your advisor encouraged you to attend</td>
<td>45</td>
<td>65%</td>
</tr>
<tr>
<td>Your advisor introduced you to others in the field</td>
<td>35</td>
<td>51%</td>
</tr>
<tr>
<td>Your advisor supported you financially</td>
<td>18</td>
<td>26%</td>
</tr>
<tr>
<td>Your advisor co-authored with you on conference publications</td>
<td>17</td>
<td>25%</td>
</tr>
<tr>
<td>Your advisor played no role in your conference attendance</td>
<td>19</td>
<td>28%</td>
</tr>
</tbody>
</table>

As shown, the main roles played by advisors were encouraging the students to attend and introducing them to others in the field. About a quarter of respondents noted that their advisor supported them financially and/or co-authored with them on conference publications. Twenty-eight percent of respondents indicated that their advisor played no role in conference attendance.

In keeping with the idea that many programs were creating future faculty members, many interview respondents spoke at length about how their doctoral education trained them for their future life as an academic. One advisee recalled a “very deliberate effort on the part of the school at [institution] to make doctoral program have the same kind of benchmarks and feedback mechanisms as junior faculty members have” in order to make the “transition” into an academic position “relatively seamless” (ID153). One advisor similarly noted the practice at their institution requiring students to publish as a way in which to prepare them for their future life as a faculty member (ID488). The respondent also noted that this acculturation extended beyond
the research area: “I think that part of a doctoral program, a good doctoral program is
socialization and teaching people about what the academic life is about and I don’t know how
much of it is teaching, it’s just providing a model in some ways—they see how you behave, they
see your responsibilities you have, they see your interactions—and I think that, you know, if
they’re smart, they’re going to model themselves and follow what you’re doing” (ID488). One
respondent noted: “we have to pay as much attention to acculturation into academe as we do to
actually inculcating them with knowledge and, you know, it isn’t just about theory and methods,
it’s about understanding the role of committee meetings and how universities work and your
place in them” (ID234). In the words of one respondent: “being a faculty member is not a job; it
is a way of life” (ID2).

4.1.3.9. Summary

The majority of advisees and advisors reported monthly meetings. The importance of
physical proximity and in-person meetings were reported by both groups of respondents. It was
expected that students were the primary initiators of instances of information exchange. E-mail
and in-person communication were used most frequently for these exchanges.

The conversations between advisors and advisees seemed mainly research and career
focused, with relatively little in the way of psychosocial or pedagogical mentoring; however, it
was noted that each student was an individual and may have individual needs.

The majority of respondents stressed the value of the doctoral degree as a research degree
and one that was intended to create researchers. In many cases the expectation was specifically
on creating academic faculty, but other respondents noted alternative career paths.
Almost all advisees reported attending conferences and many reported receiving encouragement and networking assistance from their advisors; 30% of advisees indicated that their advisors played no role in their conference attendance.

4.1.4. Separation

Responses from the questionnaire and interviews identified many potential points at which the formal relationship between an advisor and advisee can be terminated. Those at the initiation of the advisee include the advisee switching to another advisor, the advisee successfully graduating, or the advisee dropping out of the program.\textsuperscript{31} The ways reported in which an advisor terminated the relationship were almost entirely due to the advisor leaving the school or the department. Although there were cases of committee members “quitting” the student, it did not appear common for an advisor to terminate the relationship with their advisee.

On the questionnaire, advisees were asked if they changed advisors during the course of their dissertation; 25% (n=18) of the advisees indicated that they had changed advisors. The most frequently listed reasons were that the advisor left the university (n=6), the advisor died (n=4), or there were personal issues between the advisee and advisor (n=4). Also listed were a change in research interests (n=3), and retirement of the advisor (n=3).

These same themes were reinforced by the interview responses. Respondents noted advisor-driven separation in terms of the chair retiring (ID2), going on sabbatical (ID42), or passing away (ID155). Advisee-driven separation was noted particularly in regards to a change in research interests. Advisees made comments such as “it just wasn’t a fit for the kind of research I ended up doing” (ID283) and “after a time it became clear to me that it just wasn’t going to work…we had a fundamental disagreement about how to move forward in the research that I wanted to do” (ID153). One advisor recalled that his “old-fashioned approach” (ID506)

\textsuperscript{31} Since this study focused on successful graduates, this option received sparse treatment.
was a deterrent to many students. He described: “the first thing that we do is we hypothesize then we make sure it is operational” (ID506). He remarked that this “methodical approach” caused students to “self-select” and said: “I may have a student in the fall who starts with me and by the spring they want another advisor and then I pick up another student in the spring who wants that structure” (ID506). Other respondents reported that their advisors just switched roles during the process, moving from the role of advisor to that of committee member (ID74).

The degree to which switching advisors occurred and was encouraged differed by institution. As reported in the Initiation section, many of the advisors at schools at which advisors were assigned reported that very few of their students switched. An advisee from another institution remarked that “there’s no hard feeling usually if you switch advisors,” saying most students at his institution did eventually switch from their initial advisors (ID153). Other advisees reported that the practice was not particularly encouraged, saying “there was some expectation that the person who you started with is who would be the person who would eventually become your committee chair” (ID74).

One theme which was frequently discussed was the need to counsel students out of doctoral programs. Many respondents indicated that this was not done frequently enough, such as the following respondent who noted: “We don’t have a point where we say, ‘You’re not doing it, you’re out of the program’…there’s never that sense of, ‘Ooops, you know, we really blew it here by admitting this student—they’re really not doctoral candidate quality and we don’t want to put our stamp of approval on them, we’re going to be writing their dissertation, we need to get rid of them’…I don’t think we’re very good about counseling people out of our program” (ID495).
Some respondents noted the mechanisms in place at their institution for counseling people out. One advisor explained the process at her institution in which the students are reviewed after the first year saying, “it’s a graceful time where everybody can just stop or you’re at a point where you could, if they haven’t got a master’s degree, they could finish the requirements for a master’s degree and leave after another year or so, you have some options there” (ID497). However, the respondent went on to say that “it’s hardly ever that anybody actually leaves at that point” and talked about the two experiences she had where an advisee dropped out of the program: “in both cases they were working full-time their entire program and neither of them needed the Ph.D. for an instrumental purpose” (ID497). The respondent also recalled another student who did not need the Ph.D. and who she asked repeatedly, “Why don’t you just stop this?” (ID497), but the student “was very stubborn” and “passed all the roadblocks” that the advisor put up (ID497).

Another respondent talked about counseling students out and also the possibility of counseling students “in” if they were not finding their way in the program:

“One of the faculty members there while I, within my hearing, once made a comment that, you know, she wishes that there was just a trap door in the floor, you know, to make those students sort of vanish, because counseling them out is such a pain in the neck…it required a lot of documentation over a long span of time and meetings and everyone agreeing that, you know, yeah, this was probably the best thing and after putting a few years in, doctoral students aren’t really willing to call it quits…we had a lot of students fall into that hole, where once they finished their coursework, then they were faced with the task of coming up with a dissertation topic and a lot of students fell into that hole and never were seen again…I do think that it is possible to teach a student how to acculturate
and what the tasks are that they need to do…I learned a lot from watching [my mentor] suss out the game that is academia, right. He was in very large part my role model, because he taught me that this is a game, it has rules, those rules are not laid out in any documentation, but they can be figured out if you just pay attention, right, and you can play the game according to those rules and win, right. End of story. And so I absolutely do think you can teach a student to do that. The question is, would it be a good idea, right? If a student can’t figure that out for themselves, isn’t motivated enough to figure it out themselves, then once the mentorship relationship ends, they’re just going to sink again…so, I mean, yes, I think you could counsel a student in from the cold, but I’m not sure you’d want to.” (ID153)

Another advisor reinforced the idea that some students are better off being counseled out, saying: “I think it’s a hard thing to do, to counsel people out of a program, but probably in the long run, it’s the best thing you could do for them” (ID488). One respondent noted that much of this has to do with the career trajectories of their students, where “the end goal is to try to help people into a life that they are comfortable with” (ID641).

An additional issue that came up in the interviews in regards to separation was the pace at which students were expected to graduate. One advisor said “we are rushing students” (ID575), noting that students feel pressure to publish “although they have not learned enough in their thinking” (ID575). The advisor recalled her own experience where “the expectation of publication is not until I do my dissertation” and laments that “students feel pressured to go through the program fast” (ID575). Another advisee noted in an open-ended question on the questionnaire:
“I believe the biggest disservice done to doctoral students is that many of them are shoved out of the door with the thought that they can teach, research, and pursue service with little or no mentoring once we have a professional position. I am finding that not all institutions do an adequate job of taking the new Ph.D. and helping them along the next steps that need to be taken. More of us should take formal classes in teaching and how to write a decent article instead of it being assumed that we walk away with this knowledge.” (ID42)

4.1.5. Redefinition

Those students who successfully graduate may have varying levels of post-graduation relationships with their advisors. In order to assess this, the questionnaire asked advisors to describe (on average) their relationship with their advisees post-graduation and for advisees to describe their post-graduation relationship with their advisors. Choices included: 1) we are friends, 2) we are colleagues, 3) we are collaborators, 4) I am a mentor to my advisee (post-graduation)/my advisor continues to serve as my mentor, or 5) we have no relationship. Respondents were allowed to select as many options as desired.

As seen in Table 18, the largest percentage of advisors (90%) perceive their advisees as colleagues after graduation. More than 50% of respondents reported that their advisees were considered friends and collaborators and indicated that they remain in a mentor role to their advisees. Very few advisors (n=3) reported having no relationship with their advisee following graduation.

Table 18. Frequency of advisor/advisee responses to question about post-graduation relationship

<table>
<thead>
<tr>
<th></th>
<th>Friends</th>
<th>Colleagues</th>
<th>Collaborators</th>
<th>Mentor</th>
<th>No Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advisors</td>
<td>50 (54%)</td>
<td>84 (90%)</td>
<td>52 (56%)</td>
<td>50 (54%)</td>
<td>3 (3%)</td>
</tr>
<tr>
<td>Advisees</td>
<td>46 (66%)</td>
<td>43 (61%)</td>
<td>16 (23%)</td>
<td>19 (27%)</td>
<td>9 (13%)</td>
</tr>
</tbody>
</table>
Advisees were most likely to see their advisors as friends after graduation, with 66% selecting this response. The next highest category was the perception of the advisor as a colleague, with 61% selecting this response. This was reinforced in the interviews by comments such as “I am friends and colleagues with every one of the people on my committee” (ID2).

Less than 25% of the advisees saw the advisor as a collaborator. However, a few interview respondents talked about collaborating after graduation (ID175, ID74, ID155, 217). One advisee recalled: “My advisor was extremely supportive and she continues to be, I mean, she still kind of like keeps me in mind…she was asked to edit a special issue of a journal recently and she contacted and asked me if I would be interested in co-editing with her” (ID175). Another student noted collaborating with her advisor on a grant application, but says that she did not collaborate during her program. She remarked: “it seems like it takes them, sort of the senior faculty members, maybe it takes them a few years to sort of recognize you as a colleague…you have to prove yourself as an independent person” (ID155). Another advisee also noted that she did not collaborate until after graduating (ID217).

Nine advisees on the questionnaire reported having no relationship with their advisors following graduation. However, some indicated that the reason they did not have a relationship with their advisor (and why their advisor was unable to perform as a friend, colleague, collaborator or mentor) was because their advisor had passed away. In interviews, the uniqueness of each advisee was also noted, with one advisor saying: “There is high variability across my advisees, in terms of whether they need/want me to remain in a mentor role after graduation. Some of them still ask for advice frequently, while others are more independent and we interact as peers” (ID497). Another advisee reported that, while she collaborated with her advisor during her doctoral program, her “research agenda has matured in a different direction”
so she doubts they will continue to collaborate (ID234). Another doctoral student noted the shift in the relationship post-graduation saying: “We still like each other and still like to work together, but I have become independent and we aren’t co-dependent” (ID69).

On the questionnaire, 27% of the advisees reported that the advisor continued to serve as a mentor. In interviews, one advisee reported: “she’s following me until I get tenure…she’s keeping an eye on me to make sure I know what I’m doing” (ID 175). Other advisees noted the unique relationship of moving into a faculty position saying, “you’re often being mentored and mentoring at the same time” (ID488).

4.1.6. Dissertation committee as a mentoring constellation

One element of doctoral mentoring which was examined was the extent to which doctoral students are mentored by multiple faculty members and the particular way in which the dissertation committee may serve as a “mentoring constellation.” This concept was articulated by one questionnaire respondent in the following way:

“I cannot emphasize the importance of having a team (more than just the major advisor) of faculty to mentor a student. The other people who served on my dissertation committee have continued to serve as personal and professional advisors and friends.

One faculty member does not serve as a village of doctoral study.” (ID2)

Other respondents emphasized the various roles played by their committee, saying that “other faculty in the school served as intellectual mentors in various areas, through coursework and research activities” (ID165). The idea of this mentoring constellation was reinforced in the interviews: one respondent reported having “a team of advisors” (217) and another said that he benefitted by seeing all committee members as advisors and getting as much feedback as possible (ID116).
4.1.6.1. Roles

Many respondents spoke about the role of the committee members: as advisors, the roles they played when they served on committees and as advisees, the roles they expected their committee members to play. Two advisors described their process of making their roles explicit:

“When someone comes and says they want me to be on their committee, then the first thing I say is, ‘You have to come in and talk to me about this, because I think we need a face-to-face conversation to make sure it really is actually going to work for them and then when they come in…what I really want to know from them is what role they see me as playing on their committee…do I actually play a role that’s going to be useful to them; isn’t overlapping completely with other people on the committee? What is it that they’re expecting exactly from me?’” (ID497)

“When it comes to the committee work, I serve on committees that may not be as central to my research focus and I typically tell the person when they’re asking me if I want to serve on their committee, I usually say, ‘So why do you want me on your committee?’ and they should have a good reason, right? And what I advise my advisees is, you want to have, you know, people who bring something to the table, whether it’s methodology, whether it’s content, whether it’s, you know, analysis and there should be a reason that you can give why you choose, you want to choose, x, y, and z to be on your committee.” (ID49)

Another respondent reinforced this idea of each member playing a particular role, saying:

“You shouldn’t be on a doctoral dissertation committee unless you can contribute something—whether it’s helping the student with research methods or being a good critic or something or knowing part of the literature really, really well” (ID342).
Advisees similarly noted purposeful selection in the composition of their committees:

“I chose them because they had specialty in a particular area that contributed to my research. Every single one of them served a purpose, including my outside person.” (ID2)

“I was very conscious of [who I put on my committee] and I was very strategic about that. I picked specific people to do specific things.” (ID69)

“I really was interested in looking at specific contributions based upon people’s skills and backgrounds, so I had one particular senior member on the committee who is very well known as being a research methodology person, so I chose her specifically for that purpose. I had two other more junior faculty members who were doing related kinds of work, not, not really close to the work that I was doing, but related in many senses to the content area of my dissertation and provided some good support in terms of specific methodological questions and research design around that content area. And then as my outside committee member I had one of the key players in the community that I was studying participating, so that, that provided some reality checks on the methodology again, but then also connections into that community that allowed for this particular project to actually happen. So, yeah, every person sort of played a particular role and that was definitely a conscious choice to pursue them individually that way.” (ID74)

Two areas stood out as major areas in which the committee members played a role: content and methods. Content was paramount for some respondents. One went as far as to say, “if the content’s not my expertise, then I will not agree to serve” (ID575). Many respondents talked about the person who was the “methodologist” (ID153) or “methods person” (ID86) on
their committee. Other respondents indicated a mix of content and methods for committee member roles. Advisors described their involvement in the following way:

“There tend to be two different kinds of roles I play. So for some of them it’s methods. I am there because of a particular methodological question or issue they have. For others…it’s the content more.” (ID497)

“So, typically I’m either there because it’s the content expertise that I could bring or methodological, but it depends on the nature of the dissertation or, you know, the student and their work, so, but unless I can offer something in…terms of methodology or content, I’m not sure I should be on the committee.” (ID49)

One advisee described his selection of committee members by saying: “I think when I was making that decision I focused 80% on content and 20% on methodology” (ID116).

Other factors were also mentioned for either selection of or roles played by committee members. One respondent noted how important accessibility and experience in the field were:

“I also had [name] on my committee because she knows the field inside and out, she knows the literature inside and out. She, like me, is absolutely always online, so if you email her at four o’clock in the morning with a question you get an answer within an hour and the same thing if you email her at four o’clock in the afternoon…She’s been in the field for so long, she just knows everything” (ID69). Mentoring experience was also valued: “[committee member] had a lot of experience guiding students, he’s a really good explainer and not a lot gets past him” (ID69).

Some committee members noted that their role was more editorial: “students have usually selected me on committees to make sure that every i is dotted and every t is crossed and all of the form is correct…I manage to edit without destroying the student’s writing style” (ID506).
Another advisor noted the more editorial nature of the role stating: “I think the committee member role is probably much less involved, more sort of externally supervisory and looking at products as opposed to personal growth” (ID495). Advisees noted these editorial roles remarking: “my advisor took the lead and my committee members reviewed what I was doing, but their content comments were more…general kind of like…copyediting and editorial feedback…fine tuning methodologies” (ID175). Another advisee remarked on the time that it took to provide such feedback, saying about one committee member: “she has a very keen eye for detail…once [committee member] gets a hold of your dissertation she also, because she can’t help herself, she copyedits it, which must take her an unbelievable amount of time” (ID69).

The amount that students wanted to be challenged also came up in the interviews. Some students remarked on choosing difficult committee members in order to improve their dissertations:

“She asks really hard questions, she pulls no punches ever…she doesn’t care if she tanks you, man, she is going to ask the hard questions and I really needed that. I really wanted to make sure I had somebody who was really going to push and really identify the weak spots in what I was doing.” (ID69)

“I knew that he would not pull any punches and that he would be really blunt, which is useful.” (ID234)

One advisor noted that, “I’m capable of being quite critical and not letting people get away with stuff and sometimes that’s my job…I’ve been told by a couple of doctoral students that that’s my job” (ID342). However, one advisor noted that students were “unhappily surprised” that he turned out to be the “hard-nosed” one on the committee (ID495). Some students explicitly noted choosing people for their kindness:
“I chose [name] because [name] was on everybody’s committee and he was very helpful. He was a very, very helpful faculty member just in general to doctoral students. He liked doctoral students and he was very helpful and non-judgmental and he had lots of good ideas and he cared.” (ID246)

Another advisee explained her rationale for choosing a committee member by saying the committee member was: “nice, normal, wouldn’t get in the way, and provide[d] good feedback” (ID175).

One difference that emerged from the interviews was the way in which the roles between advisor and committee members differed in terms of responsibility. As noted by one advisor: “I think there is a difference in how responsible you are, cause if you’re the advisor, later on everybody’s going to think about you—they’re not going to think about the committee members. I mean, the student gets associated with the advisor much more strong[ly] than any of the other committee members” (ID497).

4.1.6.2. Relationships

The importance of this advisor role and the way it shaped the relationships in the rest of the committee was noted by many respondents. This hierarchy seemed present from the beginning, where many advisees noted that the advisor was instrumental in the selection of the rest of the committee:

“First, I chose my advisor. One of the things that I did with my advisor was try to think of who would be a good committee.” (ID175)

“I chose my chair first and then coordinated with him…I always did it in conjunction with my major advisor mainly because I wanted to know, you know, it’s inevitable, some people can work with some people and some people can’t and even though I may have
wanted somebody, if it was going to be real conflict with my chair, I didn’t want to have that [be]cause I felt like my chair did the majority of the advising and provision of information.” (ID2)

“I did it after I had my chairs in place because I figured that there were so many little political battles that I knew that there were some people that my chairs would not agree to have on my committee, so I discussed it with them…I did want somebody else on my committee, though…that just didn’t work because my chair said, ‘If she’s on the committee, I won’t be your co-chair’…making sure that people get along is just as important as subject expertise.” (ID155)

“When I constituted the rest of the committee, I talked to the chair for his advice on how to constitute it and he gave me some advice, but also told me it was up to me, although he would like to know who I was thinking of as members to make sure that, in his understanding, it would be people that he would work well with, too.” (ID234)

Advisors reinforced this idea that, while the student was in charge of the committee selection, they like to have input on the decision. One advisor remarked: “I know who I can work with and who I can’t, so I might lead the student” (ID160).

Once the committee was established, many respondents noted the continued importance of the chair. One advisor remarked: “the only hierarchy is that the advisor is the manager and the rest of us are the workers, but then the advisor has to do the most work and the rest of us just provide some oversight” (ID497). Some respondents remarked on the way in which an advisor can set the expectations for the dissertation, but the views on this differed. One respondent described a situation where she served on a dissertation committee where she was told by the advisor: ‘Hey, this student is not the strongest; this dissertation is not going to be the strongest,
but this guy already has a job lined up when he leaves; he’s not going to be in academia, so hey, let’s just get him through” (ID641). The respondent indicated that the advisor was one of her friends, so it was her “friendship with this person that leads me to change my expectations, or set my expectations, for what the dissertation should be” (ID641).

Another respondent noted trying to avoid letting the advisor guide the expectations for the dissertation, saying: “I try not to let rank get in the way…the student has made a case for why I should be on a committee and I feel like I need to, you know, be as forthright in terms of my responses to the dissertation or the proposal as if it was my own student” (ID49). The respondent noted that he had been removed from a dissertation committee before because he did not accept the quality of the student’s work. He recalled: “I was not going to kind of roll over for either the chair or the student and have my name on it…I bring the same standards that I would have with my students, my advisees, to any committee that I’m on as well and hopefully it serves to improve the quality of the end project and it’s not like I’m trying to, you know, say my way or no way, but I have the best interests of the student at heart, no matter what the other committee members may be thinking” (ID49).

The advisor role continued to be important in dealing with conflicting opinions on the committee. One advisee noted that the advisor “was very respected and I don’t think that people would want to go around him” (ID86). Another advisee had a committee composed almost entirely of current or previous Deans, all of whom were male. She described them as “all really high-powered” saying, “it’s like having a bunch of stallions in a pasture” (ID234). However, her chair still managed to lead the committee, in what she called a “quiet leadership style” (ID234). She recalled that all her committee members were allowed to give input on the products, but her chair retained the “final say” (ID234).
Another advisee described her situation in which she had co-chairs, one of whom was a full professor and one of whom was an assistant professor. She explained how she received different advice from these individuals “all the time” and said, “in the end it made it a more successful dissertation because it gave me different points of view…pleasing both of them was a challenge and it made me cry a lot, but I think in the end it made it much stronger and it made my view on my research now more holistic, more accepting of different ways of looking at it” (ID155). However, in the cases where she could not accommodate both views, she noted deferring to the full professor saying: “ultimately the full professor is the chair—he signs off as the chair, so I kind of deferred to that when I needed to” (ID155). She said this decision was supported by the other junior chair, who acknowledged that the full professor would vote on this individual’s tenure decision one day. The role of untenured faculty member was noted by another advisor who said: “untenured faculty may also be somewhat diffident in pointing out problems and, you know, asking that they be fixed, particularly in the first couple of times they’re on a dissertation committee” (ID342). An additional issue of potential levels of power inequality and intimidation came up in a questionnaire response by one of the respondents who said: “I’ve been the junior committee member for a couple of people, the one who’s closest to where they are. That means that sometimes they’d come to me with issues they weren’t comfortable asking their supervisors, who are approachable and supportive but are really eminent scholars so rather intimidating. Sometimes they tried things out on me before they ran it by supervisors, or sometimes they’d tell me and I’d pass the concern along” (ID634).

Outside members also appeared to be in a secondary role. One advisee remarked that she thought if the outside person felt more comfortable, she thinks they would have given her more “trouble”, but she sensed that the outside member felt “intimidated” by her chair, an eminent
researcher in the field (ID246). Another advisee recalled: “I thought she would be a good fit—
I’m not sure how well she agreed with me on that, actually…but you know, she was gracious
enough to do it, but I think she thought I was taking it in a direction that she didn’t 100% agree
with, but she was sort of gracious enough to adhere to, you know, the custom of well, if your
advisor and your local committee say it’s okay, then it’s okay” (ID153).

Advisees also noted that, at times, their advisor served the role of acting in their defense
before the rest of the committee. One student, when asked if there were differing opinions
between his committee members said, “That’s pretty natural—you cannot get five members to
work [in] the same way” (ID116). When asked how these opinions were resolved, he responded:
“First, I have to say what I want to do and why I do it this way. There are other ways, but I need
to finish, you know in two years. Then if there is really strong opinions that are different from
mine, then I walk out of the door and they will have a discussion; I think in that case my advisor
had to push forward” (ID116).

A few respondents noted that the committee was more a mutual situation. One advisor
described: “For example, we may serve on a committee, but not named as the adviser, but work
in tight collaboration with the chair” (ID584). Another advisor noted: “It’s a compromise I
think, I mean, it just has to be. Each person has to bend a little toward the other or else you
could stalemate” (ID497).

4.1.6.3. Outside member

One of the largest roles that outside members seems to play is to provide expertise in a
particular content area, many times one which was not within the scope of the school or
discipline. As described by one advisor: “I think it’s better for the students, so we try to find
people outside with an expertise that we don’t have” (ID478). This was reinforced by an advisee
who acknowledged that the faculty within her department didn’t really know the specialty area she was studying and said, “it was important for me to have that person fill a gap that my committee couldn’t fill in” (ID175). Another advisee noted this subject expertise, but also some accompanying disciplinary challenges:

“He understood what I was doing, [be]cause a lot of the stuff I was doing the rest of my committee didn’t really understand yet, so I chose him because he had the expert subject expertise. Now, I will tell ya, it was pretty interesting, because he had come from such a scientific background that whenever we would have committee meetings he would say, ‘Gosh, this is like, so, you guys do things so different over in the social sciences’ and he was always commenting on the disciplinary differences.” (ID234)

Some advisees noted that their selection was based in large part on the discipline in which they were reading (ID86; ID153). Other advisees mentioned that the choice was to provide expertise in a particular method (ID217; ID42). Another respondent who was studying a particular community recruited a person from within that community: “As my outside committee member I had one of the key players in the community that I was studying participating…that provided some reality checks on the methodology again, but then also connections into that community that allowed for this particular project to actually happen” (ID74).

