Exploring the impact of program structure on student and faculty scholarly communities in interdisciplinary Ph. D. programs

Lenore G. Horowitz

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EXPLORING THE IMPACT OF PROGRAM STRUCTURE ON STUDENT AND FACULTY SCHOLARLY COMMUNITIES IN INTERDISCIPLINARY Ph.D. PROGRAMS

By

Lenore G. Horowitz

A Dissertation
Submitted to the University at Albany, State University of New York
in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

College of Computing & Information
Department of Informatics
2013
Exploring the Impact of Program Structure on Student and Faculty Scholarly Communities in Interdisciplinary Ph.D. Programs

By

Lenore G. Horowitz

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Abstract

The Information Science doctoral program at the University at Albany, State University of New York, faces many of the same challenges found in highly interdisciplinary programs across educational institutions worldwide such as complex curricula development, abundant discipline languages and cultures, and stakeholders clinging to the traditional, single-discipline university system. In 2006, the University at Albany Information Science Ph.D. program faculty redefined the program’s structure in hopes of addressing the challenges it was facing. Program structure is a social process shaped by community participation and is influenced by many factors including students, faculty members, and both informal and formal knowledge production.

Drawing on data collected with both students and faculty present before, during and after the transition to the new program structure, a mixed-method research strategy was performed to examine student retention rates and time to degree, and to explore the experiences of program faculty members’ and doctoral students’ sense of community and connectedness. Drawing on Wenger’s (1998) Community of Practice model and Tinto’s model of Institutional Departure, this study occurs in three stages: [1] program and participants’ content analysis, [2] surveying of student and faculty members, and [3] select interviews with student and faculty members.

The data presented here highlights the unique challenges of doctoral interdisciplinary programs and supports the need for collaboration among faculty, and calls for the unquestionable patronage of the institution and the diverse departments involved. Seeing that interdisciplinary programs work across different disciplines, students and faculty alike often find it difficult to assimilate the diverse ways of teaching
and methods of research thus calling for unique organizational and pedagogical strategies addressed in the curricula. Successful interdisciplinary programs need faculty who are broad-minded and willing to embrace and learn new methodologies, and respect sometimes conflicting viewpoints. Departments need to develop new models of organizational structure and funding sources to facilitate interdisciplinary research and interdisciplinary community. University leadership needs to move away from rigid hierarchical structures, add more flexibility to allow faculty members to have some movement between disciplinary departments, and needs to provide physical spaces to pull the diverse faculty and student communities together.
Acknowledgements

I would like to dedicate this dissertation to my mother and father, Marian and Norman Gervais who throughout my life have always supported my dreams and accomplishments. Their unending belief in my far fetching endeavors has helped me through the often difficult journey of completing my Ph.D. I wished my father, who passed while I was working on this degree, could have been here for this accomplishment.

I thank my chair and academic advisor, Dr. Deborah Andersen, for her guidance, patience, and for always holding me to the highest standards. I thank Dr. Jennifer Goodall and Dr. David Andersen for their support and encouragement throughout my doctoral work.

I would like to thank my husband, Marvin Horowitz, who endlessly supported and encouraged me through many long years while I followed my dreams. I would not have been able to complete this degree without him. Lastly I want to thank the many family and friends who accepted and supported my often impossible and demanding schedule, especially my three children, Jeffrey Horowitz, Philip Horowitz, and Carolyn Horowitz and my sister Bonnie Gervais.
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Chapter 1: Introduction

Focus of the Research

This dissertation explores both the effect a program structure has on the formation of scholarly communities among the students and faculty members involved, and whether program modifications influenced doctoral student retention rates and time to degree completion. Having taught in STEM (science, technology, engineering and mathematics) related fields in higher education for several years and subsequently immersing myself in the Information Science Ph.D. program at the University at Albany provided me with the impetus to study the highly interdisciplinary Information Science doctoral program design at the University at Albany in depth.

I chose to study this research problem through the lenses of Etienne Wenger’s (1998) Community of Practice model and Vincent Tinto’s (1997) model of Institutional Departure to help explain doctoral student learning and the relationships among the actors in the University at Albany’s Information Science Ph.D. program scholarly community. Both Wenger and Tinto insist that community is essential to doctoral persistence and the acquisition of knowledge. The objective for all involved is to achieve student success and to prepare students to conduct original scholarly research.

The University at Albany Information Science Ph.D. program was restructured in 2006 in hopes of strengthening the program and incorporating much needed updates. While retaining its focus on the campus-based interdisciplinary core program, major program features were updated and strengthened. Each of the existing specialization fields had its requirements updated to reflect current national standards. Some new fields
were added to reflect present-day research programs at the University at Albany. An existing multi-part course, Fundamentals of Information Technology, was made a formal prerequisite. The core pro-seminar courses were updated to include five, two-credit courses which would be completed by each incoming cohort during the first two years in the program. Core coursework was further expanded to include four one-credit research seminars, and a four-credit research course, Research Design in Information Science, was introduced as a core requirement. This research sequence was expected to be completed by each incoming cohort during their first two years in the program with the additional requirement of presenting at the annual, on campus, New Trends in Informatics Research (NTIR) conference.

**Overview of the Study**

The overarching goal of this research was to determine first, if the implementation of the revised Ph.D. program structure affected the development of a community of practice, and the relationships of both doctoral students and faculty in the program. It looked to determine if the revised program improved doctoral student retention rates along with shortening time to degree completion. A mixed methods research design was chosen to provide multiple perspectives and different forms of data collection and analysis. The research was performed sequentially in three distinct stages. Stage I performed qualitative content analysis on Information Science doctoral student and Informatics Department records. Stage II consisted of quantitative data collection and analysis of web-based surveys presented to the doctoral students and Informatics Department faculty members. Stage III completed the research study with qualitative
Information Science Ph.D. program student and faculty interviews followed by an analysis of the collected data.

These data will be not only useful to University at Albany administrators but also to all college administrators, faculty, and students considering doctoral study, and to those concerned with governance and policy related to doctoral education.

**Challenges of Interdisciplinary Programs**

The Department of Informatics at the University at Albany faced a particularly difficult challenge in that its Information Science Ph.D. program was highly interdisciplinary. Students arrived with a wide variety of expertise and interests, and selected specializations as diverse as geographic information systems, government information management and archival science. Their “home” departments were spread across three campuses so there was no central meeting ground for students and faculty. The dilemma the department\(^1\) faced was how to create such a meeting space so that students and faculty would get to know each other and form a unified scholarly community. Additionally, the department was concerned with how students could be mentored in their specializations, do research, and learn the skills necessary to achieve dissertation progress in an interdisciplinary environment.

This challenge is unique to interdisciplinary programs\(^2\). The organizational culture of a university is traditionally divided by thinking and performing in a single discipline (Borgman, Abelson, Dirks, Johnson, Koedinger, Linn, Lynch, Oblinger, Pea, Salen, 2008).

---

1 Prior to 2006, there was no “department” but for the purposes of description, the term is used here.
2 Defined as “programs in which elements from different disciplines are woven closely together to derive a wholly integrated approach to study” (Chandramohan & Fallows, 2008, p. xiv).
Smith & Szalay, 2008; Holley, 2009; Newswander & Borrego, 2009). Not only does the interdisciplinary program need to contend with scattered departments and faculty, it requires unique organizational and pedagogical strategies. A recent report of the National Science Foundation (NSF) Task Force on Cyberlearning stressed the importance of developing interdisciplinary researchers, knowledgeable in both science and technology, to tackle the challenges facing educational systems worldwide, thus further stressing a compelling need to develop programs to advance interdisciplinary fields (Borgman et al. 2008). Additionally, an NSF funded initiative, the Integrative Graduate Education & Research Training Program (IGERT), was developed to meet the challenges of educating U.S. Ph.D. scientists, engineers, and educators with interdisciplinary backgrounds. The initiative has spawned several scientific research studies in the area of interdisciplinary higher education (Anthony, Palius, Maher, 2007; Borrego & Newswander, 2010; Miller, Baird, Littlefield, Kofinas, Chapin & Redman, 2008; Newswander & Borrego, 2009).

To address the need for developing successful interdisciplinary researchers and the challenges associated with the unique organizational structure and pedagogical approach to the program, the Department of Informatics Information Science Ph.D. faculty in 2006 aspired to update and strengthen all aspects of the Ph.D. program. The unique, interdisciplinary fields were updated. Core prerequisite coursework was redefined, which included a campus and department-wide, four-credit research design course, and, most notably, the research requirement was expanded to include a two-year sequence of weekly seminars and the hosting of an annual on-campus research conference. Furthermore, each incoming cohort was scheduled to spend, at minimum, an entire day
each week attending seminars, courses, and brown-bag lunch series to further strengthen a support structure among the students and faculty.

The two-year sequence of weekly seminars was, as described by faculty involved in the program revision process, a “research boot camp” where new doctoral students could learn about poster sessions, conference presentations, and research standards, and the more senior students could practice these skills while presenting their own research. First year students would have the opportunity to meet the Ph.D. Program faculty members through presentations of their current research. At the close of each academic year, all Department of Informatics doctoral students and faculty would attend a day-long research conference of posters and presentations of current research presented by students.

Research Questions

At the time of writing this dissertation (2013) fiscal concerns of governments at all levels have created budgetary problems for colleges and universities worldwide. Faculty vacancies were left unfilled and recruitment plans were often pushed aside, thus exacerbating staffing issues. Universities more and more found themselves giving consideration to the effectiveness of current programs and assessing how efficient and valuable they are. This study addresses some of the questions educational institutions everywhere may have concerning interdisciplinary doctoral program effectiveness. Considering the extraordinary amounts of time and monies spent by many bright and promising students it would be expected that they would want to invest in the most effective programs, to persist in these programs, and complete them in a reasonable amount of time.
This research sheds light on how to create a Ph.D. program which realizes immediate dissertation progress and results in researchers and educators well equipped to address current issues facing organizations today, and who understand the impact technology has on people and information. To guide this research, the following overarching research questions were addressed:

- Did the implementation of the revised Information Science Ph.D. program structure affect the development of a community of practice and the relationships of both doctoral students and faculty in the program? And if so, how?
- Did the implementation of the revised Information Science Ph.D. program structure improve doctoral student retention rates and shorten time to degree completion?

University at Albany and the Informatics Department Ph.D. Program

The University at Albany is one of four university centers in the State University of New York (SUNY), the nation’s largest and most comprehensive state higher education systems. Today SUNY consists of sixty-four campuses spread across New York State, with each campus designated as belonging to one of four categories: university center, university college, technology college, and community college. Founded in 1844, the University at Albany is the oldest established campus in the SUNY system. Originally an independent teacher’s college, the University at Albany was not a public institution until the formation of SUNY in 1948 and later became a university center in 1961. The School of Library Science at the University at Albany was established in 1962, renamed to the
School of Library and Information Science in 1979, and evolved into the School of Information Science and Policy in 1986 (Williams, 2010).

The original Ph.D. in Information Science degree program was first offered in September of 1990. The interdisciplinary degree program was a collaborative effort among the School of Business, the Departments of Communication, Geography and Planning, Computer Science, the School of Information Science and Policy, and the Department of Public Administration and Policy. The first doctoral degree was awarded in 1993 (Williams, 2010). In mid-2001 the University at Albany’s Provost’s Information Science Advisory committee published a report which included recommendations to combine the existing School of Information Science and Policy, and the Computer Science Department into a new school, hire a new dean, and increase the number of Information Science faculty (Dawes, 2001). The official opening of the College of Computing and Information materialized in August 2005 by combining the Department of Information Studies (formerly the School of Information Science and Policy), the Department of Computer Science, and the Informatics Faculty with Dean Peter Bloniarz as its leader. In addition to the academic departments, the college initiated interdisciplinary relationships with the School of Business, the College of Nanoscale Science and Engineering, the Center for Functional Genomics, the School of Education, and the Center for Technology in Government (Williams, 2010).

In 2004, by general consensus of the Information Science Ph.D. faculty, a complete re-examination of all the interdisciplinary fields and program requirements, especially the structure of the core program, was initiated. After numerous meetings and retreats by the faculty, the Information Science Ph.D. program, as it exists now, was accepted by faculty
in November 2005. Table 1.1: Comparison of Pre-2006 and Post-2006 Information Science, Ph.D. Program summarizes the similarities and differences between the pre-2006 and post-2006 Department of Informatics, Information Science, Ph.D. program.

### 1. Ph.D. Specializations (Fields)

<table>
<thead>
<tr>
<th>Pre-2006 Ph.D. Program</th>
<th>Post-2006 Ph.D. Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information and Decision Systems</td>
<td>1. Business Information and Decision Systems (BIDS)</td>
</tr>
<tr>
<td>Group Decision Support Systems</td>
<td>2. Decision and Policy Sciences (DAPS)</td>
</tr>
<tr>
<td>Formerly a popular self-designed</td>
<td>4. Information Assurance (IA)</td>
</tr>
<tr>
<td>specialization</td>
<td></td>
</tr>
<tr>
<td>Formerly a self-designed specialization</td>
<td>5. Information, Government, and Democratic Society (IGDS)</td>
</tr>
<tr>
<td>This concentration could only be</td>
<td>6. Information in Organizational Environments (IOE)</td>
</tr>
<tr>
<td>taken as a secondary specialization.</td>
<td></td>
</tr>
<tr>
<td>Did not exist</td>
<td>7. Information Technology and Learning (ITL)</td>
</tr>
<tr>
<td>Organization of Knowledge Records</td>
<td>8. Knowledge Organization and Management (KOM)</td>
</tr>
</tbody>
</table>

### 2. Program Admission Policy

<table>
<thead>
<tr>
<th>Pre-2006 Ph.D. Program</th>
<th>Post-2006 Ph.D. Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normally admitted in the fall semester</td>
<td>Only admitted in the fall semester</td>
</tr>
<tr>
<td>Academic preparation should include</td>
<td>These requirements were removed.</td>
</tr>
<tr>
<td>discrete mathematics, inferential</td>
<td></td>
</tr>
<tr>
<td>statistics, research methodologies,</td>
<td></td>
</tr>
<tr>
<td>fundamentals of the policy making</td>
<td></td>
</tr>
<tr>
<td>process and organizational theory and</td>
<td></td>
</tr>
<tr>
<td>behavior, as well as computer literacy.</td>
<td></td>
</tr>
<tr>
<td>Preference is given to candidates who</td>
<td>Preference is given to candidates who have completed a</td>
</tr>
<tr>
<td>have completed a master’s degree in</td>
<td>master’s degree in a comparable or related field.</td>
</tr>
<tr>
<td>information science, computer science,</td>
<td></td>
</tr>
<tr>
<td>communication, geography and planning,</td>
<td></td>
</tr>
<tr>
<td>public administration, management</td>
<td></td>
</tr>
<tr>
<td>information systems, information</td>
<td></td>
</tr>
<tr>
<td>management, library science, or in a</td>
<td></td>
</tr>
<tr>
<td>comparable related field.</td>
<td></td>
</tr>
</tbody>
</table>
### 3. Program of Study

<table>
<thead>
<tr>
<th>Pre-2006 Ph.D. Program</th>
<th>Post-2006 Ph.D. Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>INF 523 (Fundamentals of Information Technology) is an <em>informal</em> prerequisite for the core classes.</td>
<td>INF 523 (Fundamentals of Information Technology) a <em>formal</em> prerequisite for the core classes; includes a process to waive the course. All INF Ph.D. students required to show competency in four areas of computer and information technologies: networking, web applications, programming languages and databases and are required to take one to four modules of INF 523 to meet this requirement.</td>
</tr>
<tr>
<td>Core Courses: four required 4-credit interdisciplinary pro-seminars (INF 701, 702, 703, and 704), in the areas of Information Theory, Information Management, Information Organization, and Information Policy</td>
<td>Core Courses: five 2-credit, required (INF 720, 721, 722, 723, and 724), in the areas of Information Theory, Information Management, Information Organization, Information Policy, and Information and Social Theory</td>
</tr>
</tbody>
</table>
| Research Requirement:  
  - Required research tool requirements appropriate to proposed areas of program and research specialization.  
  - Required two-part research project (*Note*: Part I paper was integrated into the required research seminars; Part II paper was integrated into the Field Comprehensive Exam requirement) | Research Requirement:  
  - Required four-semester sequence of 1-credit research seminars (INF 711, INF 712, INF 713, INF 714) completed in the first two years in the program.  
  - Required attendance at and participation in an annual INF Research Conference.  
  - Required 4-credit INF 710 research methods course.  
  - At least one additional statistics/analysis course at the doctoral level |
### 4. Qualifying Requirement

<table>
<thead>
<tr>
<th>Pre-2006 Ph.D. Program</th>
<th>Post-2006 Ph.D. Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Includes a formal review of academic achievement in the first two semesters of full time equivalent study, a recorded agreement of the proposed academic program, and assurance that the proposed area of dissertation research is appropriate</td>
<td>Includes a formal review of academic achievement during the first two semesters by the student’s program chair, a formal agreement (Program of Study form) concerning the scope and content of the student’s proposed academic program, including the student’s primary and secondary areas of specialization, and a formal sign-off by the student’s program chair and committee attesting to the student’s progress in his or her doctoral program</td>
</tr>
</tbody>
</table>