In some cases, the institution mandated a specific person to serve on the defense in an administrative capacity. One respondent described how the “graduate school representative” was “someone from another department on campus” who came in “to be the procedural watchdog” during a defense (ID622). This institution did not require an additional outside member, but, as explained by the advisor: “it’s not required, but it is very often the case that students do that” (ID622). The practice at another institution was described in the following way by a respondent:
The chair of the committee who only really comes in to run the committee meeting has to be from the outside and that person is more or less assigned by the university, so that’s not that big a deal. It’s basically just someone to do, you know, Roberts Rules of Order on the meeting and then we have to have an external reader.” (ID153)

Another advisee described how she made the most out of her institutional policies:

“Where I went, my degree, the outside person, specifically, the purpose of them was to ensure that the inside people were all following the rules—as kind of a, you know, check and balance. But that wasn’t good enough for me. I wanted that person to also contribute something from an outside perspective, so I selected that person based on, they had similar things that went on in their profession probably about 20 years prior to what library and information science is going through, so I thought she had some perspective on what was going on with [topic] in the field, which is what I was studying.” (ID 2)

Some advisors noted that the roles played by external members differed not only by institution, but also by country. The advisor noted her experiences serving as an external committee member for dissertations outside the U.S. and commented that she felt she had more involvement when she served as an external member within the U.S. The advisor remarked: “In the U.S. I think the, most committee members are involved, so they have a chance already to shape your dissertation at the time of your proposal defense… and usually they read the manuscript, they are allowed to communicate with the students” (ID575). The advisor noted that on another dissertation she was sent the completed manuscript, made external reviews based on the criteria sent by the institution, and mailed the comments back and that was the extent of her involvement. She noted that in the U.S. she felt she had more direct input (ID575).
In some cases, the advisees reported not being able to fill their needs with only one external member, so they ended up with two external members. In one case, the advisee had as one member a person from the funding agency that was paying for the dissertation research and as the other member a faculty member within her interest area (ID246). In another case, the advisee chose one committee member from another department because the advisee had taken some seminars with the faculty member and they were interested in the same set of theorists. The advisor really wanted another person involved, so the advisee ended up with two external members (ID283).

4.1.6.4. Changes in committee composition

Most changes in committee composition appeared to have been driven by the student, except in those cases where a committee member left the program or the university (ID324, ID415). Expectations on maintaining a stable committee throughout the doctoral process seemed to vary by institution, particularly those where the student began the program with a “supervisory” or “program” committee and then was allowed to reconstitute the committee before exams or the proposal (ID622, ID42, ID74). Although many respondents noted that they were encouraged to remove individuals from their committee by advisors or other committee members, they indicated that the final choice was their own. As recalled by one respondent:

“I did at one point have a person on my committee, who was actually the dean of our school, suggest to me that I remove somebody off the committee. And what I said to her at one point, when I said, ‘No, I wasn’t going to do that’ and we got into a discussion about it and I turned to her and said, ‘I hire and fire my committee members. They were asked to be there for a reason. They are there for a reason and I make the decision to hire
and fire.’ She threw her hands up in the air and said, ‘Well, that’s your decision’ and I said, ‘That’s right, I paid for this education—I will make the decision.’” (ID2)

Other faculty members reinforced the idea that it was the student’s prerogative to make changes in the committee composition (ID160). In only one case did a respondent indicate that a committee member “quit” because she was busy and wasn’t particularly involved with the project (ID246). However, the advisee recalled: “I don’t remember it being dramatic at all” (ID246).

4.1.6.5. Continued relationships

A few respondents noted the continuing personal and professional relationships they maintain with people on their committee. Some noted being “friends and colleagues with every one of the people on my committee” (ID2), and others noted collaborations with committee members after receiving the Ph.D. (ID217). Some respondents noted having more collaborative relationships with committee members than advisors in the post-graduate phase of their careers (ID74).

4.1.6.6. Summary

Committee members are considered as a team of mentors that helps the student through the dissertation process. They are usually chosen to fulfill some role or contribute to the dissertation in a very specific way—the two main ways that were reported were contributing content expertise or knowledge of the research method. A small number of respondents also noted that the committee members served the role of an editor, critic, or supporter.

Many respondents noted a hierarchy exists in the committee, with the advisor playing the lead faculty role and the committee members serving a secondary role. The outside member was seen by some to play an even more distant role and at times merely a perfunctory administrative
role. However, in many cases the outside member was seen to fill a crucial gap in terms of either content or methods expertise. The advisor’s lead role was seen in the selection of the committee, but the de-selection of certain committee members during the process appeared to be left to the student. Positive post-graduation relationships with committee members were recalled by many respondents who noted they served as friends, colleagues and collaborators.

4.1.7. Peer mentoring

One student noted how she learned from formal collaborations not only with her main advisor, but also with other doctoral students: “Now, when I…was first learning to do qualitative research, I was working not only with a professor…but also with two other doctoral students who were also learning at the time and I think that was actually kind of key. So I think that it is important to work with teams; multiple perspectives are good” (ID69). Another respondent noted serving as an editor to her colleagues, helping to edit dissertations of her fellow students for whom English was not a first language (ID42). However, most respondents commented on more informal collaborations or relationships that served as forms of peer mentoring. One advisee recalled the informal collaboration that went on between herself and fellow doctoral students all hired on the same grant: “we worked together more like on ideas, you know; we didn’t really work together on projects so much, but we…constantly got to bounce around ideas about what we were going to do” (ID217). Another respondent also recalled setting up meetings for doctoral students to collaborate on “ideas” rather than projects (ID575).

Other respondents recalled how informal meetings led to peer mentoring: “We have a regular doctoral student’s meeting every month to exchange ideas—at least to be sympathetic to everybody’s case” (ID116). Another advisee recalled a specific example of peer mentoring, saying: “I think one of the things that helped me was there were a couple…of senior doctoral
students who made it clear to us that we were expected to take the initiative and also that any efforts we took independently, in other words, if we were doing work and just sort of ignoring our advisors and doing it on our own, they wouldn’t really be very interested in that, that we really needed to keep the relationship going. I think that actually helped more than the faculty members telling us to take the initiative” (ID283). An advisor reinforced this saying, “a student who is a couple years ahead can tell things that those of us who have been out of being a student for six or eight or ten years can’t do as well” (ID234). One advisee, who had a particularly good rapport with the faculty and who had started a doctoral student group, commented on how she served as a mentor to other students: “They probably saw me as an opinion leader, because they, you know, they were like, ‘Okay, she has been through this, she’s done this, she knows this’” (ID2). An advisor also spoke of community and competition among doctoral students:

“Our students, because they’re on site, a lot of them, there is a lot of healthy competition among them, so they are very productive. They go to conferences. Most all of them, when they graduate, they’ve got a really great looking resume…I’m very jealous of our students because they have such community here…they are very close knit as a group and I think that that’s probably an extremely important part of the success of our program…and that is really peer-mentoring; there is a lot of that here.” (ID622)

The idea of community was also present in other comments, such as one respondent who reported meeting together for social events with fellow students and faculty members in the department (ID221) and another respondent who commuted to the program with a group of students and described, “we were like a support group and we have stayed close since” (ID175). One respondent who completed her dissertation from a distance remarked that she used her colleagues to “bounce ideas off”, in a way supplementing the kind of doctoral student mentoring
that occurs when students are co-located on a campus (ID86). However, the remaining respondents seemed to find the peer mentoring that happens between doctoral students as a key factor in the success of the program.

4.1.8. Summary

Many people serve as mentors in the doctoral process, but advisors, committee members, and other ILS students and faculty rank among the most frequent mentors. In terms of the dissertation, the advisor appears to be the most dominant mentor, with committee members serving a secondary role. Doctoral students also engage in informal mentoring by creating community among themselves.

The relationship between these mentors seems largely up to student initiative and selection. Once the relationship has been established, frequent, in-person meetings (largely initiated by the student) are critical for a successful relationship. These meetings seem to focus predominately on research and career preparation. Most respondents see the degree as a research degree and see an academic career as the trajectory for most students.

Terminations of advisee and advisor relationships seem to be predominately at the decision of the student, unless the advisor leaves for an external reason (such as a new job). Many respondents think that more advisees should be counseled out of or terminated from programs, but they seem to be allowed to remain in programs until they decide to leave.

After graduation, advisees and advisors report maintaining relationships, predominately as friends and colleagues, although a few report collaborative or mentoring relationships. Very few report no relationship.
4.2. Collaboration

This section will evaluate the degree of collaboration in the doctoral process, looking primarily at collaborative relationships with the advisor, other faculty members, and doctoral student colleagues. The final section will evaluate the degree to which the dissertation itself could be considered a collaborative product.

4.2.1. Collaboration with advisors

In the questionnaire, advisors were asked with how many of their students they collaborate. As shown in Figure 1, more than 61% of the respondents reported collaborating with at least half of their advisees. This question did not offer a definition of collaboration, so the following question asked for the respondents to define it by providing examples of collaboration.

![Bar chart showing the distribution of advisor responses to the question about collaborating with advisees.]

**Figure 1. Distribution of advisor responses in response to question about collaborating with advisees**

The responses focused on publishing, researching, and presenting together (with 57, 34, and 17 respondents (respectively) providing these activities as examples of collaboration). In addition, teaching was mentioned by 16 respondents and 8 respondents mentioned grant work (both the design and writing of grant proposals and managing the grant research). One advisor described the way she collaborated by treating the student as a colleague, saying this was how her advisor had also treated her. Advisees reinforced this idea in the interviews (ID175), with
one respondent describing how the faculty members at her institution “let me feel like a colleague” stating that she had a “ton to learn, but they treated me on a very equal level” (ID234). Another student recalled her advisor telling her that “you always acted more like a colleague than you did a doctoral student” (ID2).

Open-ended responses on the questionnaire indicated that there were variations regarding the degree to which advisors collaborated with students while in the program. One advisor remarked, “We collaborate on everything, usually” (ID380). Another advisor stated she only collaborated with students “after they completed their dissertation” (ID635). In open-ended responses, advisors noted having “collaborated but not placed my name on the resulting publications, to give them refereed articles for their tenure files” (ID415). Along similar lines, another advisor noted: “I’ve helped my advisees get their articles published, though I have not co-authored any studies with my advisees” (ID495).

When asked if they collaborated with their advisor during their doctoral program, 58% of the advisees (n=42) answered affirmatively. When asked to describe the ways in which they collaborated with their advisor, the majority of the respondents focused on the research angle, stating that they collaborated on research projects (n=28), joint publications (n=21), and co-presentations (n=4). Five respondents indicated that they considered the help they received on their dissertation to be a form of collaboration. Other items noted by multiple respondents included teaching and course creation (n=4), grant writing (n=4), and advising students together (n=3).

Publication practices as a specific form of collaboration were investigated in an additional question, where advisors were specifically asked with how many of their advisees they publish, both during the student’s doctoral career and after.
Table 19. Frequency of advisor responses to question about publishing with advisees

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<th>Half</th>
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<td>During</td>
<td>14 (14%)</td>
<td>17 (17%)</td>
<td>14 (14%)</td>
<td>18 (18%)</td>
<td>12 (12%)</td>
<td>11 (11%)</td>
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<tr>
<td>After</td>
<td>28 (29%)</td>
<td>28 (29%)</td>
<td>11 (12%)</td>
<td>13 (14%)</td>
<td>8 (8%)</td>
<td>7 (7%)</td>
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Note: Denotes that the option was blank on the questionnaire; shading denotes plurality of responses for each question.

As shown in Table 19, more than 50% of the advisors indicated that they published with at least half of their advisees during the doctoral process. Less than 30% indicated that they published with at least half of their advisees after the student graduated. However, in both cases, the dispersion tended toward non-collaboration. Advisees were asked a similar question on whether or not they published with their advisor during their doctoral program or after graduation.

Figure 2. Distribution of advisee responses to question on publishing with advisors

As shown in Figure 2, the majority of doctoral students did not indicate publishing with their advisor during their doctoral program in either time period (56% during; 69% after), although more indicated publishing with their advisor during than after their program (consistent with advisor responses). In the interviews, some respondents indicated reasons for not collaborating: “I didn’t really have time for collaboration, because I was a full-time librarian, I was a full-time doctoral student, and I was teaching for part of the time” (ID155). However, this respondent noted collaborating after graduation with other students and faculty.

Interviews probed more deeply into the nature and purpose of advisor/advisee collaborations in the doctoral process. One advisee called collaboration “really important” for the learning process of students, saying that she is “a constructivist” and that it all “goes back to my
pedagogical grounding for all students…everything needs to be interactive and I’m all about scaffolding” (ID69). Some advisees described how they progressed through various stages of the research process as a collaborator; at the beginning, one recalled: “the only thing I really did was I handled the statistics…there were times I felt like I was a drone” (ID42). However, one respondent explained that, once she began writing articles out of the research, “I felt like I was a co-author” (ID42). Another advisor noted that he collaborates with students if their interest areas align and feels that part of the experience is getting them to feel more confident about doing research by allowing them to experience the research process (ID415). The advisor recalled: “There’s a part of it that doesn’t make sense until you get your hands in the data” (ID415). Another advisee reinforced this idea of an advisor helping the student learn how to do research through collaborations:

“The advisor, I think, should have a leading role at the beginning stage, because usually the students don’t know how to do research well. Students have a sporadic knowledge of how to do research at the beginning stage and then at the later stages they have been doing research…with the advisor, for three or four years. Then the student knows pretty well, you know, the research style, the research problem, the research domain. Then the role can be balanced.” (ID116)

One advisor explained how she designs studies with the students, in order to expose them to the process of doing research. She also brings the students with her to conferences to allow them a “safe environment” in which they can practice presenting their research. She noted that she “never asks them to do her topics” but guides them in the exploration of their own topics (ID575). Another advisor similarly noted publishing with a student and taking them to
conferences, calling collaboration a “kind of mentorship” (ID478). The advisor explained preparing the student to take his job, saying:

“I hope she will be able to take my job at [institution], so I try to let her know everything I know myself about the job and the requirements to be a professor…When the student starts to work with the advisor he has got a couple of research methods courses; he has been through a master’s degree, he has been doing the required research methods course, so doing the research itself, it’s not, I think it’s not what I am trying to do to show the student. I try to show the job, the job of a university professor and researcher more than technically how to do the research” (ID478).

Another advisee explained the role modeling provided by her advisors with one advisor providing examples of how not to do research: “that’s just as valuable as a positive example” (ID246), and another advisor providing positive examples: “he just sees research opportunities, he knows how to set up a research question that can be answered” (ID246). She recalled: “he would give me advice about how to make a research question and…what kinds of data answers that question and how to present it and how to figure out how to write a conference paper as opposed to a journal paper” (ID246).

Grant funding came up numerous times in the conversations about collaboration. One advisor noted:

“I think the best model is…to have research grants and funding that, you know, you bring people in and you work as a team on a project and that way you really can learn not only from your faculty mentor, but also from your fellow students if you’re working as a group and I think that’s a lovely model…I think I see [institution] moving away from the old model of the solitary research to one that is more communal…I think that as we all
become more dependent on grant funding that it probably will, I mean, we’ll be moving more towards that Big Science model or at least medium-sized science model” (ID488).

One student described their experience working on a grant with their advisor as a “win-win kind of situation” in which, he described:

“We were able to identify a particular project where we could both make some progress on the research ideas and things that we wanted to move forward on from our own perspective and be able to start to have that kind of mentor-mentee and research partner kind of relationship. Even though the different aspects of that project that we worked on were quite different there was some common ground on that one particular project that helped us start to build that relationship and start to move forward toward my dissertation trajectory.” (ID74)

Another advisee worked as a project manager on her advisor’s research and continues to work with her. When asked about the advisor’s responsibility to teach students how to do research and write grants, the advisee responded:

“I think it’s a great responsibility. I think you hurt the student if you don’t teach them that, if you don’t try to involve them in that. If you’re not doing research, then I don’t think you should be on anybody’s committee.” (ID160)

The advisee also commented on the mutual benefits of these collaborative relationships, saying: “as a researcher, as a faculty member, you need to work with those students, because it’s a give and take relationship—it keeps you going because they teach you things” (ID160). Another advisee noted how she was not afraid to give her opinion on the grant on which she was working, saying: “This isn’t about authority and power, this is about knowledge level and in some cases the student may see something the faculty member doesn’t” (ID2). Other benefits of interacting
with students were noted by advisors who made comments such as: “I manage to keep in touch with my scholarship through my students” (ID506) and “I like to do collaborative research—I just find it much more rewarding than trying to do something on my own, partly because of the discipline imposed on your team members in getting things done” (ID497). Another advisor reinforced this, saying collaboration with doctoral students was both “intellectually stimulating” and “it helps keep you on track, because if you are working with somebody else, you can’t get so far behind—you have to keep up with them…you’ll postpone things forever if you don’t” (ID488). One advisor noted the need to teach students how to collaborate saying, “I think once they get out they are going to be increasingly collaborative scholars; I think the idea of information silos is disappearing, particularly in our field where our strength really lies in working with other people” (ID495).

4.2.2. Disadvantages of collaboration

Although the majority of the respondents spoke positively about collaboration, a few respondents did note some of the disadvantages and dangers of collaboration. One respondent “very careful about taking students” (ID397), saying “I do not work, for the most part, with students” (ID397). Another advisor said that she sometimes collaborates and sometimes does not, depending on the content area, the quality of the student’s work, and their career trajectory (ID641). Additionally, a few respondents noted the extent to which junior faculty members in particular should be wary in engaging in collaborative relationships with doctoral students. One respondent commented on this issue, saying:

“Junior faculty aren’t really supposed to collaborate that much, so you’re supposed to be generating your own stuff, like almost entirely you. You can write some co-authored papers, but generally that’s with a senior person and a junior person, not two junior
people together for whatever reason. So, yeah, I don’t really collaborate with anybody.”

(ID246)

When asked whether she believed this was a good model, the respondent replied, “Yeah, I do, because you really do need to set up your own research agenda and you need to figure out how to do that by yourself” (ID246). In regards to doctoral students in particular, the respondent said: “I can’t really write papers with them; I really am not supposed to write papers with them” (ID246). Another respondent commented on the ramifications of collaboration, saying: “I think there are a whole bunch of ramifications of collaboration, particularly for pre-tenure folks and that is, ‘Are you actually doing your own ideas or someone else’s?’ ‘What role do you play in the publications that come out and where is your name on that list?’” (ID495). The advisor continued: “as we increase the collaborations, we’re [going to] have to increase the finesse of our evaluation tools for each other to really see, you know, ‘Is this person thinking and contributing and growing as a scholar, or is he or she just doing a little piece of someone else’s idea?’ And I would personally not want to reward the latter” (ID495). However, the advisor noted the responsibility of post-tenure faculty members to engage in collaborative research with students, saying:

“That’s something as an associate professor I have taken on as sort of my raison d’être. In the last two years, actually, I have had a number of student projects that were so well done I said, ‘This is publishable if we work together on it, you get first author, I’ll take second author’ and off we go…my role in that is to make their product acceptable to a journal and, if necessary, to sort of fine tune it and make it a little more rigorous, whereas the intellectual idea and conceptual framework is theirs.” (ID495)
The advisor did note a difference between working with master’s and doctoral students, however, saying: “I would never counsel an assistant professor to collaborate and, you know, help a student prepare a paper...I think they do it, but I think it’s not a great use of time in terms of them building their resume for tenure, so, you know, I think if it’s a doctoral student then I would say, maybe so, because, you know, collaborating with a doctoral student produces a different kind of paper, a different quality of paper usually, and so it would be more of a research study and, you know, tagging your name as second author onto that makes a little more sense” (ID495). The advisor ended by noting one danger in not collaborating, calling the pre-tenure stage “so self-focused” and noted: “At the associate professor level and the full professor level we should be gearing back towards students and I’m not sure that ever happens” (ID495). These issues may be the reason behind many programs not allowing junior faculty to serve as advisors on dissertations (ID234).

4.2.3. Collaboration with other individuals

In the interviews, some respondents indicated that they collaborated with other faculty members and students during and after their doctoral program. One respondent noted that her advisor was a great mentor, but that she collaborated (and continues to collaborate) on a longitudinal study with another committee member with whom her interest areas were more aligned (ID2). Other advisees recalled doing “grunt work...to see how research was done” (ID217) with some committee members and engaging in “cross-collaborations” with students and other faculty members that grew out of a grant project on which they were all working (ID74). Another respondent indicated that she did not collaborate during her program, but now collaborates with former doctoral student colleagues (ID175).
One respondent noted that, when he arrived as his current institution, he did not see enough collaborations happening with the doctoral students and faculty (ID74). He described the problem and his approach to it:

“I have noticed, in my particular case, a lack of engagement between the doctoral students as a whole and the faculty as a whole and certainly there are cases where there are more and less interactions between certain people, but just in general I had the sense that most of the faculty didn’t really know what most of the doctoral students were up to, what they were working on, what their interests were. So I have just recently been collaborating with some of the doctoral students and some of the other faculty members to set up a weekly faculty and Ph.D. student research discussion group that’s very general in terms of scope—it’s not tied to a particular project or a particular topic area—it’s wide open, covering all of LIS. And we did that as a way to really try to foster that engagement between the faculty and doctoral students and try to strengthen some of those ties going forward to build some more collaborations on specific projects, but also try to foster this idea that we’re a community of scholars and we need to engage pretty regularly around our broad topical areas of our field more than we have before.” (ID74)

The respondent noted that this program had been well-received by doctoral students and faculty alike.

4.2.4. Dissertation as collaboration

In order to further assess the degree of collaboration on the dissertation itself, advisors and advisees were asked in the questionnaire what the typical involvement was between the advisor and advisee on a series of tasks involved in writing the dissertation. Table 20 displays the median results where 1=entirely the student, 4=equal involvement and 7=entirely the advisor.
As is shown in Table 20, all tasks averaged on the “entirely the student” end of the scale in both sets of responses, except reviewing and approving the final draft. For all items, the advisor median was closer to “entirely the advisor” than the advisee median, perhaps indicating that both parties overestimate their own contributions to the dissertation. The ranking of the items, in terms of mode, was the same. However, the largest differences were in interpretation and approving the final draft.

Advisors and advisees were also asked how often they would consider significant work by a colleague in the same areas as grounds for authorship on a publication, where 1=never, 2=sometimes, 3=often.

The two items which were closest to “entirely the advisor” in Table 20 were the two that had the lowest modes in Table 21 in terms of inclusion for publication, perhaps indicating that the contributions made by the advisor on the dissertation itself would not be considered sufficient.
grounds for co-authorship in another communicative genre. As one advisor remarked in an open-ended question, “I usually do not collaborate with students on their dissertation research” (ID394).

Advisees were asked to indicate whether they have published or planned to publish the work from their dissertation. Ninety-six percent of respondents ($n=69$) indicated that they had published or planned to publish the work from their dissertation. Advisees were then asked whether or not they did (or would) list their advisor as a co-author on these publications. Seventy-eight percent ($n=54$) of respondents indicated that they did not intend or had not included their advisor as a co-author. When asked to state the reasons why they chose to include or not to include their advisor on the dissertation, the overwhelming majority of those choosing not to include the advisor stated simply that the dissertation was their work, not their advisors ($n=43$). Other reasons for not including their advisor included “advisor would not expect to be included” and “advisor said not to.” The majority of those who included their advisor felt that their advisor had made significant contributions ($n=7$). Other reasons for inclusion included “common practice in the field” and “as a courtesy.”

As a point of comparison, advisors were asked whether or not they were included as a co-author on publications that resulted from the student’s dissertation, with 42% of advisors indicating that they were never included (see Figure 3).
Interview respondents were also queried about the extent to which the dissertation itself could be considered a collaborative product. Similar to the questionnaire results, many respondents indicated that the dissertation was the advisee’s work (ID415), with a focus on the dissertation being a demonstration of an ability to conduct independent research (ID221). Many respondents simply explained that “my dissertation was mine” (ID234) or “I felt like [my dissertation] was pretty much all mine” (ID217). One advisee explained:

“As far as the dissertation itself, it was not collaborative…and my advisor made this very clear from…the beginning, she said, ‘This is your work, this is your thing.’ My committee members said, ‘By the end of this process you should know more about these particular items than any of us do’…Their role was very much guidance, advice, but when it came down to what I did and what I decided to do and what I wanted to do it was my work and my product.” (ID2)

One advisee described their experience in receiving guidance on the dissertation:

“I would characterize not only the dissertation as a narrative kind of output, but the process of crafting the research design and, you know, coming up with the initial topic and questions and then crafting the design and the actual proposal to do the work—this was an externally funded project where I was the PI. So writing that grant proposal for
that and initiating the contacts with the third parties that I was studying, that was all
driven by me. So it wasn’t really a traditional hard science model where the advisor is
the PI and delegates some portion of the project to the student. This was very much
initiated by me…it was very much driven by me with, I would actually say, minimal
input from my advisor and the rest of the committee.” (ID74)

One advisee noted the benefit of doing the dissertation independently, saying, “I really wanted to
have the experience of doing it myself, because that’s what I would be doing as a faculty
member” (ID234).

Some respondents indicated that there were various degrees of collaboration that
occurred during the dissertation process. One respondent indicated the amount of editing he
provides as a form of collaboration:

“In terms of the dissertation being collaboration, I think a lot depends on what you mean
by collaboration. So, I’m working with a student now very closely and I read and edit
and comment and mark-up and give back and that involves both, both dealing with what
is being written as well as the ideas: it’s grammar stuff and it’s also conceptual. So those
two parts would be elements of collaboration, I think, but it’s her dissertation and I
certainly won’t have my name on it and don’t want my name on it. It’s her work, it’s her
ideas, she came up with it and I helped her develop it, helped her shape it, but I think that
little collaboration goes on a lot.” (ID398)

An advisee also noted the contribution of editing, saying that her dissertation was “not
collaborative” (ID42), however, she noted that “probably the only way it was collaborative was
through the editing process” (ID42). One advisee noted that, while she “did not feel that the
outcome was collaborative” (ID234), she did feel there were some elements of collaboration:
“What I did feel [that] was kind [of] collaborative was that they were willing to help me, but it was …not like when I’ve done a paper with somebody where, you know, you really know that the intellectual input all the way through is very, very similar…no, this was very definitely, this was my project with just really good guidance.” (ID234)

Guidance as collaboration was noted by another respondent who explained:

“I wouldn’t say it was collaborative, not in the way that we usually mean that word, right. It’s not like it was co-authored or something, but the faculty had a very heavy hand in, in guiding the direction of the research and the questions that were being asked and the methodology and, you know, basically the shaping of the final product that was the written work of the dissertation. The faculty had a much heavier presence in that…so I don’t mean collaborative in the sense of we all worked on writing it together, but a more firm sort of guidance.” (ID153)

Another advisee noted the heavy presence of her advisors in her dissertation saying: “I think that in a way your dissertation is really not your own work, because it is so heavily directed by your committee and the purpose of doing your dissertation in a lot of ways is to graduate…if you’re smart and you want to get through the program in a reasonable amount of time, you will do whatever your committee tells you” (ID155). However, she went on to note: “Both my chairs told me that when I published anything out of the dissertation, they said, ‘we want you to be the only author because this is really your work and you own it and don’t bother listing us as co-authors” (ID155).