### 5. Comprehensive Examinations

<table>
<thead>
<tr>
<th>Pre-2006 Ph.D. Program</th>
<th>Post-2006 Ph.D. Program</th>
</tr>
</thead>
</table>
| A two part comprehensive examination is required.  
  - A general portion common to all students  
  - A specialized portion associated with the student's area of primary and secondary specialization | The general comprehensive exam administered after the core courses are completed and consists of two sections:  
  - One question selected from one of three prepared in advance by the faculty. The questions will focus drawing together points taught in two or more of the core seminars  
  - A literature review on a topic of the student's own choosing |

### 6. Apprentice Teaching Option

<table>
<thead>
<tr>
<th>Pre-2006 Ph.D. Program</th>
<th>Post-2006 Ph.D. Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not available</td>
<td>An apprentice teaching option is available in order to teach in the Information Science Undergraduate Program</td>
</tr>
</tbody>
</table>

---

3 This requirement was subsequently changed to a take-home exam consisting of one question selected from a set prepared in advance by the faculty
7. Admission to Degree Candidacy

<table>
<thead>
<tr>
<th>Pre-2006 Ph.D. Program</th>
<th>Post-2006 Ph.D. Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal admission to degree candidacy occurs after successful completion of both parts of the comprehensive examination process, assuming that residency and other University requirements have been met</td>
<td>Formal admission to degree candidacy occurs after successful completion of all prerequisite, core and research courses with at least a B (3.0) average, research tool requirements, qualifying requirements, and both parts of the comprehensive examination process, assuming that full-time study in residence have been met</td>
</tr>
</tbody>
</table>

Table 1.1: Comparison of Pre-2006 and Post-2006 Information Science, Ph.D. Program

Although the program retained its focus on the campus-based interdisciplinary core program, key program elements were updated and strengthened. Interdisciplinary fields were refocused to reflect current trends in research. Admission requirements were strengthened and broadened to consider the varied educational backgrounds of incoming students. The program requirements were updated to encourage an in-step student cohort and to assure competency in computer and information technologies. Five interdisciplinary pro-seminars were designed for reflection on information theory, policies, and organization. Required course work and mandatory participation in an annual conference assured better student preparation in using varied research methods. In the first two years in the program in-step student cohorts were to be exposed to a clearly defined program which would prepare them for future dissertation research.

In general, the revised doctoral program aimed to form a stronger and closer academic community among the varied interdisciplinary backgrounds of both students and faculty members engaged in the program in the hopes of increasing student retention rates and shortening time to degree completion.
Research Design and Methodology

This study involved a triangulated, mixed method approach using a web-based survey, semi-structured interviews, and concurrent analysis of documents to explore relationships between faculty experiences and student experiences before and after the implementation of the revised Information Science Ph.D. program structure at the University at Albany. Two distinct, yet highly related populations, doctoral students and faculty in Information Science programs, were studied. Both populations have the same goal which is to advance student progress to degree completion.

Stage I Data Collection

This research used data collected from several sources. During the first stage, student data were collected using content analysis. Student documents, including the Ph.D. program application, previous college degree transcripts, and the Information Science Ph.D. Program Plan, were examined to extract data. (See Appendix A: Student Data Extraction Sheet.) Additionally, exploratory data collection and qualitative content analysis of university, department and program documents, such as University at Albany Graduate Bulletins, University at Albany Libraries newsletter, Update, Informatics department meeting minutes, memos, reports, program review documents and Ph.D. student manuals, New Trends in Informatics Research conference programs, and University at Albany web site pages, were examined to extract information and data on faculty members. (See Appendix B: Faculty Data Extraction Sheet.)
Stage II Data Collection

The second stage entailed the distribution of a web-based survey to Information Science Ph.D. students enrolled in the program two years before and two years after the implementation of the revised program in 2006. (See Appendix C: Student Research Survey.) A total of forty-one surveys were distributed to individual students. Of the forty-one distributed surveys, thirty were returned giving a seventy-five percent response rate. Additionally, the same survey was distributed to thirty-seven doctoral faculty involved in the Information Science Ph.D. program since its inception. Of the thirty-seven distributed surveys, sixteen completed surveys were returned giving a forty-three percent response rate. (See Appendix D: Faculty Research Survey.) Analysis of survey data provided student and faculty sense-of-community and connectedness measures. These measures, along with results from the document analysis, served as a source for classifying students and faculty meant for determining the sample for the third research stage.

Stage III Data Collection

The final stage of the research consisted of selected student and faculty semi-structured interviews based on the classifications determined in the second stage. (See Appendix E: Student Semi-Structured Interview Guide, and Appendix F: Faculty Semi-Structured Interview Guide.) The purpose for this third stage of the project was to cross-check findings and to explain possible misunderstandings unveiled earlier in the research project. A total of nine interviews were conducted, four faculty members and five doctoral students.
Using a mixed method research design, quantitative and qualitative data were collected on both populations offering complimentary views of the revised Information Science Ph.D. program structure at the University at Albany. An overview of the research design methodology structure is presented in Figure 1.1: Overview of the Research Design Structure.

An overview of stages of the research, the data collection methods used during each stage, and the resulting analysis techniques are presented in detail below. The submission of all the required documents for Institutional Review Board (IRB) review and approval in the use of human subjects was completed in December 2011. (See Appendix G: Institutional Review Board (IRB) Protocol Submission for Student Data Extraction and Online Survey, Appendix H: Institutional Review Board (IRB) Protocol Submission for Faculty Data Extraction and Online Survey, Appendix I: Institutional Review Board (IRB) Protocol Submission for Semi-Structured Interviews.) Data extraction sheets, survey questions and interview protocols can be found in the appendices at the end of this dissertation (Appendices A to F).
Dissertation Overview

In Chapter 2: Literature Review, a Case Study and Hypotheses, a review of the literature is provided. The chapter begins with a discussion of the study’s theoretical framework and the models used to explain a sense of community and connectedness among the players in the Information Science Ph.D. program. The next sections describe in detail the three most prevalent issues identified in the literature concerning doctoral programs -- attrition, disparities between undergraduate and graduate education, and the
complexities of interdisciplinary programs. Following these sections is a discussion of the history behind the Information Science Ph.D. program at the University at Albany. Gaps in the current literature are identified in the next section. The chapter concludes with the research questions and research hypotheses addressed in this study.

Chapter 3: Methodology begins with a discussion of the research method chosen, a mixed-method design, and the rationale for this choice. This is followed by a section of the research study’s populations and sampling frames. Next, a discussion of the data sources and data collection process for each of the study’s three research stages is presented. The details of the sequential, triangulated mixed method research design and the three, distinctive research stages are described. The chapter concludes with discussions of conflict of interest issues, and strengths and limitations of the study.

The next six chapters describe in detail each research stage’s design methods and detailed findings. Chapter 4: Stage I Research Design Methods begins with a description of the populations and sampling frames used in Stage I, followed by a section on document data collection. A discussion of the content analysis research method used in this research stage follows. The last three sections describe the human subjects review, followed by the strengths and limitations of content analysis for this study.

Chapter 5: Stage I Findings: Gathering Demographic Information starts with a discussion of the characteristics of both samples used in Stage I – the doctoral students and the doctoral faculty members. Following this section are descriptions of the measures used and the findings from Stage I of this research study.

Similar to Chapter 4, Chapter 6: Stage II Research Design Methods begins with a description of the populations and sampling frames used in Stage II, followed by a
section describing the survey data collection. This is followed by a discussion of survey research used during this stage of the study. The last three sections describe the human subjects review, followed by the strengths and limitations of self-completion, web-based surveys used in this study.

Chapter 7: Stage II Findings: Quantifying Community and Connectedness, begins with the quantitative measures of both the doctoral student sample and the doctoral faculty member sample used in Stage II of the research study. The last two sections of this chapter discloses first [1] the findings from the survey administered to the Information Science Ph.D. students followed by [2] the findings from the survey administered to the Information Science Ph.D. faculty members.

Like chapters 4 and 6, Chapter 8: Stage III Research Design Methods begins with a description of the populations and sampling frames used in Stage III, followed by a section describing the data collection from the interviews. This is followed by a discussion of interviewing research used during this stage of the study. The last three sections describe the human subjects review, followed by the strengths and limitations of semi-structured interviews used in this study.