As with other conversations about collaboration, grant funding came up again as a situation in which a student may have collaborative opportunities that may lead to dissertation work. However, many respondents noted that while collaborative products (grant funded and
otherwise) may create a collaborative “problem space” (ID153) in which the advisors and advisees work, the dissertation itself should not be collaborative. One advisor described his experience working with students on a grant project, explaining that “for the most part, because they have often worked on projects on my research agenda that they end up doing research not specifically in my area, but at least related enough that there’s an overlapping of interests on my part with what they want to do” (ID499). The advisor explained how he “guided them to think about the research problem area” but that “it’s still not the same as the natural science model, because they’re not actually taking a piece of my work, of our project work, to do their dissertation on, but rather it’s sort of like a jumping off point of an interesting and probably vital area to do research in and kind of, based on their experience in the project, being able to pursue research in one of these areas” (ID499). The advisor talked about how he has many people working on his grant and encourages the team approach to that problem space:

“I expect them to collaborate and be able to learn those sorts of working relationships…I don’t think that it necessarily affects how they are going to separate themselves and then move forward independently. I think it has to do a lot with how the advisor, namely me, says, ‘Okay, this is your work, you know, not the project work. You’re not getting paid to do your dissertation here, you’re paid to put in 20 hours a week on my project and help us get to the deadline of August 31 and so I have to be hard-nosed about it. I don’t have enough funding to both get to my project goals and objectives and have them also doing their dissertation work on my dime, so I, by necessity say, ‘This is separate from, in terms of your time and your effort’ and they need to kind of separate out that piece of their intellectual work from my project work.” (ID499)
This advisor recalled his own experience working in the “humanities model” noting: “It…really pushed into us that this is independent research, you know, that your chair or advisor is there to help, but not necessarily be on top of you. And your committee is there to provide whatever expertise they have to help you move forward and because their names are on it, they want to see good quality work and don’t want to have something go out with their names on it, that is embarrassing, but it was really the student’s work” (ID499). In closing, the advisor defended the model of creating a team-based approach in which many students approach the same problem space, but are doing independent dissertations:

“I think our model is more robust in terms of that, of, you know, really having to grapple with, ‘What’s the research problem here? What’s the research questions?’ I don’t want to assume that the natural science model gives those things to the students, but I think that that’s a really important piece of the… doctoral research apprenticeship, is being able to identify interesting problems that are researchable and then being able to develop methodologies and address those research problems and the research questions and so in some ways, you know, my kind of intuition tells me that that can serve as a better approach for developing really good independent researchers.” (ID499)

Another advisee reinforced this idea of the problem space arising out of collaboration, but the final product being her own:

“I got the germ of the idea for my dissertation out of that study…but I didn’t use any of those data…didn’t work with any of those participants for my dissertation. My dissertation was a fresh instrument, a fresh set of questions, fresh data collection, with a completely different set of people that I did all on my own.” (ID69)
In only one case did a respondent describe a truly collaborative dissertation model, “where students work together on a dissertation—each one doing their own dissertation, but they are working together” (ID622). This respondent noted that they have not implemented this yet, but “are taking a look at it” (ID622).

4.2.5. Summary

Although most definitions of advisee-advisor collaboration were in regards to research, there were many other interpretations of collaborations, including teaching and role modeling. Advisors and advisees reported some collaboration between them, although it did not appear that the majority of the advisor-advisee relationships included collaboration. Many commented on the way in which grant funding facilitates collaborative relationships in the doctoral process, between the students and their advisors, other faculty members, and other doctoral students. For the most part, the respondents indicated that collaboration was beneficial for both parties. Only a few respondents commented on the negative aspects of collaboration, particularly in regards to pre-tenured faculty members.

Advisors and advisees were in strong agreement that the advisees are the main contributor in the process of writing a doctoral dissertation and although the advisor provides support and guidance, the dissertation could not (and should not) be seen as a collaborative product.

4.3. Interdisciplinarity

This section will look at interdisciplinarity from three perspectives—those of the advisor, advisee, and program. Specifically, the questionnaires and interviews gathered data on 1) the disciplines in which advisors received their degrees and the external dissertations on which they
served as committee members; 2) the disciplinary classification and types of methods used in the advisee’s dissertations; and 3) interdisciplinary doctoral programs and minors.

4.3.1. Degrees and dissertations

The questionnaire investigated the disciplines from which advisors received degrees and the disciplines in which they had served on doctoral dissertations. The majority of the advisors (66%, n=70) indicated that they received their doctoral degrees in the field of information and library science (ILS). The remaining 36 respondents were spread across 17 different disciplines with education, computer science, and history ranking among the most frequently mentioned disciplines (6, 5, and 5 respondents, respectively). Ninety percent (n=94) of the advisors indicated that they had served on a doctoral dissertation in the field of information and library science. The majority of the advisors (73%, n=77) indicated that they had served on dissertation committees in disciplines outside of ILS. Sixty-one different disciplines were indicated among 72 respondents. Some advisors reported serving as many as 75 different times on outside dissertation committees. The disciplines most highly represented appear in Table 22.

Table 22. Frequency of advisor respondents serving on dissertation committees outside of ILS

<table>
<thead>
<tr>
<th>Disciplines</th>
<th>Number of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>27</td>
</tr>
<tr>
<td>Computer science</td>
<td>19</td>
</tr>
<tr>
<td>Journalism and Mass Communication</td>
<td>7</td>
</tr>
<tr>
<td>History</td>
<td>5</td>
</tr>
<tr>
<td>English</td>
<td>5</td>
</tr>
</tbody>
</table>

As corroborative data, advisees were also asked from what field their advisor received their doctoral degree. Seventy-four percent (n=55) indicated that their advisor received their degree in ILS. Eleven other disciplines were represented, with one respondent indicating not knowing the field from which their advisor received their degree. The most highly represented on the list of other fields was communication (n=3), education (n=3), computer science (n=2), psychology (n=2), and history (n=2).
As stated above, only those respondents who indicated that they received their degree in ILS were included in this analysis. However, one question on the questionnaire asked them to classify their discipline as humanities, social science, natural science or other. As shown in Figure 3, 68% of respondents classified their dissertation as social science and 16% classified their dissertation as humanities. An additional 15% did not find any of these labels accurate.

![Disciplinary classifications of dissertations by advisees](image)

Figure 4. Disciplinary classifications of dissertations by advisees

Among those that indicated “other” (n=14), computer science (n=3), information science (n=2), informatics, systems analysis, IR, information systems, LIS education, and education were among those items listed by respondents.

Respondents were allowed to select more than one option. Twenty percent (n=15) chose to select more than one option. Nine respondents chose to select Humanities/Social Science, 2 respondents selected Humanities/Other, 2 respondents selected Social Science/Other, one respondent chose Natural Science/Other, and one individual chose Humanities/Social Science/Other.

To evaluate another element of interdisciplinarity, advisees were asked to select categories that described the types of methods used in their dissertation (they were allowed to select more than one response). Table 23 describes their responses.
Table 23. Frequency of advisee responses to type of method used in dissertation

<table>
<thead>
<tr>
<th>Type of method</th>
<th>Number of Responses</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview</td>
<td>46</td>
<td>61%</td>
</tr>
<tr>
<td>Content analysis</td>
<td>29</td>
<td>39%</td>
</tr>
<tr>
<td>Ethnography/participant observation</td>
<td>18</td>
<td>24%</td>
</tr>
<tr>
<td>Survey</td>
<td>17</td>
<td>23%</td>
</tr>
<tr>
<td>Experiment/Quasi-experiment (with humans)</td>
<td>12</td>
<td>16%</td>
</tr>
<tr>
<td>Field studies/naturalistic research</td>
<td>12</td>
<td>16%</td>
</tr>
<tr>
<td>Historical research</td>
<td>9</td>
<td>12%</td>
</tr>
<tr>
<td>Critical analysis</td>
<td>8</td>
<td>11%</td>
</tr>
<tr>
<td>Experiment/Quasi-experiment (without humans)</td>
<td>4</td>
<td>5%</td>
</tr>
<tr>
<td>Bibliometric</td>
<td>3</td>
<td>4%</td>
</tr>
<tr>
<td>Bibliographical</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Other</td>
<td>10</td>
<td>13%</td>
</tr>
</tbody>
</table>

Additional items mentioned by respondents in the “other” category included: author co-citation analysis, case study analysis, case study design, concept analysis, grounded theory, hypothesis testing with chi square and regression analysis, legal research, phenomenological study, software design, and system design. (It should be noted that some of these could be classified in the broad headings provided.) Advisees were allowed to select as many options as they liked and 64% chose to select more than one option, with one respondent choosing eight different options (33% selected two options, 13% chose three, 8% chose four options and 8% chose five options).

4.3.2. Programs

In the interviews, many respondents noted being situated within a larger college (ID2; ID234; ID575) or having an “interdisciplinary program” (ID175; ID506; ID160; ID488). Many respondents indicated positive experiences with these programs. One respondent explained:

“Information touches on every aspect of human knowledge and every way that we study and every perspective that we have of the world and every domain. I think that we are just by nature something that crosses all these domains…I think we are one of the few disciplines that really has … an opportunity to have an impact and to participate in a range of domains and so I think that having an interdisciplinary course of study is helpful for that, because … to grow as a scholar in an environment where you are around all
these different perspectives and understanding that people are coming from all these different angles, I think for an information scholar in particular, is really useful…Growing as a scholar in an interdisciplinary environment really is a strength for us.” (ID234)

Other respondents noted the requirement of interdisciplinary minors (ID495; ID86; ID641) or the requirement to take courses outside of the department (ID69; ID116). In some cases, it was not required, but highly encouraged. As one respondent noted: “It was thought that this would add dimension to the dissertation” (ID221). One advisee recalled that this was a positive experience for him, especially in terms of research methods classes (ID116). Another advisee recalled: “It gave me a breadth of knowledge for methods as well as a breadth of content knowledge that was invaluable for me…It sort of forces people to think beyond their little world and begin to draw in other things” (ID495).

Despite the positive aspects of the programs, some challenges and pitfalls were mentioned. One respondent recalled: “It works and it doesn’t work at [institution]. And when it goes well, it works really well and when it doesn’t, there are a lot of culture wars, as you can probably imagine, because some people get very territorial” (ID175). Other respondents noted that while it was an interdisciplinary program, there were definitely divides between the faculty members (ID42). Another respondent noted that, while everyone was very supportive, it was up to the student to make connections with faculty in the other departments within the college (ID234). She also noted that, in the case of a college-wide doctoral program in which all students took the same requirements, it could be very “jarring” for the students from an LIS background to suddenly be required to learn the theory of the college level discipline (ID234).
One issue that came up in regards to interdisciplinarity was the situation in which programs were so “fragmented, where people don’t know the basic people in the field” (ID69). Proponents of interdisciplinary programs noted that, while the interdisciplinarity was a strength, “it is very important that you have to be really well-grounded in IS” (ID234). Another respondent noted that students who are too narrowly focused will not be able to work well on a faculty and that this is a “core problem” at her institution, saying that it is hard to find applicants who are able to understand all the other areas of research on the faculty (ID397). One respondent also noted the problem that, although some programs claim to be interdisciplinary, they are still unwilling to “deconstruct” (ID500). The respondent explained: “When we say interdisciplinary, we already privilege the fact of disciplines. If we have to talk about crossing boundaries, then the boundaries exist” (ID500).

4.3.3. Summary

The questionnaire respondents indicated that the majority of advisors in ILS received their degree in the field, although this number was less than 75% from both the advisor and advisee perspectives. Education, computer science and history were listed by both advisees and advisors as other disciplines in which the advisor received their degree. These disciplines also appeared as disciplines in which advisors served as external committee members. The majority of the advisees (83%) classified their ILS dissertation as a social science discipline; however, 19% classified their dissertation as a humanities discipline and 19% did not feel that it fit into social science, humanities, or natural science.

Interview respondents noted the strengths and weaknesses of interdisciplinary doctoral programs or minors within a program. Many proponents of these programs discussed that our field is “by nature” interdisciplinary and that scholars within the field need to understand the
broader context in which they work. Weaknesses noted were that some students graduate with a
degree in the field without ever knowing the key people within the field.

4.4. Program differences

One theme which arose out of the interview data was the extent to which the institutional
requirements changed the nature of the advising relationship and the doctoral experience. Five
main “milestones” will be considered here (coursework, annual reviews, comprehensive exams,
dissertation proposal, and dissertation) along with issues of funding and academic models.

4.4.1. Coursework

Prescribed seminars were noted as required elements of the doctoral process for many
programs (ID575; ID86), with most programs noting very few required classes beyond the
seminars (ID415). One respondent explained the flexibility in the program and the discontent
among the students when they tried to make it more structured:

“It was…deliberately a somewhat ill-defined process to allow for a lot of flexibility in
terms of coursework. It was somewhat controversial while I was there, because
originally the only requirement was a two-semester sequence of statistics and some
teaching and research practica…And then, while I was there, they imposed a seminar
requirement, which did not really go over very well with a lot of people…I think a
number of us felt that we had been promised a less structured program, more freedom,
and it was felt that the seminars were not really of much interest to us in some cases and
we also did not feel that the quality of the seminars was very high” (ID283).

Some respondents noted that there were not enough required courses for doctoral students
and that it affected the community building in the school: “I think we need to look at our
curriculum again and probably put in two more classes at least—that would not only…connect
the students to one another, because they would be in those classes, but it would also connect
students to faculty they’re not working with” (ID488). This idea of seminars functioning as
ways to connect people was reinforced by another respondent who recalled “a required faculty
seminar which is basically just to introduce the students to the tenure track faculty, give the
faculty more access to students, too” (ID622).

In addition to traditional seminars, respondents also mentioned pro-seminars and
colloquia as elements of their doctoral education. One respondent recalled a required two year
pro-seminar research colloquium in which students discussed readings and presented research
(ID69). Other respondents noted similar colloquia in which the faculty and doctoral students
present their research (ID507). Other required courses included statistics courses (ID575;
ID415) and research methods courses (ID86; ID69; ID641).

An additional component of doctoral education was the prominence of independent
studies (ID415). In some cases, the independent studies were intended to prepare the student for
comprehensive exams, but were very flexible in terms of what the student wanted to do (ID86).
In many cases, the independent studies were part of required teaching or research practicum.
However, although these were required, respondents noted a large degree of flexibility in them:
“the practica are intended to be one-on-one…working with a faculty member who is doing
teaching or working with a faculty member or research team doing research…they are pretty
much totally arranged with individuals and according to where they are—so, you know, some
people come with lots of teaching experience, so they’re going to do a lot more, other people
have nothing, so they are going to do a lot less” (ID622). Another respondent described these
practica as a space in which “students learn how to do research” (ID641).
In the case of the research practicum, many of these required that the student produce a project or paper (ID342). However, one respondent noted that “one of the faults of the research practica, of course, is that research projects never fit cleanly into a semester. So of course, research practica are always kind of bleeding over into the next semester and they just go on and on and there isn’t a good mechanism for saying, ‘Alright, we’re done, this practicum is over’” (ID153). Although the respondent noted the faults of the process, he also remarked on how it prepared students for faculty positions: “Fundamentally the idea is that junior faculty are going to be doing research and teaching, so doctoral students need to also be doing research and teaching” (ID153).

One advisor spoke about his own experience with doctoral education and how he believed that there were many alternative approaches other than coursework, to help develop doctoral students. He recalled one of his doctoral student colleagues going to their advisor in the first semester and asking what he should do. The advisor told him to go away for two years and then come back and convince the faculty member that the student could write a dissertation. The respondent noted that most students in his program did not take more than four courses, although they sat in on many lectures. In large part, the education took place in informal meetings. As the respondent described: “In the going out for beer, going out for coffee with other faculty members, we were exposed to the way they did things, the way they thought, the way they seemed to interact with each other, the way they seemed to interact with other students. And so, without a formal instruction in ‘here’s how to do it’ we did have informal mechanism…By being accepted into the doctoral program we had been accepted into the sandbox, the toy area, the playground and allowed not just to hang around, but to hang around and interact with faculty” (ID500). The respondent was concerned that the current model of required coursework just
propagates the “shut up, listen, regurgitate mindset” that the student has been exposed to in K-12 educational models (ID500). However, the respondent noted that “enabling that kind of engagement” that he experienced as a doctoral student requires more comprehensive funding models than are currently possible at many institutions (ID500).

Overall, the respondents’ descriptions of the coursework at their institutions seemed fairly standard across all the schools—most schools expected the students to engage in about two years of coursework and that coursework was to be made up of a few required seminars, some independent studies or practica, and the remaining classes in the student’s particular interest area (many of which may be taught outside of the department).

4.4.2. Annual reviews

Many respondents noted the practice of doing annual reviews in the doctoral process (ID153; ID495; ID342; ID398; ID246). One respondent described this as a way to prepare students for their dissertation and life as future faculty, saying: “There is a mechanism for annual evaluations…where doctoral students work with whoever they work with over the course of the year, whether it’s professors in courses or on projects or whatnot, everybody gets together the way a kind of proto-doctoral committee, a dissertation committee, would get together and give you feedback and you run early ideas for dissertations past them and they give you feedback in the way we are supposed to do for junior faculty as well” (ID153). Another advisor reinforced this idea of it being preparation for a future academic career, describing the process in the following way:

“We examine also their contributions in terms of publications and conferences and also in terms of contributions in courses, be it formal teaching or not and everything is written in the portfolio…just like a professor already …If they don’t meet the expectations or if we
feel they are not…at the same level as the others, we, the PhD. Chairwoman is writing a letter to that person, to the student and specifying in the letter that next year we would like her or him to do that or that…It’s the way we work in universities. We need to be self-disciplined and we are our own boss, so we need to be active and to produce to maintain our job.” (ID478)

Therefore, the annual review often serves both an evaluative function—letting the student know how they are progressing in the program—and as a preparatory function—preparing the student for similar evaluations as a faculty member.

4.4.3. Comprehensive exams

Most respondents spoke of some sort of comprehensive/qualifying/preliminary/gate/core exams, portfolio/end-of-coursework, or mastery paper that came between the end of coursework and the dissertation proposal. However, the form and function of these seemed to vary considerably between and within institutions. The first variation was when the exam was taken. In some cases, respondents indicated that comprehensive exams followed directly after coursework (ID478; ID42; ID221); in other programs the exams were taken at a time set by the student and doctoral committee (ID622). Some programs presented parts of the exam at different times, with one exam following directly after coursework and another being set whenever the student and doctoral committee decided (ID175).

Much of the timing was dependent upon whether or not the exams were tailored to each student. In the cases where at least one of the exams was standardized (ID175; ID415; ID69), they fell at particular times in the year. The tailored exams (ID478; ID221; ID116), however, were set at the discretion of each student and their committee. Another factor was the connection between a student’s coursework and their comprehensive exam: a few respondents
noted that the exams were either directly based on the seminars or that the seminars were intended to prepare one for the exam (ID478; ID86; ID69).

The composition of the comprehensive exams varied widely. One respondent noted an exam in which you chose four of five areas in which to take the test (ID86); another recalled a three day exam in which the students were “put in a little room”, allowed one phone call, told to “write our hearts out” for three hours for each day, and on the third day they were to write the proposal that would serve as their dissertation proposal (ID221); another institution had two questions, one research and one systems question and a week to write each exam (ID42); another institution had two exams, one of which was qualitative and one of which was quantitative (ID175); another respondent noted one exam with two questions, one on methodology and one on content (ID415); one student reported a five day exam, with questions from two major areas and three minor areas (ID116). In some cases, the exam was accompanied by an oral component (ID622).

A few institutions did not have an exam, but had other evaluative mechanisms in place. At one institution, students could choose between a presentation and a paper in the place of the comprehensive exam (ID160) and in another the student chose between a portfolio and the exam (ID69). In one institution, a portfolio was put together and presented to the faculty “essentially justifying the idea that we were done with our coursework, that we had enough background to then proceed with the dissertation” (ID283). This portfolio was comprised of “a basic list of what courses we had had, what grades we had received, why we had taken what we took…a writing sample…some preliminary indication of what our dissertation might be and the heart of it was a statement explaining why we felt we were ready to move forward, given the kind of research we were planning for our dissertation” (ID283). A similar portfolio was mentioned at
another institution which was comprised of “a collection of papers you had written for your courses, pulled together with any other materials you wanted to provide, such as papers you had written for journals or presentation…accompanied by a significant…ten pages…personal statement of progress…explain why you were ready to move on and that was followed by a sort of defense” (ID69).

One institution reported a series of three mastery demonstration papers, in addition to a portfolio (ID641). The expectations for these papers increased with each paper, as the respondent described, the “minimal quality required for each paper goes up as time goes on…The first paper is supposed to be something that if you saw it you would accept it as a poster and then the second one…I would accept this as an article in a b or c journal…But the third one pre-dissertation is supposed to be actually something that could be published in a very good journal” (ID641). Another respondent noted a publicly defended paper (also called a “critical literature review”) serving as the “qualifying experience” (ID398).

A final variation was the degree to which this qualifying experience was related to the dissertation proposal. Some respondents noted that the exams were meant to “set you up for your proposal” (ID42), identify “general goals” for the dissertation (ID283), serve as “a springboard” to the proposal (ID622), or as a “pre-proposal proposal” (ID153). In one case the proposal was actually written during the comprehensive exam (ID221). However, some respondents noted the ambiguity that fell between coursework and the dissertation proposal. One respondent noted: “There is this weirdness about how to move from when a student is done with their coursework and moving into dissertation mode and the proposal defense, right, that is a black hole in, it seems like every program” (ID153). Another respondent explained how their institution “substituted this critical literature review for our qualifying experience because we
were noticing that students would do their, in-class-door-shut-computer-no-network-no-notes-
16-hours-of-qualfying-exam and then they would just stop working for six months, sometimes a
year, just trying to recover from that experience. And we saw that happening and there was a
pattern. And what we have replaced it with is this paper where students are kind of marking out
the domain that hopefully they’ll work on their dissertation and this critical literature review. If
it’s done correctly and if the student is trying to move quickly, it becomes…the lit review
chapter of the proposal and eventually chapter two of the dissertation” (ID398). The
conversations with respondents identified a large range of expectations and products for the
evaluative item that falls between coursework and the dissertation proposal, both within and
among doctoral programs.

4.4.4. Proposal

The dissertation proposal appeared to be something uniformly required across all
programs. However, like the comprehensive exams, the expectations for that proposal seemed to
vary dramatically. In one case, the proposal came directly out of the comprehe nsive exams
(ID221). For the first two days of the exams, the students wrote in specific subject areas. On the
third day, the doctoral student was expected to write a proposal that could serve as the
dissertation proposal. Therefore, passing the comprehensive exams would also qualify the
student to begin working on their dissertation (ID221). Some respondents lamented the close
relationship between the general exams and the dissertation proposal. One respondent noted that
the general exam “is used as kind of a springboard to dissertation proposal, so that’s one reason I
think that it takes a little bit longer for some people [to take the exams] because they really are
planning their dissertation as a part of the exam” (ID622).
In many cases, the dissertation proposal was seen as the first part of the dissertation itself. Many respondents noted that the proposal served as the first three or four chapters of the dissertation (ID234; ID283; ID246; ID415), with some respondents noting that “the proposal defense in some ways was actually more difficult then the final defense” (ID283). One respondent recalled: “My proposal was the first four chapters, so…I essentially just changed the ‘wills’ to ‘dids’—I changed the tense of the proposal…and then added my findings and conclusion and stuff…After I passed the proposal, I only had to write another…75 pages or something [in order to finish the dissertation]” (ID246). One advisor expressed dissatisfaction with this model, noting that this model asks students to write introductions which should “get rewritten as you move through your writing and research” and a literature review that is written “when most of the time people haven’t defined a problem” (ID397). In the words of the respondent: “The bottom line is that a thesis dissertation proposal should be looked upon as a provisional document—it is an aspiration, but along the route of doing the research, new questions will arise or there will be a whole different discovery that changes the question…The LIS conception of what a dissertation is, is so outmoded it isn’t funny, it’s 50 years old” (ID397).

One theme was the extent to which the proposal served as a contract between the student and the dissertation committee. One respondent recalled their own experience where the dissertation proposal “served as the contract—basically, if you carried out what you said you were going to carry out and did it in good faith, whether the end result was a success or not, the experiment failed or whatever, but we still learned from it—and that’s kind of how I approach it too; I want a really tightly nailed down proposal. In part, not to let the scope creep happen and for the committee to say, ‘Well, you know, you probably should have done this,’ you know, and it’s like, ‘Wait a second, the proposal didn’t say he had to do that’” (ID499). An advisee
similarly noted: “I tried to make it like a contract, because I needed to find a scope of my work…once [the committee] approved it, then it was a contract” (ID116). Another advisee found security in thinking of the proposal as a contract: “I think I considered it in a beneficial way a contract, to my benefit, as in, ‘You signed off on this, you know, don’t come back to me and mess with it’” (ID86). Another advisee recalled more flexibility in the proposal: “I always felt that I could change it if I wanted to” (ID221). Some advisors also noted a degree of flexibility, saying: “I would say that it’s a contract to the extent that…the committee has agreed to a particular methodology and the student is welcome to make changes as they become necessary, but the faculty at any rate have agreed that, ‘If you do this we won’t object’” (ID415).

Another interesting comment that emerged was the degree to which the entire faculty should be involved at the dissertation proposal phase. One respondent noted that, “after a proposal has been successfully defended, the student is expected to give a public presentation on the proposal, proposed research, as kind of an early warning, you know, let everybody know what’s happening. You know, other people might come up with interesting articles, kind of stuff, but it’s also a way to keep stealth dissertations from happening” (ID342).

The majority of the respondents presented the dissertation proposal as a rigorous product and process, in which the student defines their plan for their dissertation research and presents a literature review that lays the foundation for the work. Most respondents indicated that this document formed the basis of the dissertation product and that it served as a contract between the doctoral student and their committee.