Chapter 9: Stage III Findings: Understanding Experiences starts with a description of the qualitative analysis of the interview data used during this stage of the research study. The qualitative findings of the doctoral students’ and faculty members’ accounts of their experiences in the Information Science Ph.D. program are described in detail in the last section of this chapter.

In the final chapter of this dissertation, Chapter 10: Summary and Discussion, the research problem and the research methodology is presented as a review for the reader in
the first section. A summary of the results, followed by a detailed discussion follows. The next section discusses the limitations of this research study followed by a section with recommendations for future research. The last section of the final chapter provides the reader with the researcher’s final thoughts and reflections concerning her research.

Next, Chapter 2 presents a review of the current literature with a discussion of published research and findings related to this research study. Additionally, a history of the Information Science Ph.D. Program at the University at Albany will be explained.
Chapter 2: Literature Review, a Case Study and Hypotheses

Overview Review of the Literature

Graduate education is not heavily researched even though doctoral education is critical in the overall structure of higher education – this is where we prepare our new faculty members (Bowen & Rudenstine, 1992; Tinto, 1993). Perhaps this scarcity of research is due to a lack of interest or the difficulties associated with conducting such research. Bowen and Rudenstine argued that the long and uncertain nature of doctoral studies makes it difficult to access and measure outcomes. Abbe Herzig (2004) agreed that many factors contributed to this phenomenon. Doctoral students often transfer to other departments, take extended leaves, are in a combined, ill-defined, masters-doctoral program, and may remain in a program for many years, all of which contribute to the difficulty of determining the status of a student’s enrollment and inclination to complete her degree.

Despite limited research, one of the most discussed issues in existing literature is that of the unacceptable attrition rates of doctoral students. The number of students leaving their programs is disturbing, with estimates of attrition rates ranging from forty to seventy percent (Berelson, 1960; Bowen & Rudenstine, 1992; Ehrenberg & Kuh, 2009; Golde, 2005; Lovitts, 2001; Nettles & Millett, 2006; Tinto, 1993). Even more alarming are the much higher attrition rates of women, and racial and ethnic minorities (Herzig, 2004; Lovitts, 2001). Herzig argued that doctoral persistence is a function of the level of academic community integration, and that women and students of color may have greater commitments to communities outside of universities, thus limiting their participation in
the academic community. Furthermore, Herzig reasoned that women and students of color may not be as readily accepted into the academic community resulting in fewer opportunities to develop meaningful relationships with peers and mentors.

These rates are even more distressing when compared to undergraduate attrition rates of between forty and forty-five percent (Tinto, 1993). As Berelson (1960) remarked, high doctoral attrition rates are perhaps more serious because student selection is more meticulous, the education is more expensive, and most students do not leave the program until several years have passed. Furthermore, enhancing doctoral student retention, as compared to undergraduate retention, is further complicated due to the variable character of student departure (Tinto, 1993). Often there may be a change in the doctoral student’s enrollment status due to a move to a different program or a leave of absence. Furthermore, often time in obtaining the doctoral degree can be lengthy thus concealing which students are still in the program versus those who have left the program. There are many different reasons why doctoral students leave their programs in the literature, but no single explanation stands out as being the primary motive although they tend to leave their programs silently, often over a length of time (Golde 2005; Lovitts 2001; Nettles & Millett 2006). Student departure can be attributed to feelings of isolation due to a lack of faculty and peer interactions and support (Ali & Kohun, 2009; Ferrer de Valero, 2001; Golde 2005; Herzig, 2004; Hoyle & Torres, 2008; Lovitts 2001; Nettles & Millett 2006; Rovai, 2002b; Shacham, Od-Cohen, 2009; Terrell, Snyder, & Dringus, 2009; Ugrin, Odom, & Pearson, 2008; Varney, 2010; Washburn, 2002), the lack of opportunities for students to develop necessary skills and abilities (Austin, 2002; Berelson, 1960; Kiley, 2009; Lovitts 2001; Nettles & Millett 2006; Varney, 2010), poor
organization and functioning of doctoral programs (Austin, 2002; Bowen & Rudenstine, 1992; Di Pierro, 2007; Ehrenberg, Jakubson, Groen, So, E., & Price, 2007; Ferrer de Valero, 2001; Herzig, 2004; Kiley, 2009; Leshem, 2007; Lovitts, 2001; Nettles & Millett 2006; Trafford, & Leshem, 2009; Wisker, Robinson, & Shacham, 2007), personal and financial issues (Gardner, 2009; Herzig, 2004), and inadequate prior educational training (Lott & Gardner, 2009; Most, 2008; Nettles & Millett 2006). Many scholars agree that doctoral student persistence is shaped by the personal and intellectual interactions between communities of students and faculty much more so than in undergraduate education.

Much of the literature insists that integration into both the academic and social life in graduate school is a vital factor contributing to student retention (Lovitts, 2001; Tinto, 1993). Barbara Lovitts described successful integration into graduate school as a community membership. She theorized that students who maintain a strong relationship with colleagues and mentors in graduate school have more of an inclination to persist in remaining a member of the community. Tinto (1993) emphasized the importance of community in reducing attrition rates claiming that students increase their levels of satisfaction and the likelihood of persisting in a college program when they feel involved and develop relationships with other members of the learning community.

Finally, the growing interest in interdisciplinary education suggests greater attention to program structure and curricula (ASHE, 2009; Holley, 2009A; Holley, 2009B; Newswander & Borrego, 2009; NSF, 2009; Spelt, Biemans, Tobi, Luning & Mulder, 2009). The interdisciplinary perspective represents a tremendous change from the traditional, single disciplinary Ph.D. program structure, and requires faculty
collaboration and interdisciplinary integration, further pointing to the need for communities in doctoral education (Holley, 2009A; Holley, 2009B; Newswander & Borrego, 2009).

The forty studies identified in this literature review range from 2000 to 2010, except for two pivotal higher education studies of Berelson in 1960, and Bowen and Rudenstine in 1992, and include materials from several countries. Much of the literature focused on graduate education with an emphasis on doctoral attrition and student preparedness. A number of studies examined graduate interdisciplinary programs. A chart identifying and categorizing each of the forty research studies recognized in this review of the literature can be found in Appendix J: A Summary Review of the Literature.

Theoretical Framework – Two Models

One theory that has evolved as a way of examining doctoral student learning and addressing some of the problems identified specific to doctoral education is Lave and Wenger’s community of practice model.

Learning occurs when community members participate in problem solving and share the knowledge necessary to solve the problem, with the motivation to share knowledge being critical to the success of communities of practice (Wenger, 1998). Learning is not about receiving or constructing “objective” individual knowledge, but is about individuals learning to function within a group or community who share a common goal. In the case of graduate education, both doctoral students and faculty alike have the same goal which is to advance student progress to degree completion.

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4 This appendix contains a chart identifying each study, its research focus, the research methodology and theory applied, a brief list of key findings, and identified research variables.
Lave and Wenger (1991) saw the acquisition and sharing of knowledge as a social process where students and faculty can participate in communal learning at different levels. They define this as “situated-learning” – a process of acquiring knowledge within a cultural setting through participation in activities with others. Etienne Wenger defines a community of practice as “a group of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly” (Wenger, 1998, p.72). A legitimate reason for a group of characteristically similar people to come together is to learn, thus forming a community of practice. Conversely, all communities do not make a community of practice. The primary purpose of a community of practice is to create, expand, and exchange knowledge. According to Wenger, three elements are central in defining a community of practice.

The *domain* creates common ground and a sense of common identity. A well-defined domain legitimizes the community by affirming its purpose and value to members and other stakeholders. The *domain* inspires members to contribute and participate, guides their learning, and gives meaning to their actions. Knowing the boundaries and the leading edge of the *domain* enables members to decide exactly what is worth sharing, how to present their ideas, and which activities to pursue. The community must be totally committed to the *domain*.

The *community* creates the social fabric of learning. A strong *community* fosters interactions and relationships based on mutual respect and trust. It encourages a willingness to share ideas, expose one’s ignorance, ask difficult questions, and listen carefully. *Community* is an important element because learning is a matter of belonging.
as well as an intellectual process. Members must interact regularly and share a common vision to persist.

The *practice* is a set of frameworks, ideas, tools, information, styles, language, stories, history and documents that community members share. The *practice* is the specific knowledge the community develops, shares, and maintains whereas the domain is the topic the community focuses on. When a community has been established for some time, members expect each other to have mastered the basic knowledge of the community. This body of shared knowledge and resources enables the community to efficiently deal with its domain (Wenger, McDermott, & Snyder, 2002, pp.27-29).