4.4.5. Dissertation

Despite the fact that the dissertation is seen as the culminating product of the doctoral process, very few respondents commented on the actual process of writing the dissertation.
However, most of those who did comment on it, described the difficulty of this process. One respondent noted how hard it was for some students to make the transition into the dissertation writing phase of their program:

“Doctoral students seem surprised when, after exams or proposal defense or whatever the particular procedure is, all of sudden they’re pretty lonely and they wonder, ‘Well, where’s the cohort, where’s the doc student club. Oh, it’s just me.’” (ID500)

The respondent noted that many of the students “who drop out of Ph.D. programs drop out after the defense of the proposal, largely because writing is such a lonely and difficult process” (ID500). The emotional aspects were further discussed by the respondent who talked about how different doctoral programs are from other education students received (such as K-12):

“Then you get into a doc program and find out, ‘Oh, I’ve got to do everything myself.’ I have to do the thinking, I have to come up with the original idea and I have to convince somebody else that it’s a good idea.’ And that’s hard work—not just physically and intellectually, but it’s also emotionally difficult. You’re going through the same process that any artist does creating something…throwing yourself into the abyss, hoping that somebody thought about starting a safety net somewhere down there and but having no idea whether or not they have. And so I think that maybe one of the things we would [be] best off doing is explaining right away to students that the process is hard, it’s emotionally hard.” (ID500)

The advisor noted that some institutions employ a “sink or swim” mindset, in which they use the dissertation time to see if a student is able to proceed independently. To this, the respondent said:
“Some people say the sink or swim might be good for some students, but students, like real people, have very different personalities and for the most part writing a dissertation is something none of them have ever done and it’s, for many people, a terrifying experience, because you’re expected to do new knowledge and present it in a cogent, coherent way that will stand up to the rigorous examination of worlds experts in the field. And I can remember that, even though I liked my chair and after the dissertation process he and I became very close friends, I would almost puke every time I went to see him…It just was horrifying offering up one’s child and asking to have it sliced and diced and maybe patched together and maybe not…We throw you out naked on the tundra with no compass, no food, and we say, you know, ‘Come back in six or eight months with something glorious. Oh, you’ve never done this before? Tough shit.’” (ID500)

Another advisor noted the “qualitative shift” that needs to take place as a student progresses through doctoral education. The advisor describes what he expects from students as they move through their doctoral work and prepare their dissertation:

“It’s a qualitative shift in thinking about yourself as a student and yourself as a colleague and as a professional. And I think as a master’s student there is that sense of, you know, the teachers are up here and I’m down here and ‘learn from the gods’ kind of thing. As a doctoral student that shift has to happen whereby you’re equal, you’re dealing with faculty in a relationship that is not hierarchical, alright, it’s flat. And so looking for that kind of experience, how do students interact with you, are they willing to argue for their points, are they just capitulated at a moment’s notice, you know. I don’t want to espouse, you know, argumentative doctoral students necessarily, but, you know, willing to stand up for their beliefs and support them. So, I think seeing that the students know how to
create an argument, put an argument together, support it with evidence, etc., that is very important…What I look for in the products is a sense of, is really the sense of synthesis. I think that’s one of the most important developments from a master’s to a doctoral student. That they can take really disparate information from very different fields even and combine it into a logical sequence that actually holds together and makes sense, because that to me is the ability to build theory, it is the ability to build a conceptual framework, it’s the ability to see holistically a problem as opposed to very specifically a problem. And without that ability, I don’t think you can do good research, because you can collect your data and you can analyze your data, but you can never make sense of it…Unless a student has the ability to do that and think that way, writing a dissertation is a nightmare.” (ID495)

The difficulties presented by these respondents and the scarcity of comments on the writing process may indicate that the writing process may be a highly individual and challenging process and perhaps one difficult to articulate even by those who have completed the process.

4.4.6. Funding

When asked about major issues in ILS doctoral education right now, many respondents indicated that money or funding was the most critical issue. Many respondents noted that ILS programs do not have a good funding model for students, some noting that programs are “patching together funding” for students and wishing that ILS doctoral programs could offer more guaranteed funding over multiple years (ID488). Both advisors and advisees seemed to agree that doctoral students should be funded—respondents noting that they were “loathe to admit people we can’t fund” (ID641) and advisees remarking that “you should not do doctoral education for free” (ID246).
One advisor talked about needing to educate “a new generation of faculty for this field” and not being able to do that unless we can attract full-time students who are fully supported (ID415). Another respondent talked about his own experience as a fully-supported residential doctoral student and noted that it’s not the residential part that is most important: “it’s not having to work, so that you can become a part of the life of the program of which you are a part, because I think there is as much to learn outside of the classroom as there is in—if you are in the environment, the informal session that faculty and students engage in, even the study sessions, the colloquia, all of the things that you can participate in if you are there, that you can’t if you come in and take classes and go back to your job” (ID506).

One advisor noted that grant funding was the best model “so the students can also be engaged in research” (ID415). A few advisees spoke about their experience working on grants, noting not only the benefit of the funding, but the pedagogical experience it served for them—initiating them into the world of grant funding and exposing them to the process (ID234; ID74). Students who did not receive this kind of training mentioned how much they felt this disadvantaged them when they entered their first position (ID160; ID246; ID116). Although the majority of respondents spoke about grants where the student worked as a researcher or project manager, a few respondents also mentioned grants that were used specifically to recruit and fund doctoral students in particular areas of research or minority status (ID622; ID500). Many of these provided students with an opportunity to become full-time residential students, travel and attend conferences, and engage in formal mentoring programs.

In short, funding appears to be a serious concern across all programs, many of which see grant funding as the way to support and engage the next generation of doctoral students.
4.4.7. Academic models

Many of the conversations about funding led to conversations about the different types of models in academe such as the natural sciences model and the humanities model. One respondent called the “hard science model” “the way of the future” (ID506). Another called the “lab model”, where a student was working on “funded grant research”, the “ideal” and said that, “I think philosophically it has evolved toward that model…We recognize that as the best model and we try to get there” (ID507). The respondent noted that, “if you are an active researcher, you need doctoral students” (ID507). However, not all respondents were as supportive of this model:

“I don’t agree with the model, that sort of medical science model, that you come in and take a piece of someone else’s research and, you know, do that little bit and then move on to get your Ph.D….It takes away one of the most profound aspects, in my mind, of Ph.D. work, which is coming up with an idea…that is fascinating enough that you want to spend the rest of your life examining pieces of it. And then, if you don’t do that as a doctoral student, I don’t think you will do it all that well as an employee.” (ID495)

Other respondents described the humanities model as being different from the natural science model, saying that it “produce[s] a different kind of scholar who may be part of a…theoretical school, but their domain areas are going to vary widely” (ID398). When asked if advisors and advisees should be working in the same area, one respondent commented:

“I think it needs to be somewhat similar—the basic, maybe conceptual framework, needs to be the same, but I think, so long as the advisor and the committee can handle the methodology and some of the basic ideas, I think you’re okay, because by the end of the Ph.D., the student should be the expert anyway. And, you know, even if it’s fairly
closely aligned with my interests, for example, as a professor hopefully the student’s [going to] know more about his or her particular topic than I will, by the end of it, so I can actually learn, which is part of the fun of being a professor for a doctoral student, is that they actually go beyond what I am capable of doing. And interested in doing and so I get to sort of ride their coattails a little bit as well and see where they’re going and learn from them.” (ID495)

Many respondents noted that both models currently exist in our field and expressed a desire that we continue to support multiple models: “I’m hoping we always have both, because I think there’s value in both. I don’t really see the [humanities] model working, the advisee-driven model working as well, in say areas of information retrieval or some of the more computer science sections of our field; I think it’s harder in part because people are kind of constrained by the machine” (ID398). The respondent ended by commenting that “both have something to contribute” (ID398). Another respondent reinforced this, saying: “What I hope is that we continue to support a wide variety of research styles, because I think that it’s healthy. I think that our students are better off because they are exposed to all kinds of different research styles” (ID622). Another respondent said, “I think our field will always have a diversity” (ID641).

However, although many respondents indicated that they hoped multiple models would continue to flourish, they noted how funding affects this: “I think that gets tricky, you know, because not all areas of research in information and library science are funded…I hope we never narrow down to the point where we only give support for people who are on funded projects…It’s definitely moving toward more funding, but again, like I said, I hope that doesn’t mean that we will give up research I think is important, just because there isn’t money that says it’s important…I think that there are things that are very important, but for which there is no
funding” (ID497). One respondent mentioned a particular example, saying: “working on libraries is something that is not appealing for funding” (ID378).

Some respondents remarked that the natural science model was one that was able to generate more funding:

“I think the iSchools are taking those basic science or physical science approach[es]—setting up a lab and recruiting RAs and developing a research agenda or building at least some strong areas. And that model probably works well because it is well-structured and everyone can follow and learn that and for the humanities side, it is more like individual endeavor, not quite as well structure[d] and if not as well-structured, then usually there’s not institutional support, so I don’t know…how to develop that style of research, especially in a research university.” (ID116)

However, another respondent explained his desire to keep multiple models, while accepting the necessity of funding:

“I would like to see a broader diversity of doctoral students. I think we’ve got several faculty who have big grants and who can afford to bring in doctoral students so…if you look at the topic line of the doctoral students, I think it’s somewhat skewed…The IT side of our doctoral program is probably [going to] continue to be stronger and more well-represented just because of demographics and, you know, funding…I think that the model of funding students on your grants is [going to] be increasingly prevalent. Then the question comes, do you, by having the student on your grant, do you bring them in to do your research, which makes sense. But intellectually and pedagogically, I think is counterproductive and that, I think is going to be a bind that the faculty will have to wrestle with.” (ID495)
Overall, the respondents seemed in agreement that funding does and would continue to have an effect on the research that is conducted at ILS schools. However, the respondents varied widely in their reactions to this situation and their perceptions of the model(s) best suited for researching within the field.

4.4.8. Summary

There were many differences between programs that may contribute to the mentoring and developing of doctoral students at these institutions. Nearly all respondents noted the presence of coursework, annual reviews, some form of a qualifying exam or paper, a dissertation proposal, and a dissertation requirement at their institution. The qualifying experience appeared to have the largest range of differences, in terms of expectations and products. The milestone with the most ambiguity was the dissertation itself. Few respondents described the actual process of writing the dissertation or what was expected for the final product. Additional program differences were identified in the types of funding received by the school or advisor and the academic model espoused by the advisor. Respondents seemed to indicate that a variety of models currently exist within ILS schools; however, most noted uncertainty on whether this diversity can continue to exist with the current grant funding model.
5. Results II

As noted in the methods section, the second phase of the study involved a bibliometric analysis of dissertations and curriculum vitae (CV) of a sub-group of the initial population. This group consisted of those individuals currently serving as faculty in ILS programs who met the following criteria: 1) the individual graduated from an ILS program\(^{32}\); 2) the individual had a complete and current\(^{33}\) CV available on the Internet; and 3) the individual had a full electronic copy of the dissertation available via ProQuest’s Dissertation and Theses Database. Ninety-seven dissertations fell into this category. Within this group, 64 individuals were currently serving as assistant professors at ILS programs and 33 were tenured faculty members. The individuals received their degrees from 23 unique institutions\(^{34}\) and were currently serving as faculty members in 40 unique institutions. The majority (\(n=61; 63\%\)) of the dissertations were published since 2000; 32 dissertations were published between 1990 and 1999, three dissertations were published between 1980 and 1989; the earliest dissertation in the sample was published in 1970.

5.1. Description of references

Each dissertation was examined to identify the number of references per dissertation, the types of sources cited by each dissertation, and the most frequently cited authors and sources between the dissertations. In total, 15,870 references were identified across the 97 dissertations.

\(^{32}\) Qualified the same as the initial selection—that is, those doctoral programs at institutions with ALA-accredited masters programs.

\(^{33}\) Current defined as updated in 2009.

\(^{34}\) The list of these dissertations will be presented in the following section on Interdisciplinarity.
The highest number of references contained in a single dissertation was 895; the lowest number of references was 44. Each dissertation contained, on average, about 165 references (see Table 24 for more descriptive statistics).

<table>
<thead>
<tr>
<th>Descriptive Statistic</th>
<th>Number of references</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>44</td>
</tr>
<tr>
<td>Maximum</td>
<td>895</td>
</tr>
<tr>
<td>Mean</td>
<td>163.61</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>108.27</td>
</tr>
<tr>
<td>Median</td>
<td>149</td>
</tr>
<tr>
<td>Mode</td>
<td>152</td>
</tr>
</tbody>
</table>

Figure 5 shows the distribution of the dissertations, by the number of references they contained.

![Figure 5. Distribution of dissertations by number of references contained](image)

As can be seen, one dissertation was more than three standard deviations removed from the mean. The large range and standard deviation of the data was therefore taken into account for subsequent analyses of most cited sources and authors—instead of evaluating by raw citation counts, each dissertation was considered as a single unit and only one instance of the given source or author in each dissertation was counted. This mitigated the effects of the range on subsequent analyses.

5.1.1. Types of references
Each reference was classified into a particular type category as it was entered into the spreadsheet and validated as the source was examined in WorldCat. Three large categories emerged from the data, namely:

1) Monographs (in which all revised editions of a single work were aggregated)

2) Serials (predominately journals, but also including bulletins, magazine, newspapers, yearbooks, and book series; excluding conference proceedings and monograph series that are reprints of conference proceedings; aggregating all instances and previous names of a given serial)

3) Conferences (predominately conference proceedings, but also papers from symposia, colloquia, workshops, and other meetings; aggregating all instances and previous names of a given conference)

Table 25 displays the percentage of references across these categories and the other top three categories.

<table>
<thead>
<tr>
<th>Publication type</th>
<th>Number and percentage of total references</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serials</td>
<td>7577 (47.74%)</td>
</tr>
<tr>
<td>Monographs</td>
<td>4958 (31.24%)</td>
</tr>
<tr>
<td>Conferences</td>
<td>1562 (9.84%)</td>
</tr>
<tr>
<td>Websites</td>
<td>544 (3.42%)</td>
</tr>
<tr>
<td>Reports/Tech. Reports</td>
<td>361 (2.28%)</td>
</tr>
<tr>
<td>Dissertations/theses</td>
<td>304 (1.91%)</td>
</tr>
</tbody>
</table>

In total, the three large categories (monographs, serials, conferences) comprised 88.82% \((n=14,097)\) of the total citations. Other categories comprising less than 1% each included interviews, personal communications, software, film, etc.

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35 Type was largely determined by the citation style, but other indicators such as title were also considered. WorldCat has a specific field for type and this was used to validate the original decision.

36 It should be noted that this calculation is inclusive of all references and does not normalize based on number of references. To analyze the effect of the extreme outlier, the analysis was additionally conducted with the removal of this outlier. The change in results was insignificant—with the removal of the outlier, serials represented 46.90%; monographs represented 31.95%, and conferences represented 10.11%.
As shown in Table 25, 4958 monographs were identified among the 15,870 references. Duplicates were then removed from the data to identify the 3,460 unique titles (69.79% of total monograph references). From this list of 3,460 unique titles, an analysis was conducted of the number of dissertations in which each source was cited. The list of sources and the number of unique dissertations in which they appeared is shown in Table 26. Full titles are written out for those most frequently occurring among the dissertations—for those titles referenced by less than 6 unique dissertations, only the number of source titles falling into that occurrence category are noted.

Table 26. Monograph source and the number of dissertations in which they are cited

<table>
<thead>
<tr>
<th>Source title</th>
<th>Number of dissertations in which the source is cited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naturalistic inquiry for library science: methods and applications for research evaluation and teaching</td>
<td>22</td>
</tr>
<tr>
<td>The discovery of grounded theory</td>
<td>21</td>
</tr>
<tr>
<td>Qualitative evaluation and research methods</td>
<td>17</td>
</tr>
<tr>
<td>Handbook of qualitative research</td>
<td>16</td>
</tr>
<tr>
<td>Encyclopedia of library and information science</td>
<td>14</td>
</tr>
<tr>
<td>Qualitative research in information management</td>
<td>14</td>
</tr>
<tr>
<td>Information seeking in electronic environments</td>
<td>12</td>
</tr>
<tr>
<td>Content analysis: an introduction to its methodology</td>
<td>11</td>
</tr>
<tr>
<td>Qualitative data analysis: an expanded sourcebook</td>
<td>11</td>
</tr>
<tr>
<td>The practice of social research</td>
<td>11</td>
</tr>
<tr>
<td>Designing qualitative research</td>
<td>10</td>
</tr>
<tr>
<td>Diffusion of innovations</td>
<td>10</td>
</tr>
<tr>
<td>Human behavior and the principle of least effort</td>
<td>10</td>
</tr>
<tr>
<td>The structure of scientific revolutions</td>
<td>10</td>
</tr>
<tr>
<td>Basic content analysis</td>
<td>9</td>
</tr>
<tr>
<td>Information retrieval</td>
<td>9</td>
</tr>
<tr>
<td>Research design: qualitative and quantitative approaches</td>
<td>9</td>
</tr>
<tr>
<td>Seeking meaning: a process approach to library and information services</td>
<td>9</td>
</tr>
<tr>
<td>Value-added processes in information systems</td>
<td>9</td>
</tr>
<tr>
<td>Case study research: design and methods</td>
<td>8</td>
</tr>
<tr>
<td>Information retrieval experiment</td>
<td>8</td>
</tr>
<tr>
<td>Introduction to modern information retrieval</td>
<td>8</td>
</tr>
<tr>
<td>The Oxford English Dictionary</td>
<td>7</td>
</tr>
<tr>
<td>Qualitative analysis for social scientists</td>
<td>7</td>
</tr>
</tbody>
</table>

As noted above, the number of dissertations in which the source appeared was used to calculate top sources rather than the raw number of times the source was cited within the entire set of 15,870 references. This calculation, using the dissertation as a single unit, allowed for mitigation of the effects of the high range and standard deviation. This was used for the analysis on source, author, and LC class. Stated simply, this prevents one dissertation that frequently cites a single author, source, or subject area from dominating the results.
Similar data analysis was conducted on the 7577 serials identified. Just over 20% (n=1563) of the serial titles were unique. The source titles and the number of dissertations in which they occurred are displayed in Table 27.

<table>
<thead>
<tr>
<th>Source title</th>
<th>Number of dissertations in which the source is cited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal of the American Society for Information Science &amp; Technology</td>
<td>77</td>
</tr>
<tr>
<td>The Journal of Documentation</td>
<td>60</td>
</tr>
<tr>
<td>Annual Review of Information Science &amp; Technology</td>
<td>58</td>
</tr>
<tr>
<td>Information Processing &amp; Management</td>
<td>58</td>
</tr>
<tr>
<td>The Library Quarterly</td>
<td>53</td>
</tr>
<tr>
<td>Library Trends</td>
<td>44</td>
</tr>
<tr>
<td>Library &amp; Information Science Research</td>
<td>39</td>
</tr>
<tr>
<td>College &amp; Research Libraries</td>
<td>33</td>
</tr>
<tr>
<td>Communications of the ACM</td>
<td>33</td>
</tr>
<tr>
<td>Journal of Information Science</td>
<td>32</td>
</tr>
<tr>
<td>Reference &amp; User Services Quarterly</td>
<td>28</td>
</tr>
<tr>
<td>Library Journal</td>
<td>25</td>
</tr>
<tr>
<td>Aslib Proceedings</td>
<td>22</td>
</tr>
<tr>
<td>Drexel Library Quarterly</td>
<td>22</td>
</tr>
<tr>
<td>Science</td>
<td>20</td>
</tr>
<tr>
<td>Canadian Journal of Information &amp; Library Science</td>
<td>19</td>
</tr>
<tr>
<td>Cataloging &amp; Classification Quarterly</td>
<td>19</td>
</tr>
<tr>
<td>Information Technology &amp; Libraries</td>
<td>19</td>
</tr>
<tr>
<td>Library Hi Tech</td>
<td>17</td>
</tr>
<tr>
<td>Journal of Academic Librarianship</td>
<td>16</td>
</tr>
<tr>
<td>International Journal of Human-Computer Studies</td>
<td>15</td>
</tr>
<tr>
<td>Online Information Review</td>
<td>15</td>
</tr>
<tr>
<td>Psychological Review</td>
<td>15</td>
</tr>
<tr>
<td>The American Journal of Sociology</td>
<td>15</td>
</tr>
<tr>
<td>The Information Society</td>
<td>15</td>
</tr>
<tr>
<td>Academy of Management Journal</td>
<td>14</td>
</tr>
<tr>
<td>American Libraries</td>
<td>14</td>
</tr>
<tr>
<td>Bulletin of the American Society for Information Science &amp; Technology</td>
<td>14</td>
</tr>
<tr>
<td>Computer</td>
<td>14</td>
</tr>
<tr>
<td>D-lib Magazine</td>
<td>14</td>
</tr>
<tr>
<td>Management Science</td>
<td>14</td>
</tr>
<tr>
<td>Special Libraries</td>
<td>14</td>
</tr>
<tr>
<td>The Reference Librarian</td>
<td>14</td>
</tr>
</tbody>
</table>
From the 1562 conference sources, 412 unique source titles were identified (26.38% of the total conference references). The source titles and the number of dissertations in which they were referenced are listed in Table 28.

### Table 28. Conference sources and the number of dissertations in which they are cited

<table>
<thead>
<tr>
<th>Source title</th>
<th>Number of dissertations in which the source is cited</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Society for Information Science &amp; Technology (ASIS&amp;T)</td>
<td>52</td>
</tr>
<tr>
<td>ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR)</td>
<td>24</td>
</tr>
<tr>
<td>Human Factors in Computing Systems (CHI)</td>
<td>19</td>
</tr>
<tr>
<td>ACM/IEEE-CS Joint Conference on Digital Libraries (JCDL)</td>
<td>15</td>
</tr>
<tr>
<td>Text Retrieval Conference (TREC)</td>
<td>14</td>
</tr>
<tr>
<td>Hawaii International Conference on System Sciences (HICSS)</td>
<td>12</td>
</tr>
<tr>
<td>National Online Meeting</td>
<td>12</td>
</tr>
<tr>
<td>ACM Conference on Hypertext and Hypermedia</td>
<td>10</td>
</tr>
<tr>
<td>Computer-Supported Cooperative Work</td>
<td>9</td>
</tr>
<tr>
<td>Information Seeking in Context (ISIC)</td>
<td>9</td>
</tr>
<tr>
<td>International Communication Association Annual Meeting</td>
<td>9</td>
</tr>
<tr>
<td>American Library Association</td>
<td>8</td>
</tr>
<tr>
<td>International Society for Knowledge Organization</td>
<td>8</td>
</tr>
<tr>
<td>Annual National Conference on Artificial Intelligence</td>
<td>7</td>
</tr>
<tr>
<td>Conceptions of Library and Information Science (CoLIS)</td>
<td>7</td>
</tr>
<tr>
<td>International Conference on Computational Linguistics</td>
<td>7</td>
</tr>
<tr>
<td>International World Wide Web Conference</td>
<td>7</td>
</tr>
<tr>
<td>Research and Advanced Technology for Digital Libraries (ECDL)</td>
<td>6</td>
</tr>
<tr>
<td>ACM International Conference on Multimedia</td>
<td>5</td>
</tr>
<tr>
<td>ACM SIGKDD International Conference on Knowledge Discovery and Data Mining</td>
<td>5</td>
</tr>
<tr>
<td>American Educational Research Association</td>
<td>5</td>
</tr>
<tr>
<td>Canadian Association for Information Science</td>
<td>5</td>
</tr>
<tr>
<td>International Federation for Information Processing</td>
<td>5</td>
</tr>
<tr>
<td>RIAO</td>
<td>5</td>
</tr>
<tr>
<td>--------------</td>
<td>---------</td>
</tr>
<tr>
<td>[7 unique conference titles]</td>
<td>4 each</td>
</tr>
<tr>
<td>[15 unique conference titles]</td>
<td>3 each</td>
</tr>
<tr>
<td>[35 unique conference titles]</td>
<td>2 each</td>
</tr>
<tr>
<td>[331 unique conference titles]</td>
<td>1 each</td>
</tr>
</tbody>
</table>

All of the sources exhibited a “long tail” distribution, with the majority of the sources cited by only a single dissertation (85.46% of monographs, 80.34% of conferences, and 70.19% of serials—see Figure 6 for a depiction of this distribution).

![Figure 6. Distribution of source by the number of dissertations in which they are cited](image)

One difference between the sources was the degree to which the source titles were unique. Figure 7 displays the difference in percentage of unique titles within each source.
The source type of dissertations/theses was also examined to the extent to which this source type was referenced by multiple dissertations. Twelve dissertations/theses were referenced by more than one dissertation. The list of these twelve dissertations/theses and the number of dissertations in which they are cited appears in Table 29.

**Table 29. Dissertations/theses cited by at least two dissertations**

<table>
<thead>
<tr>
<th>Source title</th>
<th>Author</th>
<th>Number of dissertations in which the source is cited</th>
</tr>
</thead>
<tbody>
<tr>
<td>The identification of user criteria of relevance and document characteristics: Beyond the topical approach to information retrieval</td>
<td>Barry, CL</td>
<td>4</td>
</tr>
<tr>
<td>The nature of relevance in information retrieval: An empirical study</td>
<td>Park, TK</td>
<td>3</td>
</tr>
<tr>
<td>Information foraging among anthropologists in the invisible college of human behavioral ecology: An author co-citation analysis</td>
<td>Sandstrom, PE</td>
<td>3</td>
</tr>
<tr>
<td>The information-seeking practices of art historians in museums and colleges in the United States, 1982-83</td>
<td>Stam, DC</td>
<td>3</td>
</tr>
<tr>
<td>An examination of situational dimensions in the information behaviors of general managers</td>
<td>Fletcher, PT</td>
<td>2</td>
</tr>
<tr>
<td>The information seeking behavior of literary scholars in Canadian universities</td>
<td>Hopkins, RL</td>
<td>2</td>
</tr>
<tr>
<td>Image attributes: An investigation</td>
<td>Jorgensen, C</td>
<td>2</td>
</tr>
<tr>
<td>Cognitive processes and the use of information: A qualitative study of higher order thinking skills used in the research process by students in a gifted program</td>
<td>McGregor, JH</td>
<td>2</td>
</tr>
<tr>
<td>On the concept of relevance in information science</td>
<td>Saracevic, T</td>
<td>2</td>
</tr>
<tr>
<td>Users; criteria for evaluation in multimedia information seeking and use situation</td>
<td>Schamber, L</td>
<td>2</td>
</tr>
<tr>
<td>Information systems for children: Explorations in information access and interface usability for an online catalog in an elementary school library</td>
<td>Solomon, P</td>
<td>2</td>
</tr>
<tr>
<td>A cognitive model of document selection of real users of information retrieval systems</td>
<td>Wang, P</td>
<td>2</td>
</tr>
</tbody>
</table>
5.1.2. Authors

In total, 23,237 authors\textsuperscript{38} were recorded for the 15,870 references. The list of authors was manually cleaned in order to aggregate synonyms and differentiate homographs.\textsuperscript{39} This list was then analyzed to determine the number of unique authors within this list and the number of dissertations in which each author appeared. The resulting list identified 12,863 unique individual authors (55.35\% of the total number of identified authors). A full list of the most frequently cited authors and the number of dissertations in which the author is cited is presented in Table 30.

Table 30. Authors and the number of dissertations in which they are cited

<table>
<thead>
<tr>
<th>Author</th>
<th>Number of dissertations in which the author is cited</th>
<th>Current or latest affiliation\textsuperscript{40}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dervin, Brenda</td>
<td>40</td>
<td>Ohio State University; School of Communication</td>
</tr>
<tr>
<td>Belkin, Nicholas J.</td>
<td>33</td>
<td>Rutgers University; School of Communication, Information and Library Studies</td>
</tr>
<tr>
<td>Saracevic, Tefko</td>
<td>30</td>
<td>Rutgers University; School of Communication, Information and Library Studies</td>
</tr>
<tr>
<td>Nilan, Michael S.</td>
<td>29</td>
<td>Syracuse University; School of Information Studies</td>
</tr>
<tr>
<td>Strauss, Anselm L.</td>
<td>29</td>
<td>University of California, San Francisco; Department of Social and Behavioral Sciences</td>
</tr>
<tr>
<td>Ellis, David</td>
<td>28</td>
<td>University of Sheffield; Department of Information Studies</td>
</tr>
<tr>
<td>Taylor, Robert S.</td>
<td>26</td>
<td>Syracuse University; School of Information Studies</td>
</tr>
<tr>
<td>Kuhlthau, Carol Collier</td>
<td>24</td>
<td>Rutgers University; School of Communication, Information and Library Studies</td>
</tr>
<tr>
<td>Marchionini, Gary</td>
<td>24</td>
<td>University of North Carolina at Chapel Hill; School of Information and Library Science</td>
</tr>
<tr>
<td>Fidel, Raya</td>
<td>23</td>
<td>University of Washington; Information School</td>
</tr>
<tr>
<td>Glaser, Barney G.</td>
<td>21</td>
<td>Grounded Theory Institute</td>
</tr>
<tr>
<td>Lancaster, F. Wilfrid</td>
<td>21</td>
<td>University of Illinois at Urbana-Champaign; School of Library and Information Science</td>
</tr>
</tbody>
</table>

\textsuperscript{38} There were 171 instances in which the author wrote “et al.” No attempt was made to ascertain the exact names in these cases and these were instead counted as “authors” for the total count. These were removed for the count of unique individual authors.

\textsuperscript{39} See Smith, 1981 for further definitions of these terms within the field of citation analysis. For the purpose of this study, attention was only paid to differentiating homographs in the cases where there were a large number of entries. Those entries appearing in fewer than three dissertations were not disambigua-\textsuperscript{40}ed. Therefore, the unique number of authors could be lower if the disambiguation of homographs was completely investigated.

\textsuperscript{40} Determined by searching the individuals by name and citation (if necessary) in Web of Science and via Google.
<table>
<thead>
<tr>
<th>Name</th>
<th>Year</th>
<th>Institution and Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lincoln, Yvonna S.</td>
<td>21</td>
<td>Texas A&amp;M University; College of Education and Human Development</td>
</tr>
<tr>
<td>Salton, Gerard</td>
<td>21</td>
<td>Cornell University; Department of Computer Science</td>
</tr>
<tr>
<td>Buckland, Michael K.</td>
<td>20</td>
<td>University of California at Berkeley; School of Information</td>
</tr>
<tr>
<td>Guba, Egon G.</td>
<td>20</td>
<td>Indiana University; School of Education</td>
</tr>
<tr>
<td>Harter, Stephen P.</td>
<td>20</td>
<td>Indiana University; School of Library and Information Science</td>
</tr>
<tr>
<td>Simon, Herbert A.</td>
<td>20</td>
<td>Carnegie Mellon University; Computer Science, Psychology, Philosophy, Social and Decision Sciences, Industrial Administration</td>
</tr>
<tr>
<td>Ingwersen, Peter</td>
<td>18</td>
<td>Royal School of Library and Information Science</td>
</tr>
<tr>
<td>Patton, Michael Quinn</td>
<td>18</td>
<td>University of Minnesota; Minnesota Center for Social Research</td>
</tr>
<tr>
<td>Robertson, Stephen E.</td>
<td>18</td>
<td>City University London; Department of Information Science</td>
</tr>
<tr>
<td>Borgman, Christine L.</td>
<td>17</td>
<td>University of California, Los Angeles; Department of Information Studies</td>
</tr>
<tr>
<td>Huberman, A. Michael</td>
<td>17</td>
<td>University of Geneva; Education</td>
</tr>
<tr>
<td>Miles, Matthew B.</td>
<td>17</td>
<td>Columbia University; Education</td>
</tr>
<tr>
<td>Eisenberg, Michael B.</td>
<td>16</td>
<td>University of Washington; Information School</td>
</tr>
<tr>
<td>Oddy, R.N.</td>
<td>16</td>
<td>Syracuse University; School of Information Studies</td>
</tr>
<tr>
<td>Bates, Marcia J.</td>
<td>15</td>
<td>University of California, Los Angeles; Department of Information Studies</td>
</tr>
<tr>
<td>Corbin, Juliet M.</td>
<td>15</td>
<td>San Jose State University; School of Nursing and University of Alberta; International Institute for Qualitative Research</td>
</tr>
<tr>
<td>Croft, W. Bruce</td>
<td>15</td>
<td>University of Massachusetts, Amherst; Department of Computer Science</td>
</tr>
<tr>
<td>Markey, Karen</td>
<td>15</td>
<td>University of Michigan; School of Information</td>
</tr>
<tr>
<td>Marshall, Catherine</td>
<td>15</td>
<td>Microsoft Research</td>
</tr>
<tr>
<td>Swanson, Don R.</td>
<td>15</td>
<td>University of Chicago; Humanities</td>
</tr>
<tr>
<td>Wilson, T.D.</td>
<td>15</td>
<td>University of Sheffield; Department of Information Studies</td>
</tr>
<tr>
<td>Brooks, H.M.</td>
<td>14</td>
<td>Rutgers University; School of Communication, Information and Library Studies</td>
</tr>
<tr>
<td>Kantor, Paul B.</td>
<td>14</td>
<td>Rutgers University; School of Communication, Information and Library Studies</td>
</tr>
<tr>
<td>Schamber, Linda</td>
<td>14</td>
<td>University of North Texas; School of Library and Information Sciences</td>
</tr>
<tr>
<td>McClure, Charles R.</td>
<td>13</td>
<td>Florida State University; College of Information</td>
</tr>
<tr>
<td>Spink, Amanda</td>
<td>13</td>
<td>Queensland University of Technology; Information Science</td>
</tr>
<tr>
<td>Wilson, Patrick</td>
<td>13</td>
<td>University of California, Berkeley; School of Library and Information Studies</td>
</tr>
<tr>
<td>Yin, Robert K.</td>
<td>13</td>
<td>COSMOS Corporation</td>
</tr>
<tr>
<td>Allen, Bryce L.</td>
<td>12</td>
<td>University of Illinois at Urbana-Champaign; School of Library and Information Science</td>
</tr>
<tr>
<td>Dewdney, Patricia</td>
<td>12</td>
<td>University of Western Ontario; School of Library and Information Science</td>
</tr>
<tr>
<td>Rogers, Everett M.</td>
<td>12</td>
<td>University of New Mexico; Communication</td>
</tr>
<tr>
<td>Wildemuth, Barbara M.</td>
<td>12</td>
<td>University of North Carolina at Chapel Hill</td>
</tr>
</tbody>
</table>
As is shown, 83.08% \((n=10,687)\) of the authors are cited by a single dissertation.

5.1.3. Years

Analysis was done to identify the average age of the references, calculated by looking at the absolute\(^{41}\) difference between the date of publication of the reference and the date of publication for the dissertation. Analysis was conducted for four different groups: all 15,790 references containing publication date information; and monographs, serials, and conferences, respectively. The results for these data are listed in Table 31.

Table 31. Descriptive statistics for mean difference in age of references\(^{42}\)

<table>
<thead>
<tr>
<th>Type</th>
<th>Mean</th>
<th>St. Dev.</th>
<th>Median</th>
<th>Mode</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>14.24</td>
<td>16.70</td>
<td>8</td>
<td>4</td>
<td>0</td>
<td>161</td>
</tr>
<tr>
<td>Monographs</td>
<td>15.97</td>
<td>16.66</td>
<td>11</td>
<td>6</td>
<td>0</td>
<td>161</td>
</tr>
<tr>
<td>Serials</td>
<td>15.07</td>
<td>17.64</td>
<td>9</td>
<td>4</td>
<td>0</td>
<td>146</td>
</tr>
<tr>
<td>Conferences</td>
<td>8.56</td>
<td>10.98</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>100(^{43})</td>
</tr>
</tbody>
</table>

The distribution of the references across different age categories is depicted in figure 8.

\(^{41}\)For items “in press” these were searched and the actual publication date was obtained. Absolute difference was used for those cases in which a citation was made to something in press, denoting a publication date following the date of publication of the dissertation.

\(^{42}\)This calculation is inclusive of all references and therefore may represent some skew, due to outliers.

\(^{43}\)The oldest conference proceedings were papers presented at the American Library Association meeting and the National Academy of Sciences meeting.
5.1.4. Summary

A total of 15,870 references were identified for the 97 dissertations. Each dissertation contained, on average, 165 references. The majority of references (88.82%) fell into one of three categories: serials (47.74%), monographs (31.24%), and conferences (9.84%). Each of these three sources was analyzed to describe those sources which were cited by the highest number of dissertations. All source distributions exhibited a long tail, in which the majority of the sources were cited by a single dissertation. One difference between the sources was the degree to which the sources in each type were unique: monographs contained the highest percentage of unique titles (69.79%), with serials and conferences each containing less than 30% unique titles (20.63% and 26.38%, respectively). Authors shared similar characteristics: the unique individual authors comprised 55.26% of the total number of authors, with 83.08% of the authors cited by a single dissertation. An analysis of age between year the dissertation was published and year the
reference was published showed that monographs and serials had a higher mean age than conferences with the mean age for all average types falling around 14 years.\(^{44}\)

5.2. Mentoring and collaboration

Two aspects of mentoring were examined in the dissertation bibliographies and in the curriculum vitae of the 97 faculty members. The first aspect was passive mentoring, or the degree to which the intellectual products of the advisor and committee members influenced the dissertation, as shown through citations. The second aspect was the degree to which the student collaborated with their advisor and committee members, both before and after graduation.

The first analysis grouped dissertations by the number of times they self-cite (the author of the dissertation citing one of their previous published works), cite their advisor, or cite at least one committee member (exclusive of the advisor). Table 32 displays the number of dissertations by the number of citations in each category.

<table>
<thead>
<tr>
<th>Type of citation</th>
<th>Number of times cited</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-citation</td>
<td>44</td>
<td>18</td>
<td>13</td>
<td>8</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Citations to advisor</td>
<td>38</td>
<td>17</td>
<td>12</td>
<td>6</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Citations to Committee</td>
<td>24</td>
<td>19</td>
<td>14</td>
<td>7</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Total for Citations to Committee is 94, due to the removal of three dissertations with no committee information.

---

\(^{44}\) Significance tests were not done for these items.
As shown in Table 32, 53 (55%) dissertation authors cite themselves at least once, 59 (61%) cite their advisor at least once, and 70 (75%) cite at least one committee member at least once. On average, dissertation authors cited themselves 1.68 times, cited their advisor 2.28 times, and cited members of their committee 3.07 times. Further descriptive statistics are provided in Table 33 and a graphical depiction is provided in Figure 9.

### Table 33. Descriptive statistics regarding number of citations to self, advisor, and committee

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Min</th>
<th>Max</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self Citations</td>
<td>1.68</td>
<td>2.75</td>
<td>0</td>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td>Citations to Advisor</td>
<td>2.28</td>
<td>3.06</td>
<td>0</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Citations to Committee</td>
<td>3.07</td>
<td>3.40</td>
<td>0</td>
<td>12</td>
<td>2</td>
</tr>
</tbody>
</table>

This calculation was the average number of times any member was cited, not how many times an individual committee member was cited.
The function of co-authorship was examined by calculating the number of publications (as listed on the CV) before and including the year the dissertation was defended and after. Collaborative authorship was examined in terms of both advisee-advisor collaborations and advisee-committee member collaborations. Table 34 displays the result of these data.

Table 34. Number of instances of co-authorship with advisor and committee before and after graduation

| Type of dissertation member with whom they collaborated | Number of instances of co-authorship | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11+
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Advisor Before</td>
<td></td>
<td>57</td>
<td>18</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Advisor After</td>
<td></td>
<td>65</td>
<td>16</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Committee Members Before</td>
<td></td>
<td>62</td>
<td>11</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Committee Members After</td>
<td></td>
<td>64</td>
<td>16</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

As is shown, about 41% co-authored with their advisor at least once up to and before graduation and about 31% co-authored with their advisor at least once after graduation. In terms of committee members, about 34% co-authored with at least one committee member at least once up to and before graduation and about 32% co-authored with at least one committee member at least once after graduation. Descriptive statistics for co-authorship are presented in Table 35.

Table 35. Descriptive statistics regarding co-authorship with advisors and committee before and after graduation

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Min</th>
<th>Max</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advisors—Before</td>
<td>1.74</td>
<td>4.11</td>
<td>0</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>Advisors—After</td>
<td>0.93</td>
<td>2.01</td>
<td>0</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Committee—Before</td>
<td>1.62</td>
<td>3.66</td>
<td>0</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>Committee—After</td>
<td>1.63</td>
<td>8.32</td>
<td>0</td>
<td>79</td>
<td>0</td>
</tr>
</tbody>
</table>

46 All publications on the CV were included in this analysis.

47 Exclusive of advisor(s).
5.3. Interdisciplinarity

Interdisciplinarity was assessed in multiple ways in this phase of the study. In addition to the indicators of interdisciplinarity shown in the most frequently cited authors and sources, interdisciplinarity was assessed through classifying the references into LC classes and by means of the interdisciplinarity index (described in the methods section). The results for these last two areas will be discussed below.

5.3.1. LC class

There were 14,097 references included in the three large categories of the references—monographs, serials, and conferences. Of these, LC class was identified for more than 95% ($n=13,477$). Table 36 describes the number of references within each source for which an LC class could be identified.

<table>
<thead>
<tr>
<th>Type of source</th>
<th>Number of references for which an LC class could be identified</th>
<th>Total number of references</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monographs</td>
<td>4714 (95.08%)</td>
<td>4958</td>
</tr>
<tr>
<td>Serials</td>
<td>7355 (97.07%)</td>
<td>7577</td>
</tr>
<tr>
<td>Conferences</td>
<td>1388 (88.86%)</td>
<td>1562</td>
</tr>
</tbody>
</table>

Most of the items ($n=12,950$, 92%) were classed with a single LC class; however, 1146 (8.1%) were classed under two classes, and 1 item was classed under three classes.\(^{48}\) Table 37 describes the number of classes per source type.

<table>
<thead>
<tr>
<th>Type of source</th>
<th>References with one LC class</th>
<th>References with two LC classes</th>
<th>References with three LC classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monographs</td>
<td>4733 (95.46%)</td>
<td>225 (4.54%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Conferences</td>
<td>1374 (87.96%)</td>
<td>188 (12.04%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Serials</td>
<td>6843 (90.31%)</td>
<td>733 (9.67%)</td>
<td>1 (0.01%)</td>
</tr>
</tbody>
</table>

\(^{48}\) These classes were taken from the WorldCat record in the “Class Descriptors” field. Of those records containing an LC class in the class descriptor field, the majority contain only a single class LC class (along with classes for other systems, such as Dewey). However, some contain multiple LC classes in a single record, within the Class Descriptor field. In these cases, each class was counted, thereby counting the record multiple times, for each “discipline” in which it was classed. The item with three classes was the *Journal of Planning Literature.*
Similar to the analysis done to evaluate top sources and authors, an analysis was conducted to see which LC classes were most frequently cited among the dissertations. This was identified by calculating the number of dissertations that cited any reference designated within the given LC class. As with the other calculations, each dissertation was given a single count (even if it had multiple references within that one class). The analysis was done at the highest level of the LC classification system and at the secondary level. The results are shown in Table 38, with the number of dissertations containing references that are classified in the particular LC classes. Those categories cited by more than 50% of the dissertations are highlighted.

Table 38. Number of dissertations including references classed by general and secondary LC classes

<table>
<thead>
<tr>
<th>LC Class</th>
<th>Number of dissertation citing</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (General works)</td>
<td>33</td>
</tr>
<tr>
<td>AC (Collections. Series. Collected works.)</td>
<td>2</td>
</tr>
<tr>
<td>AE (Encyclopedias)</td>
<td>2</td>
</tr>
<tr>
<td>AG (Dictionaries and other general reference works)</td>
<td>1</td>
</tr>
<tr>
<td>AM (Museums. Collectors and collecting)</td>
<td>5</td>
</tr>
<tr>
<td>AN (Newspapers)</td>
<td>7</td>
</tr>
<tr>
<td>AP (Periodicals)</td>
<td>20</td>
</tr>
<tr>
<td>AS (Academies and learned societies)</td>
<td>8</td>
</tr>
<tr>
<td>AZ (History of scholarship and learning. The humanities)</td>
<td>14</td>
</tr>
<tr>
<td>B (Philosophy, psychology, religion)</td>
<td>77</td>
</tr>
<tr>
<td>B (Philosophy)</td>
<td>36</td>
</tr>
<tr>
<td>BC (Logic)</td>
<td>5</td>
</tr>
<tr>
<td>BD (Speculative philosophy)</td>
<td>26</td>
</tr>
<tr>
<td>BF (Psychology)</td>
<td>69</td>
</tr>
<tr>
<td>BH (Aesthetics)</td>
<td>2</td>
</tr>
<tr>
<td>BJ (Ethics)</td>
<td>3</td>
</tr>
<tr>
<td>BL (Religions. Mythology. Rationalism)</td>
<td>7</td>
</tr>
<tr>
<td>BQ (Buddhism)</td>
<td>1</td>
</tr>
<tr>
<td>BR (Christianity)</td>
<td>1</td>
</tr>
<tr>
<td>BT (Doctrinal theology)</td>
<td>1</td>
</tr>
<tr>
<td>BV (Practical theology)</td>
<td>1</td>
</tr>
<tr>
<td>BX (Christian denominations)</td>
<td>1</td>
</tr>
<tr>
<td>C (Auxiliary sciences of history)</td>
<td>19</td>
</tr>
<tr>
<td>CB (History of civilization)</td>
<td>7</td>
</tr>
<tr>
<td>CC (Archaeology)</td>
<td>2</td>
</tr>
<tr>
<td>CD (Diplomatics. Archives. Seals)</td>
<td>8</td>
</tr>
<tr>
<td>CT (Biography)</td>
<td>9</td>
</tr>
</tbody>
</table>

Analysis was not done at the tertiary or lower levels of the classification system, as most categories were reduced to single digits at this point. However, it should be noted that many disciplines only appear on these lower levels (such as computer science, journalism and mass communication, etc.). This should be taken into account in interpreting the data.
<table>
<thead>
<tr>
<th>Classification</th>
<th>Number of References</th>
</tr>
</thead>
<tbody>
<tr>
<td>D (World history and history of Europe, Asia, Africa, Australia, New Zealand, etc.)</td>
<td>18</td>
</tr>
<tr>
<td>D (History (General))</td>
<td>11</td>
</tr>
<tr>
<td>DA (Great Britain)</td>
<td>6</td>
</tr>
<tr>
<td>DC (France – Andorra – Monaco)</td>
<td>2</td>
</tr>
<tr>
<td>DG (Italy – Malta)</td>
<td>1</td>
</tr>
<tr>
<td>DJK (Eastern Europe (General))</td>
<td>1</td>
</tr>
<tr>
<td>DK (Russia. Soviet Union. Former Soviet Republics – Poland)</td>
<td>1</td>
</tr>
<tr>
<td>DS (Asia)</td>
<td>2</td>
</tr>
<tr>
<td>DT (Africa)</td>
<td>2</td>
</tr>
<tr>
<td>DU (Oceania (South Seas))</td>
<td>3</td>
</tr>
<tr>
<td>E (History of the Americas)</td>
<td>20</td>
</tr>
<tr>
<td>E (General)</td>
<td>20</td>
</tr>
<tr>
<td>F (History of the Americas)</td>
<td>7</td>
</tr>
<tr>
<td>F (General)</td>
<td>7</td>
</tr>
<tr>
<td>G (Geography. Anthropology. Recreation)</td>
<td>42</td>
</tr>
<tr>
<td>G (Geography (General). Atlases. Maps)</td>
<td>6</td>
</tr>
<tr>
<td>GF (Human ecology. Anthropogeography)</td>
<td>4</td>
</tr>
<tr>
<td>GN (Anthropology)</td>
<td>30</td>
</tr>
<tr>
<td>GR (Folklore)</td>
<td>4</td>
</tr>
<tr>
<td>GT (Manners and customs (General))</td>
<td>1</td>
</tr>
<tr>
<td>GV (Recreation. Leisure)</td>
<td>8</td>
</tr>
<tr>
<td>H (Social sciences)</td>
<td>92</td>
</tr>
<tr>
<td>H (Social sciences)</td>
<td>72</td>
</tr>
<tr>
<td>HA (Statistics)</td>
<td>39</td>
</tr>
<tr>
<td>HB (Economic theory. Demography)</td>
<td>15</td>
</tr>
<tr>
<td>HC (Economic history and conditions)</td>
<td>22</td>
</tr>
<tr>
<td>HD (Industries. Land use. Labor)</td>
<td>50</td>
</tr>
<tr>
<td>HE (Transportation and communications)</td>
<td>15</td>
</tr>
<tr>
<td>HF (Commerce)</td>
<td>50</td>
</tr>
<tr>
<td>HG (Finance)</td>
<td>9</td>
</tr>
<tr>
<td>HJ (Public finance)</td>
<td>1</td>
</tr>
<tr>
<td>HM (Sociology)</td>
<td>59</td>
</tr>
<tr>
<td>HN (Social history and conditions. Social problems. Social reform)</td>
<td>37</td>
</tr>
<tr>
<td>HQ (The family. Marriage. Women)</td>
<td>28</td>
</tr>
<tr>
<td>HS (Societies: secret, benevolent, etc.)</td>
<td>1</td>
</tr>
<tr>
<td>HT (Communities. Classes. Races)</td>
<td>11</td>
</tr>
<tr>
<td>HV (Social pathology. Social and public welfare. Criminology)</td>
<td>21</td>
</tr>
<tr>
<td>HX (Socialism. Communism. Anarchism)</td>
<td>5</td>
</tr>
<tr>
<td>J (Political science)</td>
<td>32</td>
</tr>
<tr>
<td>J (General legislative and executive papers)</td>
<td>4</td>
</tr>
<tr>
<td>JA (Political science (General))</td>
<td>14</td>
</tr>
<tr>
<td>JC (Political theory)</td>
<td>10</td>
</tr>
<tr>
<td>JF (Political institutions and public administration)</td>
<td>15</td>
</tr>
<tr>
<td>JK (Political institutions and public administration (United States))</td>
<td>18</td>
</tr>
<tr>
<td>JN (Political institutions and public administration (Europe))</td>
<td>2</td>
</tr>
<tr>
<td>JS (Local government. Municipal government)</td>
<td>2</td>
</tr>
<tr>
<td>JV (Colonies and colonization. Emigration and immigration. International migration)</td>
<td>1</td>
</tr>
<tr>
<td>JX (International law)</td>
<td>5</td>
</tr>
<tr>
<td>JZ (International relations)</td>
<td>1</td>
</tr>
<tr>
<td>K (Law)</td>
<td>26</td>
</tr>
<tr>
<td>K (Law in general. Comparative and uniform law. Jurisprudence)</td>
<td>19</td>
</tr>
<tr>
<td>KA ([unknown] 51</td>
<td>1</td>
</tr>
</tbody>
</table>

50 Many of the references within this class are in the area of management.
<table>
<thead>
<tr>
<th>LC class</th>
<th>Description</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>KB</td>
<td>Religious law in general. Comparative religious law. Jurisprudence</td>
<td>2</td>
</tr>
<tr>
<td>KD</td>
<td>United Kingdom and Ireland</td>
<td>1</td>
</tr>
<tr>
<td>KF</td>
<td>United States</td>
<td>16</td>
</tr>
<tr>
<td>KFC</td>
<td>[unknown]</td>
<td>2</td>
</tr>
<tr>
<td>L</td>
<td>Education</td>
<td>61</td>
</tr>
<tr>
<td>LA</td>
<td>History of education</td>
<td>8</td>
</tr>
<tr>
<td>LB</td>
<td>Theory and practice of education</td>
<td>52</td>
</tr>
<tr>
<td>LC</td>
<td>Special aspects of education</td>
<td>23</td>
</tr>
<tr>
<td>LD</td>
<td>Individual institutions – United States</td>
<td>1</td>
</tr>
<tr>
<td>LE</td>
<td>Individual institutions – America (except United States)</td>
<td>1</td>
</tr>
<tr>
<td>LJ</td>
<td>Student fraternities and societies, United States</td>
<td>5</td>
</tr>
<tr>
<td>M</td>
<td>Music and books on music</td>
<td>9</td>
</tr>
<tr>
<td>MH</td>
<td>[unknown]</td>
<td>1</td>
</tr>
<tr>
<td>ML</td>
<td>Literature on music</td>
<td>8</td>
</tr>
<tr>
<td>MT</td>
<td>Instruction and study</td>
<td>3</td>
</tr>
<tr>
<td>N</td>
<td>Fine arts</td>
<td>19</td>
</tr>
<tr>
<td>N</td>
<td>Visual arts</td>
<td>8</td>
</tr>
<tr>
<td>NA</td>
<td>Architecture</td>
<td>5</td>
</tr>
<tr>
<td>ND</td>
<td>Painting</td>
<td>1</td>
</tr>
<tr>
<td>NK</td>
<td>Decorative arts</td>
<td>3</td>
</tr>
<tr>
<td>NX</td>
<td>Arts in general</td>
<td>6</td>
</tr>
<tr>
<td>P</td>
<td>Language and literature</td>
<td>79</td>
</tr>
<tr>
<td>PA</td>
<td>Greek language and literature. Latin language and literature</td>
<td>2</td>
</tr>
<tr>
<td>PE</td>
<td>English language</td>
<td>22</td>
</tr>
<tr>
<td>PJ</td>
<td>Oriental languages and literatures</td>
<td>1</td>
</tr>
<tr>
<td>PL</td>
<td>Languages and literatures of Eastern Asia, Africa, Oceania</td>
<td>2</td>
</tr>
<tr>
<td>PN</td>
<td>Literature (General)</td>
<td>37</td>
</tr>
<tr>
<td>PQ</td>
<td>French literature – Italian literature – Spanish literature – Portuguese literature</td>
<td>3</td>
</tr>
<tr>
<td>PR</td>
<td>English literature</td>
<td>9</td>
</tr>
<tr>
<td>PS</td>
<td>American literature</td>
<td>14</td>
</tr>
<tr>
<td>PT</td>
<td>German literature – Dutch literature – Flemish literature since 1830 – Afrikaans literature – Scandinavian literature – Old Norse literature: Old Icelandic and Old Norwegian – Modern Icelandic literature – Faroese literature – Danish literature – Norwegian literature – Swedish literature</td>
<td>2</td>
</tr>
<tr>
<td>PZ</td>
<td>Fiction and juvenile belles letters</td>
<td>6</td>
</tr>
<tr>
<td>Q</td>
<td>Science</td>
<td>89</td>
</tr>
<tr>
<td>Q</td>
<td>Science (General)</td>
<td>70</td>
</tr>
<tr>
<td>QA</td>
<td>Mathematics</td>
<td>79</td>
</tr>
<tr>
<td>QB</td>
<td>Astronomy</td>
<td>3</td>
</tr>
<tr>
<td>QC</td>
<td>Physics</td>
<td>31</td>
</tr>
<tr>
<td>QD</td>
<td>Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>QH</td>
<td>Natural history – Biology</td>
<td>34</td>
</tr>
<tr>
<td>QL</td>
<td>Zoology</td>
<td>2</td>
</tr>
<tr>
<td>QP</td>
<td>Physiology</td>
<td>17</td>
</tr>
<tr>
<td>QR</td>
<td>Microbiology</td>
<td>2</td>
</tr>
</tbody>
</table>

51 Unknowns occur where the LC letter combination listed in WorldCat shows no heading in the LC classification system—this is most likely an error in the WorldCat record or in the cataloguing of the item.