Tinto’s (1997) model of institutional departure, the second model for this dissertation, is one of the most widely recognized student retention models which theorizes that, “the greater students' involvement or integration in the life of the college the greater the likelihood that they will persist” (p.600). He maintained that graduate school is made up of academic and social systems of interactions among students, faculty and staff (e.g. librarians) and that experiences in both systems can affect retention rates (Tinto, 1993). In order to persist students require integration into both systems.

Wenger’s community of practice learning model and Tinto’s model of student retention are highly interrelated. Tinto’s definition of the two systems of academic and social systems of interactions describes the actors – the students, faculty and staff – as interacting frequently while sharing a common “concern” (e.g. students should succeed in their studies) and a passion for a topic. All actors ultimately find value in their interactions which, in turn, keeps each individual in her present role (Tinto, 1993). Over time, knowledge is accumulated among all participants.
Wenger’s learning model expands on Tinto’s theory claiming that the bond which holds the community of practice together is not only passion but a personal commitment (Wenger, McDermott & Snyder, 2002). The boundaries of communities of practice can be ambiguous and in a constant state of flux due to various personal levels of engagement. Although membership in a community of practice can be forced (i.e. assigned), it is up to the individual to engage and connect with the community. Heterogeneous communities, comprised of members with different backgrounds, experiences and disciplines, can be more difficult to build than homogeneous communities and may require some prodding to get people to see the advantages and importance of belonging to the community of practice. Over time, communities change and grow with members moving on, new members coming in and members varying in focuses. The structure and specific characteristics of the community of practice also change and sub-communities may evolve. All communities of practice evolve and last as long as there is relevance, value and continued interest. According to Wenger, McDermott and Snyder (2002), a community can disband for many reasons. It may be that it is no longer functioning well, has lost its passion or trustworthiness, has become a clique (i.e. exclusive), or is too dependent on one member to lead and coordinate the community.

The theory associated with communities of practice is significant and prominent in the field of doctoral education, as illustrated in numerous research studies (Janson, Howard & Schoenberger-Orgad, 2004; Kiley, 2009; Leshem, 2007; Shacham & Od-Cohen, 2009; Terrell et al., 2009; Wisker, Robinson & Shacham, 2007; Zimitat, 2007 ). Janson, Howard, and Schoenberger-Orgad (2004) used Wenger’s theory of communities
of practice to explain how a doctoral student cohort felt supported and realized reduced isolation through face-to-face and online discussions. They argued what is normally a solitary process, earning a Ph.D., can be enhanced through a community of practice to provide much needed support and to avoid isolation. By applying communities of practice theory, Kiley (2009), found that doctoral students were more likely to engage in learning in an environment supported by peers within a culture of mutual participation. Through an ethnographic study, Leshem (2007), provided examples of how learning through participation in communities of practice can facilitate higher-order thinking. Shacham and OdCohen (2009) also found raised levels of thinking, enhanced social experiences, and high levels of emotional support through investigating the learning characteristics of doctoral students both during Ph.D. study and after its completion. Yet again, using communities of practice theory, Wisker, Robinson, and Shacham (2007) identified doctoral research success in a Ph.D. program which stressed student, faculty supervisor, and online communities. The community of practice enhanced the experiences of the Ph.D. students and provided ample opportunities for sharing experiences and knowledge, both personal (e.g. how to deal with direct criticism of work, how to handle stress) and professional (e.g. how to publish work, how to effectively use software programs). Terrell et al. (2009) applied communities of practice theory to develop and assess a survey instrument, the Doctoral Student Connectedness Scale, to identify students at risk of dropping out of a doctoral program. In a 2007 study, Zimitat found an interactive software package, WebCaseStudy, to be effective in enhancing student learning through the simulation of a community of practice. This thread of research found that communities of practice greatly enhanced student needs for emotional
and academic support throughout the duration of achieving a Ph.D. degree and even beyond.

Even though Tinto’s theory of student retention is the most widely cited theory for explaining students’ persistence in a college program, very little empirical research exists to support his propositions (Guiffrida, 2006). Both Herzig (2004) and Lovitts (2001) described their different theoretical frameworks based on Tinto’s idea of community integration within a graduate school program as necessary to persist. Although Lovitts (2001) expanded Tinto's theoretical framework in her extensive 2001 study, as did Herzig (2004) in her research on women and students of color prematurely leaving doctoral programs, literature supporting Tinto’s theory in its entirety is scarce.

**Undesirable Doctoral Program Attrition**

The high rate of attrition, or drop-out, among doctoral students has been the subject of research in abundant literature. Most of the research indicates an agreement on the severity of this problem and the effect it has on students (Ali & Kohun, 2006; Ali & Kohun, 2009; Beauchamp, Jazvac-Martek & McAlpine, 2000; Berelson, 1960; Bowen & Rudenstine 1992; Di Pierro, 2007; Ehrenberg, Jakubson, Groen, So & Price, 2007; Ferrer de Valero, 2001; Gardner 2007; Golde, 2005; Golde, 2007; Herzig 2004; Lott, Gardner & Powers, 2009; Lovitts, 2001; Most, 2008; Nettles & Millett 2006; Washburn, 2002). Many of the studies found a variety of factors contributing to high dropout rates. Race and gender is often found as a factor in doctoral degree progress (Herzig 2004; Lott et al., 2009; Lovitts, 2001; Most, 2008; Nettles & Millett 2006). A feeling of isolation and the lack of program community is a key factor that contributes to higher attrition rates (Ali &
Kohun, 2009; Beauchamp et al., 2000; Ferrer de Valero, 2001; Golde, 2005; Golde, 2007; Washburn, 2002). Program organization and delivery are also important factors when considering program completion (Ali & Kohun, 2009; Bowen & Rudenstine, 1992; Di Pierro, 2007; Ehrenberg et al., 2007; Ferrer de Valero, 2001; Golde, 2007; Lovitts, 2001). Despite this copious amount of research, the drop-out rates among doctoral students are rarely addressed within the programs themselves. Lovitts (2001) described this as the “invisible problem”; university faculty and administrations continue to be stunned at the high attrition rates while the students leave their programs quietly and unnoticed. Attrition, although some is to be expected, has high sunk costs in time and resources for students, faculty, departments, universities and even society. Universities are continuously under pressure to eliminate doctoral programs which are underperforming. Programs and departments which are either eliminated or combined lose faculty members and leave students in a position to either transfer to another department or take their chances in a department with dwindling resources and faculty members. Costs to the university system include the price of recruiting students, with catalog production, campus visits, and the processing of applications. This cost is often higher than retaining students (Lovitts, 2001). Once a student is admitted, there are further investments in the processing of financial aid, student services and fellowship support. There are also the costs associated with faculty members’ time and effort in teaching and mentoring graduate students. Students invest much time, effort and money in their graduate studies which does not result in much of a payoff if the terminal degree is not attained. Society needs educated, talented and knowledgeable individuals from all disciplines to teach future students, compete in innovative research, and fill the needs of
industry, which can be costly if universities are not turning out a sufficient number of
graduate students. Without the labor force to fulfill these needs, society would need to
look elsewhere, outside of their community, or do without.

Attrition happens at various stages in the process of attaining the doctoral degree
from as early as the first year where the costs are less extensive, through to the ABD, all
but dissertation, stage where many have invested much time and resources in hopes of the
student completing the doctoral degree. According to Lovitts (2001), twenty-five percent
of Ph.D. candidates never complete the dissertation. To the extent that avoidable causes
of attrition can be identified and ameliorated, graduate education can be improved.

A variety of factors contribute to increasing rates of attrition; some factors are
directly related to the design and structure of the doctoral program (Ali & Kohun, 2009;
Bowen & Rudenstine 1992; Di Pierro, 2007; Ehrenberg et al., 2007; Ferrer de Valero,
2001; Golde, 2007; Lovitts, 2001), while others are related to personal individual factors
(Berelson, 1960; Bowen & Rudenstine 1992; Ehrenberg et al., 2007; Ferrer de Valero,
2001; Gardner 2009; Herzig 2004; Lott et al., 2009; Most, 2008; Nettles & Millett 2006).
There is no one reason why doctoral students leave their program. Rather research points
to the multifaceted nature of the attrition problem (Golde 2005; Lovitts 2001; Nettles &
Millett 2006).

Barbara Lovitts’ 2001 extensive study, “Leaving the Ivory Tower”, was pivotal
research convincing educators worldwide that doctoral attrition rates were not merely the
fault of the student. Lovitts cited a misdiagnosis of the attrition issue in her research.

Most graduate programs have responded to the problem of graduate
student attrition by placing greater emphasis on selection, assuming that if
they could only make better admissions decisions, attrition rates would
decline.... The emphasis on selection suggests that universities believe the problem lies not with graduate schools but with the students themselves (p.20).