52 Many of the references classified in this category fell into the tertiary category of “Communication. Mass Media” and “Computational Linguistics.”

53 Cybernetics and information theory are subclasses within this class.
An additional analysis was conducted to examine whether there were differences between source types on the LC classes which appeared most among the references. Table 39 describes the top ten most frequent LC classes for the references in each of the three categories.\(^{54}\)

**Table 39. Most frequently cited LC classes by source type**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Monographs</th>
<th>Serials</th>
<th>Conferences</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>HM: Sociology (General)</td>
<td>HD: Industries. Land use. Labor</td>
<td>QA: Mathematics</td>
</tr>
<tr>
<td>3</td>
<td>QA: Mathematics</td>
<td>QA: Mathematics</td>
<td>QC: Physics</td>
</tr>
<tr>
<td>4</td>
<td>HD: Industries. Land use. Labor</td>
<td>HF: Commerce</td>
<td>R: Medicine</td>
</tr>
</tbody>
</table>

Note: Highlighting indicated those LC classes cited in at least 50 dissertations.

\(^{54}\) Take into consideration that this analysis counts by reference, rather than by dissertation unit; therefore, the biases introduced for the range of references between dissertations must be acknowledged.
5.3.2. Interdisciplinarity index

The interdisciplinarity index was applied to each individual dissertation as described in the methods section. As this is a relative index, the primary goal of this preliminary work was to test the index and describe the distribution of the scores across the dissertations to provide a point of comparison for future work. Table 40 provides basic descriptive statistics for the index scores of all 97 dissertations.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>58.04</td>
</tr>
<tr>
<td>Median</td>
<td>35.23</td>
</tr>
<tr>
<td>Mode</td>
<td>N/A</td>
</tr>
<tr>
<td>Min.</td>
<td>4.19</td>
</tr>
<tr>
<td>Max</td>
<td>233.22</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>51.66</td>
</tr>
</tbody>
</table>

Figure 10 depicts how the dissertations were grouped according to their score on the interdisciplinarity index.

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55 The majority of sources in this category focused on feminism and women’s studies, but also included items focusing on child/youth issues and aging among other topics.
across a number of years.

The results were also compared by year and school. A linear regression analysis was conducted to evaluate the prediction of year based on interdisciplinarity.\textsuperscript{56} The scatterplot shown in Figure 11 indicates a slight relationship to suggest that interdisciplinarity has increased over the years. However, the 95\% confidence interval for the slope (-.005 to .042) contains a zero, demonstrating that the relationship is not significant and we cannot reject the null hypothesis with this set of data.\textsuperscript{57}

\textbf{Figure 10. Distribution of dissertations by interdisciplinarity index scores}

The results were also compared by year and school. A linear regression analysis was conducted to evaluate the prediction of year based on interdisciplinarity.\textsuperscript{56} The scatterplot shown in Figure 11 indicates a slight relationship to suggest that interdisciplinarity has increased over the years. However, the 95\% confidence interval for the slope (-.005 to .042) contains a zero, demonstrating that the relationship is not significant and we cannot reject the null hypothesis with this set of data.\textsuperscript{57}

\textsuperscript{56} The value is not in being able to predict the year in which someone graduated, but rather, to show if there are patterns of levels of interdisciplinarity based upon the progression of years.

\textsuperscript{57} This may be because the majority of the dissertations evaluated were in recent years. Future studies should look across a number of years.
Analysis based on school was also conducted, in order to evaluate differences between schools. Due to the inequality of group sizes for each school, no analysis beyond calculation of the mean and standard deviation was conducted. Table 41 displays these data, organized by mean (highest mean indicates those schools with the highest degree of interdisciplinarity; lower mean scores indicate less interdisciplinarity).\(^{58}\)

\(^{58}\) As can be seen, those schools with the most extreme means have the fewest number of dissertations. More work needs to be done to collect equal numbers of dissertations across each school in order to calculated a more thorough comparison.
Table 41. Interdisciplinarity index means and standard deviations by school

<table>
<thead>
<tr>
<th>School</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Number of dissertations (n=97)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>206.67</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>110.00</td>
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<td>11</td>
<td>105.90</td>
<td>43.00</td>
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<tr>
<td>5</td>
<td>96.91</td>
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<td>2</td>
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<tr>
<td>10</td>
<td>91.81</td>
<td>77.30</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>86.71</td>
<td>47.08</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>75.16</td>
<td>47.51</td>
<td>9</td>
</tr>
<tr>
<td>8</td>
<td>65.38</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>56.53</td>
<td>49.31</td>
<td>11</td>
</tr>
<tr>
<td>20</td>
<td>49.97</td>
<td>42.25</td>
<td>5</td>
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<tr>
<td>22</td>
<td>49.31</td>
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<td>19</td>
<td>42.94</td>
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<td>17</td>
<td>36.85</td>
<td>32.43</td>
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<td>23</td>
<td>38.20</td>
<td>30.88</td>
<td>6</td>
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<tr>
<td>16</td>
<td>36.11</td>
<td>18.11</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
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<td>41.17</td>
<td>8</td>
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<tr>
<td>6</td>
<td>31.96</td>
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<td>1</td>
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<td>7</td>
<td>31.86</td>
<td>30.00</td>
<td>5</td>
</tr>
<tr>
<td>21</td>
<td>26.32</td>
<td>17.89</td>
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<td>13</td>
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<td>1</td>
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<tr>
<td>14</td>
<td>17.00</td>
<td>9.26</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>8.12</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 12 provides a boxplot visualization of the index scores across schools.
5.3.3. Summary

LC class was assigned to 95% of the monograph, serial, and conference references. The results from all references displayed a high level of importation from LC class areas such as psychology, social sciences, industries/land use/labor, sociology, theory and practice of education, philology/linguistics, science, mathematics, technology, and engineering. Analysis of LC class for category type displayed differences in disciplinary influences based on the source type, with monographs highlighting sociology, education, and gender studies, serials highlighting commerce and archives, and conferences highlighting physics and engineering. The interdisciplinarity index was calculated across all 97 dissertations to provide a baseline for future studies. Comparisons by year showed no statistically significant relationship. No relationship was established between school and the interdisciplinarity index.\footnote{More data is needed to perform additional analyses.}
6. Discussion

The goal of this study was three-fold, namely, to describe the mentoring behaviors and practices of ILS faculty, the extent of collaboration between advisor and advisees, the extent to which the dissertation could be considered a collaborative product, and the interdisciplinary influences on the ILS dissertation process. This section will discuss the ways in which data from the questionnaires, interviews, and bibliometric analyses were able to shed light on these questions.

6.1. Mentoring

This section will review the level of fit with Kram’s mentoring model, both in terms of Kram’s dichotomy between the psychosocial and career mentoring functions and Kram’s four-phase linear model of the mentoring process. Other mentoring relationships in the doctoral experience in addition to the advisor will also be discussed.

6.1.1. Application of Kram’s mentoring model

This study used Kram’s (1983) mentoring model to situate the exploration of the mentoring experience of ILS doctoral students. As stated in the literature review, Kram classifies the relationship into two broad functions, career and psychosocial, and provides a linear model of initiation, cultivation, separation, and redefinition to describe the process of the relationship.

Kram (1983) identifies the career function as “those aspects of the relationship that primarily enhance career advancement” (p. 614) and lists sponsorship, exposure-and-visibility, coaching, protection, and challenging assignments as elements of this type of function.
Psychosocial functions include role modeling, acceptance-and-confirmation, counseling, and friendship. The results from this study suggest that the career function may weigh more heavily in the doctoral mentoring relationship than the psychosocial function. When asked to provide examples of mentoring, respondents focused on research and career advice with very few respondents mentioning elements of personal or emotional support. The topics of conversation identified by the respondents focused primarily on research and career preparation, with the items regarding the respondents’ personal lives ranking as the least frequent topic of conversation and the most sufficiently discussed. In terms of broad categories, all respondents stated that the intellectual/academic topics of conversation took up the majority of the time with discipline-related/career topics occurring next.

Very few individuals spoke of the psychosocial elements of the mentoring relationship. Those who did mention elements of role modeling focused on the way in which they sought to imitate the way in which their advisor conducted themselves as a professor and researcher in order to emulate their career path. This could be seen as aligning with Kram’s notion of the psychosocial elements, which Kram defines as: “those aspects of the relationship that primarily enhance sense of competence, clarity of identity, and effectiveness in the managerial role” (p. 614). The desire to emulate a career path could be seen both in terms of career advancement and a growing sense of the scholar’s identity and what they desire for their lives. It may be the case that the career elements are more explicit than the psychosocial elements and therefore more recognizable and measurable to the respondents. Elements such as gaining a sense of competence and identity likely occur during the doctoral process but they may be more difficult for the respondents to identify. Attribution may cause an additional complexity, as respondents may see multiple actors involved in their growing sense of identity as a scholar and be less
willing to identify their advisor as the sole provider of this input. Additionally, Kram’s
dichotomy may be problematic for application to doctoral studies in that all relationships are
aimed at the point of separation—a successful mentoring experience involves graduation and
therefore many elements of the relationship can be seen as functions of career advancement. For
example, mentoring may include co-authorship or co-presenting research. While strictly
contributing to career advancement, this may also contribute to the scholar’s sense of
competence and identity. There may be a grey area between the separation of these functions in
doctoral education, where the creation of independent scholars depends on their own gained
sense of competence and identity.

The point of the relationship where the psychosocial elements seemed to emerge was in
the redefinition phase of the advisee’s career, once they had successfully graduated and thereby
made a formal separation from their advisor. More advisors reported playing a role as colleague
and friend rather than mentor in the post-graduation phase of the student’s life. Similarly,
advisees identified advisors as colleagues and friends, with only about a quarter reporting
continued mentorship from their advisor. The point of redefinition seems to sever the
hierarchical bounds of the mentoring relationship as the two individuals move into peer status. It
is perhaps this peer status that allows the individuals the intimacy necessary to engage in a more
psychosocial relationship.

Mentoring behaviors were also examined within the structure of Kram’s linear model,
beginning with Initiation. Kram’s conceptualization of initiation involves mutual “fantasies” (p.
615), in which the mentee believes a senior mentor can provide the support and guidance they
need and the mentor believes the mentee to have some degree of potential. Kram describes a
“balance of initiative” from both parties. The impetus for the relationship can come from formal or informal work contexts.

The application of the Initiation stage in the doctoral process shares some similarities. There is certainly a degree to which both parties believe in the fantasy of a shared experience—many of the characteristics that are important upon initiation are potential rather than realized characteristics (such as the student’s ability to create a rigorous dissertation). The balance of realized to potential characteristics known before initiating the relationship varies a great deal depending on the structure of the program—an advisee may be assigned upon entry into the program or may be chosen after a set time period or academic milestone. Some respondents described how they must have previous knowledge of the advisee either as a student or research assistant before accepting them as an advisee. In situations such as these, there is a higher degree of known characteristics, although the fantasy of the successful mentoring relationship still exists. Programs may want to strongly consider whether the application process and program structure allows mentors and mentees the optimal ability to discover desired characteristics before engaging in the formal mentoring relationship, thereby reducing the chances of unobtainable fantasies.

A primary divergence from Kram’s conception is in initiative: whereas Kram identifies a balance of initiative, the findings from this study support a much more advisee-driven model, where the advisee is responsible for soliciting mentorship and the advisor serves in a passive initiation role—either accepting or declining the offer. The exception to this is in the cases where the advisor is assigned before entering the program. However, even in that case the student is initiating to some extent by applying to the program and, in many cases, explicitly stating the advisors with whom the student would like to work.
Kram describes the Cultivation phase as a period in which “the positive expectations that emerge during the initiation phase are continuously tested against reality” (p. 616). The findings from this study provide evidence that a successful cultivation phase requires frequent in-person contact between the parties. Although there were exceptions, advisors were better prepared to provide guidance and advisees were more prepared with deliverables when regular, in-person meetings were observed. Many respondents described the unstructured nature of the doctoral process and the way in which students floundered in the phase between the end of coursework and the dissertation defense. Frequent meetings were a way in which structure could be imposed on this nebulous stage.

As with the Initiation phase, initiative was a strong theme in the Cultivation phase. Respondents noted that the advisee was responsible for maintaining and propelling the relationship forward. Many respondents noted that the function of the doctoral process was to teach students to become researchers and future faculty. They mentioned that strong “coddling” in this stage was actually detrimental to the advisee. The advisee should be developing themselves as an independent scholar and be fully prepared to engage as a junior faculty member upon graduation. Perhaps in response to this, many respondents reported being treated as a junior colleague rather than as a neophyte.

Kram describes the career functions emerging first during the cultivation phase with the psychosocial elements emerging over time. As noted above, there is an emphasis on career advancement in the doctoral mentoring relationship, with psychosocial elements occurring as a byproduct of these activities (i.e., gaining a sense of competence through exposure-and-visibility activities). Explicit psychosocial mentoring seems to increase once the student has officially separated and entered the redefinition phase of the relationship.
Kram’s Separation phase “occurs when both managers recognize that the relationship is no longer needed in its previous form” (p. 620). Kram characterizes this period as one replete with “turmoil, anxiety, and feelings of loss” (p. 618). Except in the cases where an advisor/advisee relationship is terminated before a successful graduation, this seems an inaccurate portrayal of the doctoral mentoring experience. The formalized separation of graduation seems to make it a less tumultuous experience in that both parties are aware of an explicit separation point in which the formal relationship will no longer exist. Although some respondents noted that the mentoring continued in the post-graduation phase, they were much more likely to characterize each other as friends and colleagues once the student successfully graduated.

Separation was also very much under the control of the advisee. There were few reports of an advisor terminating the relationship except for external reasons (another job opportunity) or death. An advisee was far more likely to terminate the relationship mid-studies and engage another faculty member. In addition to controlling the decision to stay with a particular advisor, it also appeared to be under the advisee’s control whether or not they continued in the program. Many respondents spoke of how difficult it was to counsel students out of a given program, remarking that students were never terminated from a program unless they made the decision to quit.

Kram describes the Redefinition phase as one in which the mentee becomes a peer to the mentor and the relationship becomes primarily a friendship (p. 620). Kram describes the diminished importance of career mentoring at this stage, in favor of psychosocial mentoring. As noted above, the balance between career and psychosocial elements at this stage was also recognized in this study. In addition, this study identified one additional role (in addition to
friend and colleague) played by the mentors after the student graduates: collaborator. The collaborative role may differentiate doctoral student mentoring from other types of mentoring relationships in that it reduces some of the hierarchical nature of the classic apprentice-master relationship.

6.1.2. Visualizing Kram’s model for doctoral education

While Kram’s model provides an adequate structural model for exploring the doctoral mentoring process, it does not provide depth into how these phases are negotiated or the factors that play into success at each of these stages. Mentoring in doctoral education can be seen to be structured by the programmatic phases of doctoral education. Figure 13 portrays these phases, annotated by the actors which are most dominant for each step of the process. The blue boxes are processes of Initiation, Cultivation, and Redefinition (from Kram’s model). Separation is indicated by red boxes. It is notable that the Separation processes are those items which provide movement from Cultivation to another stage of the process (either to Redefinition, back to Initiation, or terminate the process). The items in the green rounded box indicate those items which were heavily discussed by respondents, but are not necessarily part of the programmatic process of doctoral education. In fact, in many cases, a doctoral student could graduate without engaging in these items. Institutions should evaluate their programs to the extent to which they embed these items into programmatic elements—for example, requiring an interdisciplinary minor, requiring teaching/research practica, providing opportunities for students to share ideas and receive feedback from each other, and providing the student with opportunities for engagement and networking.

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60 If this is rendered in black and white, the reader should know that four boxes comprise separation, appearing as the gateways between Cultivation and Initiation, Redefinition, or an end to the process.
Figure 13. Doctoral mentoring process/actor model

As is shown in Figure 13, the advisee is the primary driver through the majority of the processes. Doctoral programs may want to consider the implications of this and determine if there are certain processes for which the advisor, committee members or schools should play more dominant roles. For example, programs mostly become involved in separation when the student has successfully completed all the requirements of a program and the advisor predominately becomes involved only for reasons not related to the student. The student is therefore given the majority of control in determining whether or not to continue in a program.

Determination of whether a student should be in control of the process and in which stages other actors should be involved is largely left to the philosophy of the school and
individual advisors. However, to enable students to move more successfully through doctoral education, it is recommended that the school make the process and expectations explicit to the students. Many students may enter a doctoral program with the conception that they will be heavily guided. When this fantasy is unrealized, many programs may unwittingly allow the student to flounder until the student drops out. This has at least two implications: programs may be losing otherwise talented students who were not prepared for this unmet expectation and programs may be expending valuable resources maintaining students who will be unable to finish (or may finish only after a prolonged time). These issues could be greatly mitigated by introducing more transparency in terms of expectations and more structured filtering mechanisms in the process.

6.1.3. Mentoring constellation

As one student noted: “One faculty member does not serve as a village of doctoral study” (ID2). The findings from this study indicate that, although the advisor is seen as the primary and most dominant mentor in doctoral education, there are many other individuals the advisee consults both formally and informally. Among those, the dissertation committee members were the most likely mentors after the advisor.

Respondents indicated that committee members were chosen to play a purposeful role—these individuals were not meant to serve merely an administrative role, but were active members of the advisee’s mentoring team, providing both career and psychosocial roles. Among these roles, the most frequently mentioned were methodological assistance, literature familiarity/subject expertise, and editing ability. The study also displayed the indirect form of intellectual mentoring provided by the committee members—75% of dissertation authors cited at
least one committee member in their dissertation, showing that the dissertation committee members may be working in related research areas.

Although the advisee appeared to drive the relationship between the advisor and advisee, the advisor seemed to be the leader of the dissertation committee. The student made the selection based on consultation from the advisor and the rest of the committee deferred to the wishes of the advisor. Some respondents indicated that the advisor was the primary determinant of what was a passable product, while other committee members indicated holding the same standards for their students regardless of the advisor. This demonstrated the range of differences in doctoral education not only on the program level, but also on the advisor level—two students from the same program may have markedly different expectations of what a dissertation can and should be, depending on their individual advisors.

The most frequently reported informal mentoring occurred between doctoral student colleagues. In some cases, these students were working together as part of a formalized research collaboration. Most often, however, the students merely met informally to provide each other with support and counseling. The nature of these relationships could be seen to provide more of the psychosocial mentoring elements than conferred in any of the more formalized doctoral mentoring structures. Many of the respondents commented on the concept of “idea sharing” with their peers. It is possible that these forums allowed the student a safe place in which to experiment with new ideas and gain confidence before presenting the ideas to their mentors. In this way, peer mentoring may provide the critical functions necessary for the doctoral student’s growing sense of competence and identity. In addition, many of the students commented on the degree to which role modeling occurred between students—faculty members were at times unable to provide students with detailed instructions on how to progress through the doctoral
process. Senior doctoral students, however, were able to provide (through role modeling and direct instruction) advice on how to navigate through the doctoral process. In this way, the doctoral student community can be seen to provide the missing piece of doctoral mentoring—the advisors and committee members primarily provide the career elements while the doctoral student community provides many of the necessary psychosocial elements. Future studies of doctoral mentoring should take these relationships into account.

6.1.4. Best practices

The results of this research can be used to improve the quality of doctoral mentoring. One place for improvement can be seen by examining the topics of conversation as rated for both frequency and sufficiency by the advisors and advisees. Figure 13 displays the topics of conversation ranked by both sufficiency and frequency (orange/light dots represent advisees, blue/dark dots represent advisor). Examining each quadrant of this graph provides a good foundation for conversations about best practices.

![Graph depicting frequency and sufficiency of topics of conversation](image)

Figure 14. Graph depicting frequency and sufficiency of topics of conversation
For example, the top left quadrant depicts those items that are frequently discussed, but are still not discussed enough. As can be seen, the only topic that fell into this quadrant from both advisor and advisee perspectives are the major people, schools, and publications in the field. The top right quadrant depicts those items that are discussed frequently and sufficient. Both advisors and advisees listed advisee’s research and advisor’s research in this quadrant. The bottom right quadrant are those items that are rarely discussed, but do not need to be discussed more frequently. The advisor’s personal life and administrative tasks fell into this category. The last quadrant, and arguably the most important are those topics that were rarely discussed and the participants felt needed more discussion. University resources available to the student, pedagogy preparation, how to prepare publications/presentation, and how to write a grant proposal fell into this category. Producers and consumers of doctoral education should consider these quadrants and identify (particularly from the last quadrant) areas for improvement.

6.2. Collaboration

This section will discuss collaboration in terms of co-publishing with faculty members and idea sharing with other doctoral students. Also discussed will be the implications of the Big Science model on doctoral education. The section will end with a discussion of the dissertation as a collaborative product.

6.2.1. Co-publishing with advisors and committee members

Triangulation between the questionnaire and bibliometric data on collaboration shows strong similarities—on the questionnaire, 44% of advisees reported co-authoring with their advisor during their doctoral program and 31% reported co-authoring with their advisor following graduation. In the bibliometric analysis, 41% of dissertation authors had co-published with their advisor before (and up to) the year in which they graduated, and 31% had co-published
after graduation. These findings regarding collaborative authorship show collaborative authorship rates between advisees and advisors only slightly lower than results of previous studies on multi-authored publications in ILS—in each of these studies multi-authorship was found to occur in about 50% of the publications\(^6\) (Cunningham & Dillon, 1997; Ding, Foo, & Chowdhury, 1998; Lipetz, 1999; Liu, 2003; Williams & Winston, 2003). Further evidence is needed to ascertain whether those advisors who collaborate with students are more or less collaborative on the whole and whether advisees who collaborate during their doctoral studies have a higher proclivity for collaboration later in their career.

Doctoral students also collaborated with other individuals throughout the doctoral process, both in terms of co-publishing and other collaborative endeavors. Bibliometric analyses indicated that about 34% of dissertation authors co-authored with at least one committee member (excluding the advisor) at least once up to and before graduation and about 32% co-authored with at least one committee member at least once after graduation. Interview respondents also indicated the presence of collaborative relationships with their dissertation committees through both formal research assistantships and self-directed research collaborations.

Data from the interviews suggest a strong component of paradigm (Kuhn, 1996) shaping occurs in the course of these collaborative relationships, in which students are exposed to the normative structure of the field and how to communicate in it. One student noted that he learned “the research style, the research problem, [and] the research domain” (ID116) through collaborations. Another advisee recalled learning “how to make a research question and…what kinds of data answers that question and how to present it and how to write a conference paper as

\(^6\) This may indicate that ILS research is less likely to be co-authored than other social science research. As stated in the literature review, Cronin, Shaw, and La Barre (2003) found that 71% of psychology publications were co-authored and Larivière, Gingras, and Archambault (2005) found that 2/3 of all Canadian social science publications were co-authored.
opposed to a journal paper” (ID246). These examples epitomize the importance of collaboration in teaching doctoral students how to conduct research and how to engage in the communicative genres of the discipline. Although advisors can provide this support in other ways (discussion on research, feedback on manuscripts), it appears that collaborative research functions as a critical method for imparting the norms and expectations of the discipline (Girves & Wemmerus, 1988). Collaborations also seemed to provide a gateway for networking opportunities—many respondents noted being introduced into the scholarly community through conferences at which they were presenting or co-presenting with their advisors. These collaborations provide the student with the opportunity to meet other scholars and engage in the wider scholarly conversation.

Although other manifestations of collaboration between advisees and faculty members were mentioned (such as teaching), collaboration in the doctoral process was focused primarily on research. This corresponds to the interview respondents’ comments on the function of ILS doctoral education—that is, to develop strong researchers. The primary focus on developing researchers, rather than developing strong teachers or administrators, seemed evident in the examples of collaboration.

6.2.2. Idea sharing

Multiple respondents noted that they engaged in “idea sharing” with their doctoral student colleagues. Although exchanges these did not often materialize into formal collaborations, this seemed to be an important aspect and benefit of a strong doctoral student community. The ability to “idea share” within a safe network of peers may provide students the space in which to develop their own sense of competence and identity. Additionally, as ILS doctoral students bring with them a diverse range of experiences and educational background
(especially considering the low number of undergraduate degrees within the field), “idea sharing” may provide a place where interdisciplinary lenses can be introduced upon the doctoral students’ research projects. As noted above, the doctoral student community may play a critical mentoring role. It may also serve a valuable function within the intellectual development of doctoral students.