She argued that student persistence is a function of the extent of student integration into the life of the program. She specified four primary reasons that students fail to integrate and thus leave the program: the lack of information regarding the nature of doctoral study and how to successfully persist, the absence of community both with students and faculty, disappointment with the learning experience, and an unsatisfactory advisor relationship. More recent research agrees with Lovitts’ 2001 study results, additionally stressing the need for dissertation preparation experiences (Hoyle & Torres, 2008; Kiley, 2009; Leshem, 2007; Trafford & Leshem, 2009; Varney, 2010), for addressing doctoral feelings of isolation (Ali & Kohun, 2006; Ali & Kohun, 2009; Golde, 2005; Herzig 2004), and for designing a highly structured, well organized doctoral program (Di Pierro, 2007; Ehrenberg et al., 2007; Smith, Maroney, Nelson, Abel, A. L. & Abel, H. S., 2006).

The existing literature that examines the causes and consequences of doctoral student attrition falls into several main categories. First, there has been found a relationship between attrition and funding where students with fewer options to receive program funding are more likely to leave the program before completion (e.g. Berelson, 1960; Bowen & Rudenstine 1992; Ehrenberg et al., 2007; Ferrer de Valero, 2001; Herzig 2004; Nettles & Millett 2006). Second, a relationship between attrition and gender with female students more likely to have higher attrition rates is indicated (e.g. Herzig 2004; Lott et al., 2009; Lovitts 2001; Nettles & Millett 2006). Third, students with culturally similar backgrounds tend to have greater attrition rates (e.g. Ali & Kohun, 2009; Bowen
Fourth, a relationship between attrition within particular disciplines (e.g. Bowen & Rudenstine 1992; Golde 2005; Lott et al., 2009; Lovitts 2001; Most, 2008; Nettles & Millett 2006) reveals rates of attrition lowest in the social sciences and humanities and highest within the STEM (science, technology, engineering, and mathematics) fields. The fifth category identifies a relationship between attrition and department procedures and expectations with numerous opportunities for supportive academic and social interactions for students resulting in lower attrition rates (e.g. Gardner 2007; Herzig 2004; Lovitts, 2001). Last, a relationship between attrition and quantitative measures such as test scores, master’s degree, and GPA usually indicates that doctoral students with higher test scores and GPAs along with a closely related master’s degree field tend to have lower attrition rates (e.g. Lott et al., 2009; Lovitts 2001; Most, 2008; Nettles & Millett 2006). These studies overwhelmingly suggest there are many explanations and factors that lead to attrition.

In contrast, the formation of a community of practice is shown to counter high attrition rates. A correlation between a lower attrition rate and effective student-advisor relationships has been shown through several research studies (e.g. Di Pierro, 2007; Ehrenberg et al., 2007; Ferrer de Valero, 2001; Herzig 2004; Lovitts 2001; Nettles & Millett 2006; Tinto, 1993). Through personal student interviews, Ferrer de Valero (2001) found the most effective student-advisor relationships were described most often with the words “excellent” “mentoring” “exceptional” and “caring.” Students with abundant community sharing coupled with strong peer support tended to persist in their doctoral studies longer (Beauchamp et al., 2000; Ferrer de Valero, 2001; Herzig 2004; Lovitts,
2001; Terrell, Snyder, Dringus, 2009; Washburn, 2002). Students involved in Washburn’s study (2002) were very clear in identifying a real need for a supportive environment especially in the ABD phase of their doctoral studies. In Lovitts’ earlier work (2001), she was able to determine that the more structures and opportunities a community provided students to interact the more they connected with the community and the less likely they were to leave their programs. Expanding further with this concept, two recent studies (Di Pierro, 2007; Ehrenberg et al., 2007), found that scheduling compulsory community program activities further reduced attrition rates. The relationship between lower attrition rates in a supportive, inviting department culture was revealed through a number of empirical studies (e.g. Di Pierro, 2007; Ehrenberg et al., 2007, Gardner, 2009; Herzig 2004; Lovitts, 2001; Washburn, 2002). In her recent qualitative study of doctoral faculty and students in one research institution, Gardner (2009) found that the more welcoming and understanding the departmental and institutional culture was, the more apt the doctoral student was to complete her studies. Finally, the relationship between doctoral program persistence and positive socialization experiences has been shown to influence attrition rates (e.g. Gardner 2007; Golde, 2007; Herzig 2004; Lovitts, 2001; Terrell et al. 2009; Tinto, 1993). Furthermore, it should be noted, that the absence of a community has a detrimental effect on the doctoral student by increasing feelings of isolation (Ali & Kohun, 2006; Smith et al., 2006), providing less support and increasing competition among students (Ali & Kohun, 2006).

**Undergraduate and Graduate Education Disparities**

Doctoral education is unlike undergraduate education, and academic institutions need to acknowledge and embrace the differences and foster the development of
community within doctoral programs. Undergraduate education is more well-defined and discernible (Bowen & Rudenstine, 1992). Students follow a precise path to graduation which generally is within a four-year period. The students start their education together and graduate as a “class”. Undergraduate programs are better understood and experienced by more individuals (Bowen & Rudenstine, 1992). Parents and alumni are more involved in and aware of undergraduate programs. In Vincent Tinto's seminal, classic work on attrition and retention in higher education (1993) he insisted that community is essential to doctoral persistence, much more so than in undergraduate education. This is due to several factors. The Ph.D. program is traditionally local to one discipline and one department whereas we find undergraduate education expanding a broader university base, across many departments, thus emphasizing the need for stronger ties between students and the faculty in the department based doctoral programs. Emphasis in graduate education is on developing future teachers and research scholars who learn by interacting closely with faculty and fellow students (Berelson, 1960). Tinto (1993) explained that social integration is tied to academic integration thereby connecting the students with each other and with faculty, and faculty further connecting with one another. This, in essence, is a community of practice.

Since doctoral education is at the top of the higher-education system it affects the nature and quality of teaching the nation’s students at all levels of education (Bowen & Rudenstine, 1992). Berelson (1960) pointed out that it is the high-quality graduate, not undergraduate, program that singles out the leading educational institutions—making the case for improving Ph.D. programs to promote the university.
Doctoral programs especially need to assure that the students are well prepared for the rigors of doctoral progress, have clearly defined expectations and obtain the necessary skills to succeed (Austin, 2002; Hoyle & Torres, 2008; Kiley, 2009; Leshem, 2007; Lovitts, 2001; Trafford & Leshem, 2009; Urgin, Odom, Pearson, 2008). Margret Kiley’s 2009 study determined how best to support doctoral candidates when they are struggling toward, or “stuck” in, their doctoral progress. She argued that a strong community of academic learners and a welcoming research culture is key to providing students with the confidence and motivation to succeed in completing their doctoral studies. Leshem (2007) and Trafford and Leshem (2009) further examined doctoral progress deterrents and explained that candidates need to know what is expected of them to succeed. In Ann Austin’s four-year study (2002) she examined how best to prepare doctoral students for an academic career. She found that the students did not necessarily receive the opportunities to develop skills and abilities such as teaching, curriculum development, advising, and the ethical facets of the faculty role. Neither were they prepared for working with colleagues outside of academia, the expectations for institutional service, or the changing nature and learning characteristics of students. This research thread points to the importance of faculty mentors’ and advisors’ roles in guiding, encouraging and effectively communicating with doctoral students.

**Interdisciplinary Higher Education Programs Complexities**

The organizational culture of a university is traditionally divided by thinking and performing in single disciplines. Today, higher education programs of study are often not situated in a single disciplinary area but rather draw on several fields of study. Chandramohan and Fallows (2008) described three different models of such programs.
The first model is a joint degree or joint major/minor combination chosen from unrelated disciplines. Another model, often confused with interdisciplinary, is multidisciplinary where a mixture of disciplines is combined into a program with each discipline retaining its distinct methodologies and perspectives. A multidisciplinary program is additive whereas the interdisciplinary program is integrative. The true interdisciplinary program model integrates elements from different disciplines to address a shared problem. Holley (2009B) further described interdisciplinary programs as using a collaborative involvement of faculty from various disciplines. She argued that this integrative approach often produces a change in the participating disciplines. Successful interdisciplinary programs need faculty who are broad-minded and willing to embrace and learn new methodologies, and respect sometimes conflicting viewpoints. Not only does the interdisciplinary program need to contend with multiple disciplines which come with their own faculty members, cultures and languages, it requires unique organizational and pedagogical strategies naturally enhanced by communities of practice (Anthony, Palius, Maher, Moge, 2007; Holley, 2009A; Larson, Landers, Begg, 2011; NSF, 2009).