6.2.3. Big Science and grant funding

It is notable that, in the formalized collaborations between the advisee and the advisor and committee members, many respondents stressed the student’s ability to engage in their own research, rather than to conduct research that fulfilled their advisor’s or committee members’ particular research agendas. Doctoral students are encouraged and expected to conduct research and begin developing their own, individual research agenda during the course of their study, even when engaged in collaborations and are, in many respects, considered to be junior colleagues. Future research is necessary to evaluate how this may differentiate ILS from other disciplines, particularly those in which the lab model is more structured and plays a larger role in dictating the student’s research projects.62 This will be especially important as we consider the impact of the “Big Science” movement and the growing importance of grant funding on the field of ILS. In considering our current paradigm, we must examine whether the importation of certain characteristics of the Big Science model will dramatically change the way in which we do science and, if so, if that change is beneficial.

For the most part, interview respondents indicated a positive attitude toward grant funding—believing it would serve a double function of allowing the students to be in-residence

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62 See, for example, Golde and Dore’s (2004) study of English and Chemistry doctoral students in which 43.2% of the Chemistry students and 95.6% of the English students agreed or strongly agreed that the dissertation topic was one of their own choosing. Golde and Dore additionally investigated the extent to which the dissertation was a monograph or a compilation of smaller products with 70.5% of the Chemistry students indicating that their dissertation would include work from several different products.
and devoted to research. However, questionnaire respondents indicated that grant writing was among the least frequently discussed and the least sufficiently discussed item between advisors and advisees. Faculty members seem to have realized a value and potential in moving toward this model of scholarship, but have not yet engaged in work practices that reflect this move. Many of the advisees interviewed felt that they were at a great disadvantage when they began their careers because they were expected to generate grants, but had not received any instruction on how to do so. If the field of ILS decides to move in this direction, it will be imperative to educate future faculty at the doctoral level, rather than waiting until they are in the midst of their pre-tenure career to understand the mechanics of the grant writing/application process.

6.2.4. The dissertation as a collaborative product

One of the research questions driving this study was the extent to which the dissertation itself could be seen as a collaborative product and whether the same process, in another genre, would be considered co-authorship. Data from the questionnaire and interviews suggest that the dissertation is not and should not be considered a collaborative product. The respondents saw the dissertation as predominately advisee-driven, with guidance and support from the dissertation committee. In addition, the majority of respondents did not believe the advisor should appear as an author on any publications directly resulting from the dissertation. The dissertation stood apart as the single demonstration of the student’s ability to conduct independent research, therefore qualifying them for graduation.

Furthermore, many of the advisors noted that there was not an exact match between the dissertation research of the student and their own research. Instead, many respondents talked about a “shared problem space” in which the advisor and the advisees of that advisor were all working in similar, yet non-identical research areas. In interview discussions, respondents
reported a continuum of disciplinary models, bounded at one end by the humanities model, which, at its most extreme appeared to be conceptualized as the sole scholar, “squirreled away” in a library, separate from human contact, and bounded at the other end by the lab model, conceptualized as a team of students working on fractions of a shared research project under a single advisor. The repeated conception of the “shared problem space” may be an indication this represents a third model—that of the social science model—in which students’ work may be connected by a shared lens, even while they engaged in very distinct projects. The ability to share a lens, but not a research project, may increase the ability to engage in interdisciplinary or possibly inter-paradigmatic approaches and analysis. The characteristics of what defines a social science model, and how this model is practiced across other social science disciplines, begs further investigation.

6.3. Interdisciplinarity

The impacts of interdisciplinarity will be discussed in three ways: the disciplines of influence, that is, those disciplines from which ILS heavily draws; the interdisciplinary impacts on research methods; and the effects of the core literature on understanding our disciplinary identity.

6.3.1. Disciplines of influence

Respondents on the questionnaire indicated that the majority of the advisors received their degrees within the field of ILS. The most frequently mentioned non-ILS doctoral degrees had been received in education, computer science, history, communication, and psychology. Advisors noted serving on dissertations in education, computer science, journalism and mass communication, history and English. These topics triangulated well with the topics most frequently cited by ILS dissertations. The list of top-cited authors was predominately those
within the field of ILS, but also included researchers from the fields of communication, computer science, education, psychology, and social research (see affiliations from Table 30). Among the most cited serials were source titles from psychology, sociology, and management. The top cited conferences included those from computer science, communication, computational linguistics and education. Highly cited monographs were predominately research methods texts, with a focus on qualitative research methods. Those LC classes of references that appeared in more than 50% of the dissertations (across all source types) included the areas of psychology, management, sociology, education, linguistics, journalism and mass communication, mathematics, technology, and engineering. One item which was not explored was the extent to which the disciplines imported in the dissertations have changed over the years. Cronin and Meho’s (2008) longitudinal study of ILS articles showed a “significant increase in the number of highly cited business and management, computer science and engineering, health/medical sciences, and communication studies titles at the expense of information studies, sociology, statistics, and education titles” (p. 562).

It is important to note the differences in disciplinary imports according to communicative genre. Each source type had at least two LC classes within the top ten that were unique to that source type, for example, physics and engineering in conference proceedings and sociology, education, and gender studies in monographs. Topics such as medicine were highly cited within the serial and conference literature, but not within the monograph literature; psychology was highly cited within monographs and serials, but not within conferences. This is perhaps not surprising given the dominant communicative genres of each of these disciplines. However, many previously conducted bibliometric analyses are limited to a single source type. This study suggests that limiting to a particular source type may provide a substantial bias in the results of
the disciplinary influences on that field. Future studies need to take this into consideration and provide ample justification when limiting a study to only one communicative genre.

6.3.2. Impacts on research methods

Paradigm theory and studies of disciplinarity suggest that much of what characterizes a field are not just the questions asked, but the methods used to answer those questions. The prominence of research methods books on the list of most frequently cited monographs suggests a strong component of qualitative research occurring within the field.\textsuperscript{63} This corresponds well to the list of research methods identified on the questionnaire as those most frequently used by the advisees (in rank order): interview, content analysis, ethnography/participant observation, survey, experiment/quasi-experiment (with humans), and field studies/naturalistic research. In terms of curriculum, most interview respondents commented that research methods instruction occurred outside of the department, with students electing the department from which they would receive this training. Future studies should evaluate the research methods most prominent in the published research in the field and the way in which doctoral curricula prepare students to engage in these methods.

6.3.3. Core literature and disciplinary identity

Genre practices are another defining disciplinary characteristic. The results of this study show a dominance of serial and monograph literature among the references. This may differentiate ILS from other disciplines which rely more heavily on conference proceedings or exchange ideas almost exclusively through monographs. However, although monographs held a

\textsuperscript{63} See, for example the top four most cited monographs: the first covers naturalistic inquiry, the second grounded theory and the third and fourth are handbooks for qualitative research methods. It may also be the case that those engaging in qualitative research feel a higher need to justify their use of these methods.
substantial portion of the total references, they had less of a “core”\textsuperscript{64} than serial and conference literature. These findings may indicate that ILS has established a core in the serial and conference literature, but does not rely on a core for monograph literature.

The idea of a core literature relates to the concept of disciplinary identity and maturation—the extent to which the field has coalesced around a set of values, practices, and literature. Findings from the questionnaire appear to indicate some ambiguity in our disciplinary identity—when asked to classify ILS into a broad disciplinary category (humanities, social science, or natural science), 15% chose the “other” option. In addition, 20% selected more than one option on this list.\textsuperscript{65} While this may be an indicator of the status of ILS as a meta-field (Bates, 1999), the inability to classify the field in relation to the current academic structure may be problematic for our own understanding of the field and for communicating this identity to those outside the field.

Many respondents boasted of the interdisciplinary opportunities and requirements of their doctoral students and called the field “inherently” interdisciplinary. However, while some respondents discussed a concern that students become “grounded in the core” there did not appear to be many functional aspects of the curriculum designed to assess if and how this was occurring. Some programs noted removing standardized comprehensive/qualifying exams in favor of more specialized and individualized exams or projects. Although some programs require a master’s degree in the field, this is not universally required and undergraduate degrees are scarce.\textsuperscript{66} Given these things, coupled with the often individualized curriculum of doctoral

\textsuperscript{64} Titles appearing across multiple dissertations

\textsuperscript{65} It is speculated that this same ambiguity would not exist in most other fields; however, further research is necessary to validate this speculation.

\textsuperscript{66} It may also be noted that master’s degrees in the field are professional degrees and the degree to which students are exposed to the theoretical underpinnings of the field may vary by program.
education, and the inevitability of a specialized dissertation, ILS runs the risk of graduating scholars who lack a clear sense of the field as a whole and who are unable to communicate among themselves. This fracturing of the invisible college may require additional analysis when considering our disciplinary identity.

6.4. Limitations

As with any research, limitations exist which restrict the study’s generalizability. Although the limitations of the research have been noted throughout the text, four main limitations will be discussed here: study population, the survey instrument, the use of the LC class in the interdisciplinarity index, and the index itself.

As stated in the methods section, this questionnaire recruited one kind of “successful” graduate—those who had completed their degree in ILS and had received a position as a faculty member at an ILS institution in the United States or Canada. Many limitations are embedded in this choice: the nature of using assistant professors as proxies for doctoral students, the focus on successful graduates, the focus on the U.S. and Canada, the exclusion of non-ALA-accredited schools, and the self-selecting properties of using a questionnaire.

The choice to consider assistant professors as proxies for doctoral students was made in order to ensure that the respondent had experienced all aspects of the doctoral experience and could evaluate their post-doctoral experience relationships with their advisors. The implications for this choice were that the population would only be those who completed their degree. In addition, the population was scoped to include only ALA-accredited programs, excluding many schools arguably within the field (such as additional schools engaged in the iSchool caucus). Lastly, the population for the questionnaires and interviews was self-selecting, adding an additional degree of bias to the results. Future studies should consider longitudinal methods to
collect data during the doctoral experience, capturing both those who graduate and those who do not, and evaluating the various career paths of these graduates.

Additionally, this study did not evaluate many possible demographic variables (such as age, gender, race, cultural background) and the impact of these variables on the doctoral mentoring experience. A choice was made in this study not to collect on these variables\(^{67}\), but these could certainly be included in future studies. In addition to collecting information on these variables independently, future studies should evaluate pairs of these variables in mentoring relationships (such as the age, gender, race, native language of both the advisor and advisee) and whether similarities and differences in these paired variables impact the mentoring experience. It is hoped that the current exploratory research will provide a foundation against which these future studies can be compared.

Another limitation of this study was the adequacy of the electronic questionnaire for gathering the study data. The benefits of this method were the sheer quantity of data that were collected and the large variety of institutions represented by the participants. However, there were a number of specific limitations to this particular instrument. One large disadvantage was the time it took to complete the questionnaire—this was a deterrent to some and an annoyance to others. A shorter, more focused survey may have been better. In addition, many respondents to the advisor questionnaire complained that the questions required that they group and evaluate all their advisees together, which they did not feel they were able to do. In addition, many found the Likert-type scale of all – half – none (“of your advisees”) to be nonsensical. Future studies should evaluate better ways in which to elicit general responses about mentoring from advisors.

\(^{67}\) The rationale for this choice was that this would be a very different avenue of research, and one that should be explored only once the baseline study had been conducted. It was also felt that the most meaningful studies of this type should include mentoring pairs, which were not explicitly studied in this dissertation.
As exploratory research, this study sought to test the use of the LC class on a small subset of ILS dissertations. The selection criteria of these dissertations produced a convenience sample, rather than a random sample, which resulted in many dissertations written within the last 10-15 years. In order to assess the relationship of interdisciplinarity to other variables (such as year or school), future studies should consider randomly selecting equal groups of dissertations from specific decades or schools for analysis.

In addition, further refinements should be made to the index based on the results of this work, which found a large range between the dissertations. One might also consider the arbitrary .1 in the denominator (included to avoid something becoming infinitely interdisciplinary) and whether there are more accurate means for addressing this issue. Additional measurement of validity and reliability also need to be examined before this could be widely used.

Future studies may also want to consider the appropriateness of the LC classification scheme for determining disciplinarity. As mentioned in the discussion section, many previous bibliometric studies of interdisciplinarity have focused on one source type. This study utilized the LC classification scheme in order to assign disciplinarity to multiple source types. However, the interdisciplinarity index works on the assumption that the unit used is a proxy for discipline. The findings from this study suggest that this may not be the most appropriate assumption—there is no uniformity to the level of the structure on which a codified discipline may appear and many of the classes do not describe a particular discipline. Other classification systems, which are able to classify multiple source types, should be explored in future research.

Once an appropriate classification scheme is found, validity of the index will need to be assessed—that is, the degree to which the index is measuring interdisciplinarity. Ways in

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68 This test was originally planned for this work, but was abandoned after the discovery that the classification scheme and the index may need further refinements.
which this could be operationalized could include a Delphi study, a content analysis, or comparing against other standards of interdisciplinarity. Validation will be a necessary step before this index can become fully functional.
7. Conclusions and Future Research

This exploratory research provided much needed data regarding the development of scholars within the field of information and library science. The study found that advisors serve as the most dominant mentor in the doctoral process and provide guidance and support of the student to prepare them for a career in research. Committee members serve a similar function, although to a lesser degree. Doctoral student colleagues provide emotional support and role-modeling. However, although there are multiple individuals providing support and guidance, the doctoral process is largely driven by the student. Collaboration of some form occurs in the majority of the advising relationships, however, slightly less than 50% of advisees co-publishing with their advisors. The doctoral dissertation is not considered to be collaborative, although the advisor and committee members provide guidance and support. The dissertation bibliographies display a core in serial and conference literature, with interdisciplinary borrowing of research methods and subject literature from fields such as communication, computer science, linguistics, psychology and sociology.

Some key contributions of this study, in addition to providing a state-of-the-art for ILS doctoral education, were in the introduction of the concepts of idea sharing, the social science model, and the interdisciplinarity index. This work found that idea sharing between doctoral students was seen as a critical type of informal collaborative activity, in which the students engage in discussion about their scholarly work, without producing formal collaborative products. In addition, students shared doctoral experiences and received mentoring in the form of peer role modeling. It was found that doctoral student colleagues may serve as a better source
of information regarding navigating the doctoral process than advisors. More work should be
done to examine the extent to which doctoral programs can, do and should support and facilitate
this type of behavior.

The social science model also requires further investigation. Participants routinely placed
themselves somewhere on a continuum between the humanities model and the lab science model,
without describing themselves as rooted in a social science model. The idea of the shared
problem space as being the defining element of this social science model requires further
evidence. In addition, comparison to other social science disciplines is warranted, especially
given the possibly unique demographic of the ILS doctoral student population.

Although further refinements on the interdisciplinarity index are needed, this work was
able to introduce a measurement that took into account both the internal and external citations of
a given work for a single index. This differentiates itself from previous measurements that only
investigate one of these functions. In addition, this is an index that can be calculated on any
sized set of units, unlike other indexes that require hundreds or thousands of data points. Future
refinements should bear in mind the importance of calculating both internal and external
citations and continue to provide relatively simple calculations that do not require access to large
sets of data or data of a specific communicative genre.

The results of this study generated many avenues for future research. This study focused
on one type of mentoring relationship—that of the successful graduate who obtains a faculty
position in the field of ILS. Future studies should be done to address the mentoring experiences
of those who graduate, but go on to different positions and those who do not complete the
doctoral degree. International contexts should also be considered. In addition to evaluating the
effects of mentoring on retention and attrition, a longitudinal study could evaluate the effects of
mentoring on time-to-completion rates within the field. Comparisons of these groups to the data from the current study may provide valuable insights on the ways in which we can improve the way in which we are currently providing doctoral education.

This study evaluated the degree to which doctoral students were engaged in co-publishing with their advisors and committee members and the degree to which the dissertation itself could be considered a collaborative product. More work could be done to examine other elements of collaboration in the doctoral process, such as work on grants and joint projects and the ways in which these collaborations may impact future work and research behaviors of the student. In addition, future research is necessary to more fully understand the ways in which students learn how to communicate in genre-specific ways. Analyses of these types could also be extended to junior faculty mentoring, as another context in which scholars learn to engage in cultural norms.

This study provided the first large-scale analysis of the references of ILS dissertations. In addition to identifying the sources and authors which comprise our disciplinary core, this work provides a foundation upon which future studies can evaluate change in the discipline. An interdisciplinarity index was also proposed and tested. As a relative index, future studies are necessary to examine change across time, between schools, and between disciplines. This work provides a necessary state-of-the-art for future comparisons.

Many questions about the future of the discipline were also addressed here and require future analysis. At the heart of many of these questions is the impact of the Big Science model and grant funding system on our current disciplinary paradigm. As noted by Walker and colleagues (2009), “funding patterns and incentives can radically reshape academic passions and pursuits” (p. 31). Future research needs to be done to assess the ways in which these funding
patterns have impacted the research areas, methods, interdisciplinary influences, and doctoral education in ILS.
Appendices
Appendix A. Findings from Isaac, Quinlan, and Walker (1992) study (p. 262)

TABLE 12
Mean Rating Values for Selection of Dissertation Topic

| Faculty: “For your Ph.D. students, who typically makes the final selection of the doctoral dissertation topic?” |
| Students: “Which of the following best characterizes your final selection of a (dissertation) topic?” |

<table>
<thead>
<tr>
<th>Academic Area</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative science</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td>4.2%</td>
<td>66.7%</td>
<td>29.2%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>2.3</td>
</tr>
<tr>
<td>Students</td>
<td>41.4%</td>
<td>41.4%</td>
<td>13.8%</td>
<td>0.6%</td>
<td>3.4%</td>
<td>1.8</td>
</tr>
<tr>
<td>Agricultural science</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td>9.0%</td>
<td>43.3%</td>
<td>37.3%</td>
<td>10.4%</td>
<td>0.0%</td>
<td>2.5</td>
</tr>
<tr>
<td>Students</td>
<td>4.3%</td>
<td>0.0%</td>
<td>13.0%</td>
<td>52.2%</td>
<td>30.4%</td>
<td>4.0</td>
</tr>
<tr>
<td>The arts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td>22.7%</td>
<td>40.9%</td>
<td>36.4%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>2.1</td>
</tr>
<tr>
<td>Students</td>
<td>40.9%</td>
<td>40.9%</td>
<td>18.2%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>1.8</td>
</tr>
<tr>
<td>Biological sciences</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td>2.0%</td>
<td>24.0%</td>
<td>68.0%</td>
<td>6.0%</td>
<td>0.0%</td>
<td>2.8</td>
</tr>
<tr>
<td>Students</td>
<td>16.7%</td>
<td>29.2%</td>
<td>37.5%</td>
<td>16.7%</td>
<td>0.0%</td>
<td>2.5</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td>12.2%</td>
<td>58.5%</td>
<td>29.3%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>2.2</td>
</tr>
<tr>
<td>Students</td>
<td>66.9%</td>
<td>26.4%</td>
<td>12.6%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>1.5</td>
</tr>
<tr>
<td>Engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td>1.4%</td>
<td>11.4%</td>
<td>54.3%</td>
<td>24.3%</td>
<td>8.6%</td>
<td>3.3</td>
</tr>
<tr>
<td>Students</td>
<td>20.7%</td>
<td>32.8%</td>
<td>25.9%</td>
<td>10.3%</td>
<td>10.3%</td>
<td>2.6</td>
</tr>
<tr>
<td>Humanities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td>14.5%</td>
<td>70.9%</td>
<td>12.7%</td>
<td>0.0%</td>
<td>1.8%</td>
<td>2.0</td>
</tr>
<tr>
<td>Students</td>
<td>30.0%</td>
<td>50.0%</td>
<td>15.0%</td>
<td>0.0%</td>
<td>5.0%</td>
<td>2.0</td>
</tr>
<tr>
<td>Physical sciences &amp; mathematics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td>3.2%</td>
<td>25.4%</td>
<td>54.0%</td>
<td>12.7%</td>
<td>4.8%</td>
<td>2.9</td>
</tr>
<tr>
<td>Students</td>
<td>24.5%</td>
<td>34.7%</td>
<td>24.5%</td>
<td>10.2%</td>
<td>6.1%</td>
<td>2.4</td>
</tr>
<tr>
<td>Professional biological sciences</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td>3.3%</td>
<td>30.0%</td>
<td>53.3%</td>
<td>13.3%</td>
<td>0.0%</td>
<td>2.8</td>
</tr>
<tr>
<td>Students</td>
<td>51.3%</td>
<td>31.3%</td>
<td>25.0%</td>
<td>9.4%</td>
<td>3.1%</td>
<td>2.2</td>
</tr>
<tr>
<td>Social &amp; behavioral sciences</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td>19.0%</td>
<td>54.4%</td>
<td>22.8%</td>
<td>2.5%</td>
<td>1.3%</td>
<td>2.1</td>
</tr>
<tr>
<td>Students</td>
<td>52.2%</td>
<td>29.9%</td>
<td>13.8%</td>
<td>3.0%</td>
<td>1.5%</td>
<td>1.7</td>
</tr>
<tr>
<td>All respondents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td>8.7%</td>
<td>40.3%</td>
<td>40.5%</td>
<td>8.5%</td>
<td>2.1%</td>
<td>2.5</td>
</tr>
<tr>
<td>Students</td>
<td>37.5%</td>
<td>30.9%</td>
<td>19.0%</td>
<td>7.8%</td>
<td>4.9%</td>
<td>2.7</td>
</tr>
</tbody>
</table>

**Note:** Responses were recorded using a five-point scale as follows:

1 = the student
2 = the student with input from the adviser
3 = mutual decision by student and adviser
4 = the adviser with input from the student
5 = the adviser

234
Appendix B. Measurements used in interdisciplinarity studies

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Examples of works that use these measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borrowing</td>
<td>Do Espirito Santo &amp; Walker, 1978</td>
</tr>
<tr>
<td>Boundary crossing</td>
<td>Pierce, 1999</td>
</tr>
<tr>
<td>Citation delay</td>
<td>Rinia et al., 2001</td>
</tr>
<tr>
<td>Citation identities</td>
<td>White, Wellman, &amp; Nazer, 2004</td>
</tr>
<tr>
<td>Co-author analysis</td>
<td>Schummer, 2004</td>
</tr>
<tr>
<td>Co-citation analysis</td>
<td>White, Wellman, &amp; Nazer, 2004</td>
</tr>
<tr>
<td>Co-word analysis</td>
<td>Palmer, 1999; van Raan, 2000</td>
</tr>
<tr>
<td>$h$-indexes</td>
<td>Levitt &amp; Thelwall, 2009</td>
</tr>
<tr>
<td>Inter-citations</td>
<td>Allan, 1980; Levitt &amp; Thelwall, 2008; White, Wellman, &amp; Nazer, 2004; Liu &amp; Wang, 2005; Pluzhenskaia, 2007; Odell &amp; Gabbard, 2008; Morillo, Bordons, &amp; Gómez, 2003</td>
</tr>
<tr>
<td>Raw co-citation counts</td>
<td>Qin, Lancaster, &amp; Allen, 1997</td>
</tr>
</tbody>
</table>
## Appendix C. Classification systems used in interdisciplinarity studies

<table>
<thead>
<tr>
<th>Classification systems</th>
<th>Examples of works that use these systems</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Books in Print</em></td>
<td>Herring, 1999</td>
</tr>
<tr>
<td>Cluster analysis</td>
<td>Liu &amp; Wang, 2005</td>
</tr>
<tr>
<td>Dewey classification systems</td>
<td>Allan, 1980; Khawam, 1992</td>
</tr>
<tr>
<td>Disciplinary affiliations of authors</td>
<td>Haythornthwaite, 2006; Pierce, 1999; Qin, Lancaster, &amp; Allen, 1997; Schummer, 2004; Herring, 1999</td>
</tr>
<tr>
<td>ISI subject categories</td>
<td>Pluzhenskaia, 2007; Levitt &amp; Thelwall, 2008; Pierce, 1999; Herring, 1999; Levitt &amp; Thelwall, 2008; Morillo, Bordons, &amp; Gómez, 2003; Porter &amp; Chubin, 1985; Porter, Roessner, &amp; Heberger, 2008</td>
</tr>
<tr>
<td><em>JCR subject categories</em></td>
<td>Sanz-Casado et al., 2004; Odell &amp; Gabbard, 2008</td>
</tr>
<tr>
<td>Library of Congress classification system</td>
<td>Herring, 1999; Palmer, 1999</td>
</tr>
<tr>
<td><em>Ulrich’s International Periodicals Directory</em></td>
<td>Qin, Lancaster, &amp; Allen, 1997; Herring, 1999; Palmer, 1999</td>
</tr>
</tbody>
</table>
Appendix D. Advisee questionnaire

Did you receive your doctoral degree from the field of information and library science (including: information studies, information science, library science, library and information science, library and information studies, informatics, etc.)?

- [ ] Yes (if yes, please specify exact title of degree)
- [ ] No (If no, please specify the field from which you received your degree)

Which of the following categories best describe the type of work you did for your dissertation (may choose more than one):

- [ ] Survey
- [ ] Interview
- [ ] Experiment/Quasi-experiment (with humans)
- [ ] Experiment/Quasi-experiment (without humans)
- [ ] Content analysis
- [ ] Field studies/naturalistic research
- [ ] Ethnography/participant observation
- [ ] Bibliometric
- [ ] Historical research
- [ ] Bibliographical
- [ ] Critical analysis
- [ ] Other (please specify)

How would you classify your dissertation? (May choose more than one.)

- [ ] Humanities
- [ ] Social science
- [ ] Natural science
- [ ] Other (please specify)
From what field did your advisor receive their doctoral degree?

- Information and Library Science (including: information studies, information science, library science, library and information science, library and information studies, informatics, etc.) If ILS, please specify the exact title of your degree and include any majors, minors, concentrations, or interdisciplinary areas (if known):

- Computer science
- Education
- Communication
- Other (please specify)

Survey Completion
0% [ ] 100%
Please describe how you chose or were assigned to your advisor.
How important were the following characteristics in initiating a relationship with your advisor?

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Not Important</th>
<th>Somewhat Important</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is doing interesting research</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reputation for getting students through in a timely manner</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has money to support me</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intellectual interests match mine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Will make sure I do a rigorous dissertation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommended by other people</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reputation as a good researcher</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reputation as a good teacher</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reputation as a good advisor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knows the techniques and methods I will employ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fosters a working environment I like in this/her research group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can write a good recommendation letter to carry my career a long way</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Willing to take me</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Did you change advisors during the course of your dissertation?

- Yes
- No

Survey Completion

0% 100%
At what point in your studies did you change advisors and what was the reason for the change?
How often did you have one-on-one meetings (in-person or phone) with your advisor in the time BEFORE you finished coursework?

- More than once a week
- Once a week
- Twice a month
- Once a month
- Once a term
- Once a year
- Never

How often did you have one-on-one meetings (in-person or phone) with your advisor in the time AFTER you finished all your coursework?

- More than once a week
- Once a week
- Twice a month
- Once a month
- Once a term
- Once a year
- Never

How often did you have meetings with your advisor and other doctoral students in a non-course environment (i.e., project, team, lab meetings)?

- More than once a week
- Once a week
- Twice a month
- Once a month
- Once a term
- Once a year
- Never
How often did you communicate with your advisor in the following ways?

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Once a year</th>
<th>Once a term</th>
<th>Once a month</th>
<th>Twice a month</th>
<th>Once a week</th>
<th>More than once a week</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-person</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>E-mail</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Phone (voice)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Print correspondence</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>IM/Chat/Text messaging</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Mediated conferencing</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Survey Completion: 0% - 100%

Would you say you were mentored during your doctoral program (by any individual or communities)?

- ☐ Yes
- ☐ No

Survey Completion: 0% - 100%
Did any of the following serve as a mentor? (Check all that apply.)

- Faculty advisor
- Dissertation committee member
- Other ILS faculty (not on committee)
- Other non-ILS faculty (not on committee)
- Other ILS students
- Other non-ILS students
- Administrative staff
- Other (please specify)

Please provide examples of ways in which you were mentored during your doctoral program.
What was the degree of involvement between you and your advisor on the following tasks of writing the dissertation?

<table>
<thead>
<tr>
<th>Task</th>
<th>Entirely the student</th>
<th>Equal involvement</th>
<th>Entirely the advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conception</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Design</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Data collection</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Analysis</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Interpretation</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Drafting</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Revising</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Reviewing the final draft</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Approving the final draft</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Survey Completion: 0% - 100%
Please describe the way(s) in which you collaborated with your advisor.

Did you publish with your advisor during your doctoral studies?
- Yes
- No

Have you published with your advisor since you graduated?
- Yes
- No

Have you published or do you plan to publish the work from your dissertation?
- Yes
- No
Will you (or did you) list your advisor as an author on publications coming from your dissertation?

☐ Yes
☐ No

Please state the reason(s) why you chose to include or not to include your advisor on published work coming from the dissertation.
How often would you consider significant work by a colleague in the following areas as grounds for authorship on a publication?

<table>
<thead>
<tr>
<th>Area</th>
<th>Never</th>
<th>Sometimes</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conception</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data collection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpretation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drafting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revising</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reviewing the final draft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approving the final draft</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Survey Completion: 0%  [ ] 100%

Did you attend conferences during your doctoral studies?

- [ ] Yes (please state your main reason for attending): [ ]
- [ ] No (please state your main reason for not attending): [ ]

Survey Completion: 0%  [ ] 100%
Which conferences did you attend and how often?

What role did your advisor play in your conference attendance? (Check all that apply.)

- Your advisor encouraged you to attend
- Your advisor supported you financially
- Your advisor introduced you to others in the field
- Your advisor co-authored with you on conference publications
- Other (please specify)
- Your advisor played no role in your conference attendance

Survey Completion

0% [ ] 100% [ ]
In how many of your information exchanges with your advisor did you discuss the following items? Was this frequency sufficient?

<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency</th>
<th>Sufficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your research</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your coursework</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your advisor’s research</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research in the field</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrative tasks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University resources available to you</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How to write a grant proposal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How to prepare presentations and publications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How to be a successful teacher</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your personal life</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your advisor’s personal life</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your past graduation job opportunities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The major people, schools, publications, etc. in the field</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upcoming conferences</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please describe any additional types of information exchange not covered in the previous question.
How was the time spent interacting with your advisor distributed across the following categories? (Must total 100%)

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intellectual/Academic</td>
<td>0</td>
</tr>
<tr>
<td>Administrative</td>
<td>0</td>
</tr>
<tr>
<td>Technical/Technology-related</td>
<td>0</td>
</tr>
<tr>
<td>Personal/Social/Emotional</td>
<td>0</td>
</tr>
<tr>
<td>Discipline-related/Career</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3</strong></td>
</tr>
</tbody>
</table>

Who initiated instances of information exchange between you and your advisor?

<table>
<thead>
<tr>
<th>Initiation Type</th>
<th>Always the student</th>
<th>Equal Initiation</th>
<th>Always the advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Survey Completion: 0% - 100%
Please check all that apply:

- I worked as a teaching assistant for my advisor
- I co-taught with my advisor
- I received pedagogical instruction from my advisor
- None of these choices apply

How would you describe your post-graduation relationship with your advisor?

- We are friends
- We are colleagues
- We are collaborators
- My advisor continues to serve as my mentor
- We have no relationship

Do you have any further comments you would like to add?
Please provide your name and contact information if you are willing to be contacted regarding this survey.

Survey Completion

0% 100%

We thank you for your time spent taking this survey. Your response has been recorded.

Survey Completion

0% 100%
Appendix E. Advisor questionnaire

From what field did you receive your doctoral degree?

- Information and Library Science (including information studies, information science, library science, library and information science, library and information studies, informatics, etc.) If ILS, please specify the exact title of your degree and include any majors, minors, concentrations, or interdisciplinary areas (if applicable):

- Computer Science
- Education
- Communication
- Other (please specify)

Have you ever served on a dissertation committee (or committees) in a field other than ILS (as a committee member or chair)?

- Yes (if yes, please specify discipline(s) and how many times you have served in this capacity):

- No

Have you served as an advisor on a doctoral dissertation committee in the field of information and library science?

- Yes (if yes, please specify how many times):

- No

Survey Completion

0% 100%
Please describe the practices at your institution in regards to assigning/choosing dissertation advisees (in 2 or more sentences).
How important are the following in choosing to work with a potential or assigned advisee?

<table>
<thead>
<tr>
<th></th>
<th>Not Important</th>
<th>Somewhat Important</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student is doing interesting research</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>You perceive the student will graduate in a timely manner</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Students' academic record</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Students' standardized test scores</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Students' letters of recommendation for the program</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Reputation of the student within the department/discipline</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>You perceive the student will do a rigorous dissertation</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Students' level of initiative</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Students' previous work experience</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Match of the student's intellectual interests with your own</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Having money to support the student</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Students' personality</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Survey Completion: 0% → 100%
How often do you have one-on-one meetings (in-person or phone) with each of your advisee(s) in the time BEFORE they have finished all of their coursework? (Excluding time spent with them in class, if you are one of their instructors.)

- More than once a week
- Once a week
- Twice a month
- Once a month
- Once a term
- Once a year
- Never

How often do you have one-on-one meetings (in-person or phone) with each of your advisee(s) in the time AFTER they have finished all of their coursework?

- More than once a week
- Once a week
- Twice a month
- Once a month
- Once a term
- Once a year
- Never
How often do you meet with multiple students at once in a non-course environment (i.e., project, team, or lab meetings)?

- More than once a week
- Once a week
- Twice a month
- Once a month
- Once a term
- Once a year
- Never

How often do you communicate with your advisees in the following ways?

<table>
<thead>
<tr>
<th>Method</th>
<th>Never</th>
<th>Once a year</th>
<th>Once a term</th>
<th>Once a month</th>
<th>Twice a month</th>
<th>Once a week</th>
<th>More than once a week</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-person</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>E-mail</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Phone (voice)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Print correspondence</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>IM/Chat/Text messaging</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Mediated conferencing</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Survey Completion: 0% - 100%

To how many of your advisees would you consider yourself a mentor?

<table>
<thead>
<tr>
<th>None</th>
<th>Half</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Survey Completion: 0% - 100%
Please provide an example of how you have been a mentor to your advisee(s).

Reflecting on your experience as a committee member (not chair/advisor), to how many of these students would you consider yourself a mentor?

None  
Half  
All

Survey Completion
0% 100%

Please provide an example of how you are a mentor to the students on whose committees you have served.

Survey Completion
0% 100%
What percentage of the work that you do as a dissertation adviser is associated with each of these facets of scholarship? (Must total 100%)

<table>
<thead>
<tr>
<th></th>
<th>Entirely the student</th>
<th>Equal involvement</th>
<th>Entirely the adviser</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conception</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data collection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpretation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drafting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revising</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reviewing the final draft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approving the final draft</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Survey Completion
0% 100%

What is the typical degree of involvement between you and your advisee(s) on the following tasks of writing the dissertation:

With how many of your advisee(s) do you collaborate?

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>Half</th>
<th>All</th>
</tr>
</thead>
</table>

Survey Completion
0% 100%
Please provide examples of ways in which you collaborate with your advisee(s).

**Survey Completion**

| 0% | 100% |

| With how many of your advisee(s) do you publish, during their doctoral program? |
|---------------------------------|-------------------------------|
| None                           | Half                          | All                           |
| ![Circle](null)                | ![Circle](null)              | ![Circle](null)              |
| ![Circle](null)                | ![Circle](null)              | ![Circle](null)              |
| ![Circle](null)                | ![Circle](null)              | ![Circle](null)              |
| ![Circle](null)                | ![Circle](null)              | ![Circle](null)              |
| ![Circle](null)                | ![Circle](null)              | ![Circle](null)              |

| With how many of your advisee(s) are you a co-author on publications that result from their dissertation work? |
|-------------------------------------------------|-----------------------------|
| None                                           | Half                        | All                          |
| ![Circle](null)                                | ![Circle](null)             | ![Circle](null)              |
| ![Circle](null)                                | ![Circle](null)             | ![Circle](null)              |
| ![Circle](null)                                | ![Circle](null)             | ![Circle](null)              |
| ![Circle](null)                                | ![Circle](null)             | ![Circle](null)              |
| ![Circle](null)                                | ![Circle](null)             | ![Circle](null)              |

<table>
<thead>
<tr>
<th>With how many of your former advisee(s) do you co-author after they have graduated?</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
</tr>
<tr>
<td><img src="null" alt="Circle" /></td>
</tr>
<tr>
<td><img src="null" alt="Circle" /></td>
</tr>
<tr>
<td><img src="null" alt="Circle" /></td>
</tr>
<tr>
<td><img src="null" alt="Circle" /></td>
</tr>
</tbody>
</table>

**Survey Completion**

<p>| 0% | 100% |</p>
<table>
<thead>
<tr>
<th>Activity</th>
<th>Never</th>
<th>Sometimes</th>
<th>Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conception</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data collection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpretation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drafting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revising</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reviewing the final draft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approving the final draft</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Survey Completion: 0% - 100%
Who initiates instances of information exchange between you and your advisee(s)?

<table>
<thead>
<tr>
<th>Always the student</th>
<th>Equal initiation</th>
<th>Always the advisor</th>
</tr>
</thead>
</table>

In how many of your information exchanges with your advisee(s) do you discuss the following items? Is this frequency sufficient?

<table>
<thead>
<tr>
<th>Item</th>
<th>None</th>
<th>Half</th>
<th>All</th>
<th>Sufficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student's research</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The student's coursework</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your research</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research in the field</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrative tasks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University resources available to the student</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How to write a grant proposal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How to prepare presentations and publications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How to be a successful teacher</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The student's personal life</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your personal life</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The student's post-graduation job opportunities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The major people, schools, publications, etc. in the field</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upcoming conferences</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Please describe any additional types of information exchange not covered in the previous question.
How is the time spent interacting with your advisee(s) distributed across the following categories? (Must total 100%)

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intellectual/Academic</td>
<td>0</td>
</tr>
<tr>
<td>Administrative</td>
<td>0</td>
</tr>
<tr>
<td>Technical/Technology-related</td>
<td>0</td>
</tr>
<tr>
<td>Personal/Social/Emotional</td>
<td>0</td>
</tr>
<tr>
<td>Discipline-related/Career</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>0</td>
</tr>
</tbody>
</table>

What role do you play in your advisee(s)’ conference attendance? (Check all that apply)

- [ ] I support them financially
- [ ] I introduce them to others in the field
- [ ] I co-author with them on conference publications
- [ ] Other (please specify) [ ]
- [ ] I play no role in my advisee(s)’ conference attendance

Please check all that apply:

- [ ] My advisee(s) serve as teaching assistants for my classes
- [ ] My advisee(s) co-teach with me
- [ ] I provide pedagogical instruction to my advisee(s)
- [ ] None of these choices apply
On average, how would you describe your relationship with your advisee(s) after they graduate? (Choose multiple, if applicable.)

- We are friends
- We are colleagues
- We are collaborators
- I am a mentor to my advisee (post-graduation)
- We have no relationship

Do you have any further comments you would like to add?

Survey Completion

0% [progress bar] 100%
Please provide your name and contact information if you are willing to be contacted regarding this survey.

We thank you for your time spent taking this survey. Your response has been recorded.
## Appendix F. Advisor questionnaire justification

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>RQ</th>
<th>Justification/Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you ever served as an advisor on a doctoral dissertation committee in the field of information and library science?</td>
<td>1</td>
<td>Criteria for inclusion in the study—the individual must have had chaired a doctoral dissertation committee in the field of information and library science.</td>
</tr>
<tr>
<td>From what field did you receive your doctoral degree?</td>
<td>3</td>
<td>Ascertains the degrees from which advisors of dissertation committees received their degrees. This is different from the data collected in the ALISE statistical reports because the ALISE reports provide generalized data from all faculty members, while this focuses on those who chaired dissertation committees. As discussed in the literature review, disciplinary acculturation makes a difference in doctoral education. The explicit non-ILS disciplines that were listed were chosen from the listing of non-LIS disciplines most commonly held by ILS faculty (ALISE statistics report, 2004).</td>
</tr>
<tr>
<td>Have you ever served on a dissertation committee in a field other than ILS (as a committee member or chair)?</td>
<td>3</td>
<td>The goal of this question was to ascertain the degree to which ILS faculty members were serving in other disciplines. The assumption was that if they were serving in a number of different disciplines, they may be learning disciplinary norms and models of those disciplines and bringing them back to inform their advising of the dissertation process in ILS.</td>
</tr>
<tr>
<td>Please describe the practices at your institution in regards to assigning/choosing dissertation advisees (in 2 or more sentences). Follow-up question: How important are the following in choosing to work with a potential or assigned advisee?</td>
<td>1</td>
<td>The goal was to describe ILS doctoral mentoring using Kram’s (1983) mentoring model (initiation-cultivation-separation-redefinition). This provided evidence for the “initiation” stage. Choices for the follow-up question were taken from the Survey on Doctoral Education and Career Preparation (<a href="http://www.phd-survey.org/">http://www.phd-survey.org/</a>). (Results from this survey research appear in Zhao, Golde, &amp; McCormick, 2007.)</td>
</tr>
<tr>
<td>How often do you have one-on-one meetings (in-person or phone) with each of your advisee(s) in the time BEFORE they have finished all of their coursework? (Excluding time spent with them in class, if you are one of their instructors.)</td>
<td>1</td>
<td>See the “cultivation” stage of Kram’s (1983) mentoring model. Also, high levels of interaction have been described in the literature as positive mentoring behavior (Gerholm, 1990; Girves &amp; Wemmerus, 1988; Hartnett, 1976; Weiss, 1981; Ashford, 1996; Benderly, 2003). The reason for this question and the similar question about after the coursework requirement was to ascertain if different levels of mentoring are encountered at different stages in the process.</td>
</tr>
<tr>
<td>How often do you have one-one-</td>
<td>1</td>
<td>See the “cultivation” stage of Kram’s (1983) mentoring model. Also, high levels of interaction have been described in the literature as positive mentoring behavior (Gerholm, 1990; Girves &amp; Wemmerus, 1988; Hartnett, 1976; Weiss, 1981; Ashford, 1996; Benderly, 2003). The reason for this question and the similar question about after the coursework requirement was to ascertain if different levels of mentoring are encountered at different stages in the process.</td>
</tr>
</tbody>
</table>

268
<table>
<thead>
<tr>
<th>Question</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>How often do you meet with multiple students at once in a non-course environment (i.e., project, team, lab meetings)?</td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td>In regards to RQ1, this provided further evidence of “cultivation” from Kram’s (1983) mentoring model. In regards to RQ2, this provided evidence of the “relationship constellation” aspect of mentoring (Higgins &amp; Kram, 2001; de Janasz &amp; Sullivan, 2004; Kram, 1983), in which an individual may receive mentoring from a variety of people. While the literature has identified the scenario of one person with many mentors, I would also proposed the concepts of one mentor to many students—and the resulting peer mentoring which can occur in this setting.</td>
<td></td>
</tr>
<tr>
<td>To how many of your advisee(s) would you consider yourself a mentor? Follow-up: Please provide an example of how you have been a mentor to your advisee(s).</td>
<td>Def.</td>
</tr>
<tr>
<td>This was used to justify the definition of mentoring in the advising context and to ascertain whether one can equate advisors with mentors.</td>
<td></td>
</tr>
<tr>
<td>Reflecting on your experience as a committee member (not chair/advisor), to how many of these students would you consider yourself a mentor? Follow-up: Please provide an example of how you are a mentor to the students on whose committees you have served.</td>
<td>Def.</td>
</tr>
<tr>
<td>This was used to extend the concept of mentoring to all those on the committee, not exclusively the advisor to ascertain whether committee members also provided mentoring functions.</td>
<td></td>
</tr>
<tr>
<td>How often do you communicate with your advisee in the following ways?</td>
<td>1</td>
</tr>
<tr>
<td>This question sought to identify how advisors and advisees exchanged information. The type of communication was used to describe the main modes of mentoring communication in the ILS dissertation process. This is also part of Kram’s (1983) “cultivation stage.”</td>
<td></td>
</tr>
<tr>
<td>Who initiates instances of information exchange between you and your advisee(s)?</td>
<td>1</td>
</tr>
</tbody>
</table>
| This question also contributed to the “cultivation stage” (Kram, 1983) and identified who was the key player in initiating instances of information exchange. This information will provide insight on the degree that advisor/advisee initiative is
In how many of your information exchanges with your advisee(s) do you discuss the following items? Is this frequency sufficient?

<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Necessary for cultivation of the disserting relationship.</td>
<td>1</td>
</tr>
<tr>
<td>More on the “cultivation” stage (Kram, 1983) and provided insights on the nature of the relationship. Provided further evidence of the “cultivation” stage (Kram, 1983) and whether the relationship performed primarily career or psychosocial functions (Kram, 1983). More evidence for the “cultivation” stage (Kram, 1983). This behavior of assisting in networking has been shown in the literature to be a positive mentoring behavior (Maack &amp; Passet, 1994; COSEPUP, 1997; Illes, 2002).</td>
<td>1</td>
</tr>
<tr>
<td>Provided further evidence of the “cultivation” stage (Kram, 1983)</td>
<td></td>
</tr>
<tr>
<td>and whether the relationship had primarily a career or psychosocial function (Kram, 1983). Provided further evidence of the “cultivation” stage (Kram, 1983) and whether the relationship had primarily a career or psychosocial function (Kram, 1983).</td>
<td>1</td>
</tr>
<tr>
<td>This assisted in identifying whether the dissertation relationship had primarily a career or psychosocial function (Kram, 1983). Provided further evidence of the “cultivation” stage (Kram, 1983) and whether the relationship performed primarily career or psychosocial functions (Kram, 1983).</td>
<td>1</td>
</tr>
<tr>
<td>This provided evidence to the perception of mentoring in the disserting process by defining mentoring in the concept of academic scholarship. In addition, the literature shows that faculty commitment to each area of the traditional triad of scholarship (teaching, research, and service) varies by discipline (Biglan, 1973; Girves &amp; Wemmerus, 1988).</td>
<td>Def.</td>
</tr>
<tr>
<td>What role do you play in your advisee(s)’ conference attendance?</td>
<td>1</td>
</tr>
<tr>
<td>What percentage of the work that you do as a dissertation advisor is associated with each of these facets of scholarship? (Must total 100%).</td>
<td>Def.</td>
</tr>
<tr>
<td>What is the typical degree of involvement between you and your advisee(s) on the following tasks of writing the dissertation:</td>
<td>2</td>
</tr>
<tr>
<td>With how many of your advisee(s) do you collaborate? Follow-up: Please provide examples of ways in which you collaborate with your advisee(s).</td>
<td>1</td>
</tr>
<tr>
<td>With how many of your advisee(s) do you publish, during their doctoral program?</td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td>With how many of your advisee(s) are you a co-author on</td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td>This question was informed by the definition of authorship given by the International Committee of Medical Journal Editors (1991). The one function added to this list was data collection. The rest were identified by the editors as components of authorship. The argument here was if the advisor is contributing in a significant way to these functions, then they have grounds for authorship on the paper. If they were authors, the possibility of the dissertation as a collaborative product would exist.</td>
<td>2</td>
</tr>
<tr>
<td>This question evaluated the extent to which the advisor and advisee collaborated during the doctoral process on publications (other than the dissertation). This also informs the “cultivation” stage (Kram, 1983). This question returned to the idea of the dissertation itself as a collaborative product. The question also</td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td>Research Questions</td>
<td>Questionnaire Questions</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>RQ1</strong>: What are the mentoring behaviors and practices of ILS faculty? What types of information is exchanged between doctoral students and their advisors and how is that information exchanged?</td>
<td>□ Have you served as an advisor on a doctoral dissertation committee in the field of information and library science?</td>
</tr>
<tr>
<td></td>
<td>□ Reflecting on your experience in ILS, on average, do you personally choose those students whom you have as advisee(s)? Follow-up question: How important are the following in making your decision to choose an advisee?</td>
</tr>
<tr>
<td></td>
<td>□ Think of your most recently assigned advisee. How was that relationship initiated?</td>
</tr>
</tbody>
</table>
On average, which best describes the frequency with which you have one-on-one meetings (in-person and phone) with your advisee(s) in the time **before** they have finished all their coursework? (Excluding time spent with them in class, if you are one of their instructors.)

On average, which best describes the frequency with which you have one-on-one meetings (in-person and phone) with your advisee(s) in the time **after** they have finished all their coursework?

How often do you meet with multiple students at once in a non-course environment (i.e., project, team, lab meetings)?

For the following question, allocate a percentage for the time you spend communicating in each of these media with your advisee(s). (Must total 100%.)

Who initiates instances of information exchange between you and your advisee(s)?

In discussions with your advisee(s), how frequently do you discuss the following items? And, in your opinion, how adequate is that frequency? Follow-up: Are there other items discussed, that did not appear on the above list?

Think of all the interactions you have with your advisee(s). How would you describe the type of content exchanged/discussed in these interactions? (Must total 100%).

Do you encourage your advisee(s) to attend conferences? Follow-up: What role do you play in your advisee(s)’ conference attendance? (Check all that apply.)

Do you collaborate with your advisee(s)? Follow-up: Please provide examples of ways in which you collaborate with your advisee(s) OR
| RQ2: What is the extent of collaboration between ILS advisors/advisees (both during and after the dissertation)? To what extent can the dissertation itself be considered a collaborative product? | Please explain why you do not collaborate with your advisee(s).  
☐ Do you publish with your advisee(s) during their doctoral studies?  
☐ Are you a co-author on publications with advisee(s) that result from their dissertation work?  
☐ Do you publish with former advisee(s) after they graduated?  
☐ On average, how would you describe your relationship with your advisee(s) after they graduate? |
| --- | --- |
| RQ3: What are the interdisciplinary influences on the ILS dissenting process and to what degree do ILS doctoral students engage in interdisciplinary borrowing in their dissertations? | ☐ How often do you meet with multiple students at once in a non-course environment (i.e., project, team, lab meetings)?  
☐ Reflect on all of the ILS doctoral dissertation committees you have advised and answer the following set of questions with these in mind. On average, what is the relative degree of involvement of the advisor and advisee on the following tasks of writing a dissertation:  
☐ Do you publish with your advisee(s) during their doctoral studies?  
☐ Are you a co-author on publications with advisee(s) that result from their dissertation work?  
☐ Do you publish with former advisee(s) after they graduated?  
☐ In collaborating on a publication with a colleague, would you consider significant work by the colleague in the following areas as grounds for authorship? |
| ☐ From what field did you receive your doctoral degree?  
☐ Have you ever served on a dissertation committee in a field other than ILS (as committee member or chair)? |
Appendix G. Questionnaire recruitment email
Dear [Faculty Member]:

I am conducting a study to investigate the doctoral dissertation process within the field of information and library science (ILS). As a full-time faculty member in an ALA-accredited school, you have been chosen to participate in this study. The results from this survey will be used to identify current trends in the ILS doctoral dissertation process and could be used by educators to suggest improvements for doctoral education.

If you choose to participate, your participation will be completely voluntary. You may choose to terminate the survey at any point or to skip questions you would not like to answer. Your answers will be anonymized prior to dissemination of results and you will only be contacted for a follow-up interview if you choose.

The survey contains no more than 30 questions and should take approximately 11-13 minutes to complete. If you would like to complete the survey, please continue to the following link:

http://uncodum.qualtrics.com/SE?SID=SV_5gmyHSTCIWJjfCs&SVID=Prod

Thank you for taking the time to help us understand more about doctoral education in the field of information and library science.

If you have any questions about this study, feel free to contact me via email at csugimoto@unc.edu.

Sincerely,
Cassidy R. Sugimoto
Doctoral Candidate
School of Information and Library Science
University of North Carolina at Chapel Hill
www.unc.edu/~cpratt

IRB Study # 08-1389
Appendix H. Interview recruitment email

Dear [faculty member]:

Thank you for your recent participation in my questionnaire on ILS doctoral education. I sincerely appreciate the time and energy you put into the survey response.

I am contacting you regarding your willingness to be involved in a follow-up interview. This interview will last less than 30 minutes and will be conducted via telephone. The interviews will be recorded. The topics to be discussed in the interviews may include: the place of doctoral education in the community of practice model, the individuality of each advisee, and the role of collaboration in the doctoral process.

If you are willing and able to participate in this semi-structured interview, please choose up to three available dates and 30 minute time-slots from the list of available times below. Please email me at csugimoto@unc.edu by April 8th with your availability. I will confirm exact times by April 10th and request a phone number on which you can be reached at that time.

4/13: 10am-4pm
4/14: 10am-11am
4/15: 10am-5pm
4/16: 10am-3pm
4/17: 10am-noon; 2:30pm-5pm
4/27: noon-3pm
4/28: noon-4pm
4/29: noon-4pm
4/30: noon-4pm
4/31: noon-4pm

If you are unable to participate in this stage of the study, I would like to thank you again for your willingness to participate on the questionnaire.

Sincerely,
Cassidy R. Sugimoto
Doctoral Candidate
School of Information and Library Science
University of North Carolina at Chapel Hill
www.unc.edu/~cpratt

IRB Study # 08-1389
Cited References


279


de Bellis, N. (2009). *Bibliometrics and citation analysis: From the Science Citation Index to Cybermetrics*. Lanham, MD: The Scarecrow Press, Inc.


Leydesdorff, L. (2007b). Mapping interdisciplinarity at the interfaces between the Science Citation Index and the Social Science Citation Index. *Scientometrics, 71*(3), 391-405.