The literature supports the existence of many important components of a quality doctoral program as one which facilitates diversity, community, integration and cultural change, and interdisciplinary cooperation (Aboelela, Larson, Bakken, Carrasquillo, Formicola, Glied, Haas, Gebbie, 2007; Borrego & Newswander, 2010; Meeuwisse, Severiens, Born, 2010; Newswander & Borrego, 2009). Faculty members, the driving force behind interdisciplinary research at the university, need to recognize and appreciate each other’s contributions to collaborate effectively (Larson et al., 2011; NSF, 2009). Because interdisciplinary programs demand high levels of integration and collaboration it
is essential to encourage the engagement, community culture, and integration to support scholarly work (Holley, 2009A; Newswander & Borrego, 2009; NSF 2009). Engaged students and faculty participate in their communities of practice by attending formal classes, seminars, and lectures sponsored by the doctoral programs, as well as informal activities such as co-authoring papers, working on research, and attending professional conferences. The acquisition of knowledge enables students to become active members of the community of practice and produce valuable research. Both faculty and peers in the community of practice are the anchors for students to master knowledge (Holley, 2009A; Newswander & Borrego, 2009).

Departments outside of the faculty-student community of practice have the responsibility to enhance engagement of faculty by encouraging multiple departments to use each other’s courses, thus, not only acknowledging multiple faculty value, but avoiding the duplication of effort (NSF, 2009). Departments need to develop new models of organizational structure and funding sources to facilitate interdisciplinary research and interdisciplinary community.

According to the NSF (2009), administration, at the university level, needs to move away from rigid hierarchical structures, and add more flexibility to allow faculty members to have some movement between disciplinary departments. Working with the interdisciplinary department, the university needs to provide physical spaces to pull faculty and student communities together (NSF, 2009). Empirical evidence suggests that program success is enhanced by providing a dedicated space for classes, offices and a lounge area for students (Benbasat & Gass, 2002; Lovitts, 2001).
Developing curricula for interdisciplinary programs can be very challenging (Holley, 2009A; Holley, 2009B; Newswander & Borrego, 2009; NSF, 2009; Spelt et al., 2009). Interdisciplinary programs work across different disciplines, so students often find it difficult to assimilate the diverse ways of teaching and methods of research. Teaching is more complex as faculty members contend with the challenge of accomplishing interdisciplinary thinking among students (Chandramohan & Fallows, 2008; Spelt et al., 2009).

The discussion so far speaks of general challenges and benefits of higher education interdisciplinary programs. Although there is much informative literature in the field of interdisciplinary studies in the humanities, research is not only scarce in the sciences but no strong empirical studies have been published (Borrego & Newswander, 2010; NSF 2009; Spelt et al., 2009). There are many interdisciplinary studies going back more than twenty years in the humanities and social sciences whereas very few science and engineering faculty engage in true interdisciplinary research (Borrego & Newswander, 2010). Collaboration among science faculty is common as seen in the multitude of publications with authors and co-authors from different academic disciplines. These are not true interdisciplinary studies which have been designed and worked on by two or more persons of different disciplines whose goal is to solve a problem as a team; rather, they are studies where labor is divided among those faculty members who rely on each other’s expertise.

Having discussed communities of practice and interdisciplinary programs in general, the next section moves on to describe a case of a doctoral, interdisciplinary, information science program which was enhanced in the hopes of strengthening the
program. The theoretical frameworks offered by Etienne Wenger (1998) and Vincent Tinto (1993) help to understand this specific case.

The Case of an Information Science Ph.D. Program

In many ways the Information Science doctoral program at the University at Albany can be seen as characterized by the three innovations of communities of practice which build related communities of practice: student learning in communal cohorts (the Community of Practice domain and the Community of Practice community), the annual research conference (the Community of Practice practice), and the compulsory four-semester research seminar (the Community of Practice community and the Community of Practice practice).

In 2005 there was a major effort among the Information Science Ph.D. faculty to examine if a more interdisciplinary approach to core learning objectives could be developed and if the student doctoral experience could be made richer with more emphasis on student research. Program faculty felt there was a need for integrating academic activities which were spread across three campuses and to encourage a tighter community among the doctoral students and faculty members. As a result of this program revision, interdisciplinary fields were updated, the five interdisciplinary doctoral pro-seminars were strengthened, core prerequisite coursework was redefined, which included a four-credit research design course, and, most notably, the research requirement was expanded to include a two-year sequence of weekly seminars and the hosting of an annual on-campus research conference. A thorough history of the original Information
Science Ph.D., which was first offered in the early 1990s, can be found in chapter one of this dissertation.

The Revised Informatics Department Ph.D. Program

This revised doctoral program formed a community of practice by encouraging the Information Science doctoral students and faculty to engage in a process of communal learning at different levels. They grew as a community “who share[d] a concern or a passion for something they do[did] and learn[ed] how to do it better as they interact[ed] regularly” (Wenger, 1998, p.72). Additionally, the program was designed to encourage student retention by integrating the doctoral students into the “life” of the department and promoting student involvement (Tinto’s, 1997, model of institutional departure).

The three elements that are central in defining a community of practice are the domain, the community, and the practice (Wenger, McDermott, & Snyder, 1998). The domain was well-defined and encouraged both Information Science Ph.D. students and faculty to contribute and participate in the weekly seminars and the annual conference. The community encouraged interactions and relationships based on mutual respect and trust. Lastly the community of practice was shaped early with the formation of body of shared knowledge and resources unique to Information Science academicians.

As the doctoral students moved from the fringe of the community, in their first year, to its center, they became more active and engaged with the culture and assumed the role of expert or “senior student”. This process is referred to as legitimate peripheral participation (Lave and Wenger, 1991) and it is an important step in the development of a learning community because the expert learners then scaffold newer students as they get
acquainted with the community. Expert learners host their own sub-communities, and often provided feedback to faculty mentors about how to improve the resources and tools in the community.

Ideally, a connection to a learning community provides the social context needed to help learners feel less isolated. Through genuine sharing between students and faculty, students had opportunities to interact not only through the content and skills being learned but socially in a prearranged environment.

Identifying Gaps in the Literature

This research addresses three current gaps in the literature. First, despite numerous studies on doctoral attrition, much of the focus has been on identifying factors that contribute to attrition, without addressing the implementation of best practices and interventions that resolve this enigma. Second, although there is much informative literature in the field of interdisciplinary studies in the humanities, robust empirical research is scarce in the sciences (Borrego & Newswander, 2010; NSF 2009; Spelt et al., 2009). Third, the present literature in interdisciplinary higher education is consistently calling for research into teaching and learning to help understand how different disciplinary ways of knowing work together. The research concerning teaching and learning in interdisciplinary higher education, especially with respect to interdisciplinary thinking, is limited and merely explorative. This research is designed to fill this gap.

This study focuses on the implementation of a revised interdisciplinary Information Science doctoral program aimed at increasing third-year retention rates and shortening time to candidacy and degree completion. The intervention of the revised program
centered on forming a stronger and closer academic community among the varied interdisciplinary backgrounds of both students and faculty members engaged in the program.

**Research Questions and Research Hypotheses**

This study examined a viable community of practice, and the knowledge sharing and the problem solving that occurs within it. The preceding discussion led the researcher to the following hypotheses and research questions that guided the research.

**Research Question 1**

*Did the implementation of the revised program structure in Information Science increase doctoral student third-year retention rates and shorten time to candidacy and degree?*

Case study research was performed in Stage I of the study to collect doctoral student data. Documents were examined to extract the necessary data. The third stage of the study, doctoral student semi-structured interviews, supplied data to cross check the findings from the first stage.

**Hypothesis 1**

*Third-year retention rates are positively related to the implementation of the revised program structure in Information Science. Furthermore, students in the program after the implementation of the revised program structure in Information Science will*
realize shortened \textit{time to candidacy and degree} than those in the program before the revision.

\textbf{Research Question 2}

What are the levels of \textit{student sense of community}, \textit{student-student connectedness} and \textit{student-faculty connectedness} and did the implementation of the revised program structure in Information Science increase these levels?

Measures of \textit{student sense of community}, \textit{student-student connectedness} and \textit{student-faculty connectedness} were extracted from web-based surveys in Stage II of the project. In the third stage of the project, doctoral student interviews supplied data to cross check the findings and clear up any possible misunderstandings from the second stage of the project.

\textbf{Hypothesis 2}

The levels of \textit{student sense of community}, \textit{student-student connectedness} and \textit{student-faculty connectedness} are positively related to the implementation of the revised program structure in Information Science.

\textbf{Research Question 3}

What are the levels of \textit{faculty sense of community}, \textit{faculty-faculty connectedness} and \textit{faculty-student connectedness} and did the implementation of the revised program structure in Information Science increase these levels?
Measures of faculty sense of community, faculty-faculty connectedness and faculty-student connectedness were extracted from web-based surveys in Stage II of the project. In the third stage of the project, doctoral faculty member interviews supplied data to cross check the findings and clear up any possible misunderstandings from the second stage of the project.

Hypothesis 3

The levels of faculty sense of community, faculty-faculty connectedness and faculty-student connectedness are positively related to the implementation of the revised program structure in Information Science.

Chapter Summary

This chapter presents a review of the literature relevant to the research study. Two theoretical models were examined, Etienne Wenger’s (1998) Community of Practice and Vincent Tinto’s (1997) model of Institutional Departure, to help explain doctoral student learning and the relationships among the actors in the University at Albany’s Information Science Ph.D. program community of practice. Three key problems, identified as being specific to doctoral education and interdisciplinary programs, were explored: excessive doctoral program attrition, disparities between undergraduate and graduate education, and complexities specific to interdisciplinary doctoral programs. The case study, the revised University at Albany’s Information Science doctoral program, was examined with respect to the aforementioned theoretical models. Last, the research study hypotheses and
research questions were presented with reference to areas of theory that informed the research design and analysis presented in the following chapters.

Next, Chapter 3 presents an overview of the triangulated research design and methods used in this study. Additionally, the three concurrent research design stages will be described.
Chapter 3: Methods

Restatement of Research Questions and Research Hypotheses

The Wenger (1998) and Tinto (1997) frameworks guided the strategies applied in this research study from developing the data coding sheets, identifying the data sources, choosing a survey instrument, and developing open-ended questions, through to choosing the data analysis methods and, finally, guiding the “usefulness” of the findings.

The purpose of this study was to first determine if the implementation of a revised, interdisciplinary doctoral program affected the experiences of doctoral faculty and students in the Information Science Ph.D. program at the University at Albany. Of particular interest was whether the revised program affected the development of a viable community of practice and the knowledge sharing and the problem solving that occurs within it between the students, between the faculty members, and between the students and the faculty members. Second, the study was to establish whether the program structure modifications influenced doctoral student retention rates and time to degree completion. The community of practice in this case study was the highly interdisciplinary Information Science Ph.D. program at the University at Albany. To best address the overarching research questions raised in the previous chapters the research design examined the program faculty members, students, and program procedures. Specific research hypotheses and research questions were:
Research Question 1

Did the implementation of the revised program structure in Information Science increase doctoral student third-year retention rates and shorten time to candidacy and degree?

Hypothesis 1

Third-year retention\(^6\) rates are positively related to the implementation of the revised program structure in Information Science. Furthermore, students in the program after the implementation of the revised program structure in Information Science will realize shortened time to candidacy and degree than those in the program before the revision.

Research Question 2

What are the levels of student sense of community, student-student connectedness and student-faculty connectedness and did the implementation of the revised program structure in Information Science increase these levels?

Hypothesis 2

The levels of student sense of community, student-student connectedness and student-faculty connectedness are positively related to the implementation of the revised program structure in Information Science.

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\(^6\) The key, measurable variables have been underlined.
Research Question 3

What are the levels of faculty sense of community, faculty-faculty connectedness and faculty-student connectedness and did the implementation of the revised program structure in Information Science increase these levels?

Hypothesis 3

The levels of faculty sense of community, faculty-faculty connectedness and faculty-student connectedness are positively related to the implementation of the revised program structure in Information Science.

Research Design

To provide the best understanding of the research questions presented here, a mixed method research design was chosen. A mixed method research design is becoming more commonplace in both educational and information science research and is often considered preferable to studies exclusively either qualitative or quantitative as it can be useful to capture the best of both approaches (Creswell, 2003; Jick, 1979; Johnson & Onwuegbuzie, 2004). By converging methods researchers agree that the researcher can get a richer, more comprehensive picture by providing multiple viewpoints and perspectives as well as different forms of data collection and analysis (Bryman, 2008; Creswell, 2003; Hesse-Biber & Leavy, 2008; Johnson & Onwuegbuzie, 2004). Both Mingers (2001) and Johnson and Onwuegbuzie (2004) claimed that the mixed method
research approach is the preferred method for educational and information science research.

Hesse-Biber and Leavy (2008) maintain that even though a mixed method design can often provide a better understanding of the problem being studied it can also result in a more complex, lengthy, and challenging study. They stress the need for the researcher to be experienced in both qualitative and quantitative design methods and analysis techniques. The researcher must not only be able to identify and administer the right survey instrument for the study but must know how to write valuable open-ended questions, choose a suitable sample, and effectively interview participants. During the analysis of the data, the researcher must further be experienced in using different software applications to most efficiently and accurately express the results of the study.

The study described here exemplifies a sequential, triangulated mixed method design. The sequential procedure for a mixed method design is largely where the researcher attempts to explain findings of one method with another method in a chronological order (Creswell, 2003; Johnson & Onwuegbuzie, 2004). Triangulation refers to a research strategy which seeks to validate data and results by combining data sources and methods (Brewer & Hunter, 2006; Bryman, 2008; Jick, 1979, Mingers, 2001). Brewer and Hunter (2006) assert that triangulation is valuable in order to see the research problem from different viewpoints. It provides the researcher with more confidence in her results and may even help to uncover discrepancies in a theory or model (Bryman, 2008; Jick, 1979). A schematic representation of this design is shown in Figure 3.1: Triangulated Research Design Combining Multiple Data Sources and Three Methods.
The researcher was intent on using a mixed method in hopes of better understanding the underlying research problems. She felt that each stage of the design could not only verify previously collected data but could build on the others to provide a more robust and comprehensive picture of the doctoral students and faculty members immersed in this challenging, interdisciplinary Information Science Ph.D. program.

**Populations and Sampling Frames**

The populations for this research were doctoral students and faculty in interdisciplinary Ph.D. programs. Interdisciplinary approaches in higher education are necessary for addressing critical socio-technological challenges facing the world today, with strong interdisciplinary programs recognized as central to increasing
interdisciplinary research capability (Borrego and Newswander, 2010). In a 2009 National Science Foundation (NSF) report the NSF Task Force on CyberLearning recommended increasing the numbers of cross-disciplinary researchers and practitioners knowledgeable in both science and technology to confront the challenges. Successful and sustainable graduate programs are necessary to bring this desire to fruition.

For the purposes of this research, data were collected from Ph.D. students and faculty who are, or were, a part of the Information Science Ph.D. program at the University at Albany where the researcher is a doctoral student and was a co-teacher in the program. This program is a well-established, respected interdisciplinary doctoral program at the University at Albany and a rich data source for a mixed method study.

The faculty and students in this sample were an instance of a viable community of practice, one with members participating for different reasons and at different participation levels but uniformly working toward a shared goal of successfully graduating students (Wenger et al., 2002). It is a community intent on providing value to the university, the department and the program itself. Wenger et al. insisted that a successful community often most values the small, everyday transactions similar to those found both inside and outside the classroom and between graduate students and faculty. Furthermore communities do well at being held to schedules and planned events common in educational institutions everywhere. Wenger et al. called this a “rhythm” in the community and insisted that it is this rhythm which keeps the community healthy and active.
Data Collection Overview

The three primary data sources for this research study were the doctoral students who were matriculated in the University at Albany Information Science Ph.D. program between the years 2003 and 2007, faculty members of the University at Albany Informatics Department between the years 2004 and 2008, and University at Albany and Informatics Department documents pertinent to the Information Science Ph.D. program from 1990 through 2010.

In the first stage of the research a sample of forty-one University at Albany Information Science Ph.D. students in cohorts from two years before and two years after the implementation of the new program structure in 2006 were used. This two-year window was chosen because the researcher wished to explore relationships with third-year doctoral program retention rates and thus could only study those students in cohorts from 2006 who had reached the third-year retention mark. Demographic and background data were collected using content analysis.

A second study sample, n=37, consisted of doctoral faculty members in the Information Science Ph.D. Program at the University at Albany involved in the program since the early planning stages of the revised program in 2006. Here too demographic and background data were collected using content analysis.

In the second stage of the research, the samples identified in the previous stage, n=41 doctoral students and n=37 faculty members, were surveyed. Thirty doctoral students and sixteen Informatics Department faculty members responded to the survey.
The third stage of the research study sample, n=10, was interviewed doctoral students, n=5, and faculty members, n=5, in the Information Science Ph.D. Program at the University at Albany carefully selected from the first and second stage samples.

The details of the populations and sampling frames for each of the three stages are provided in chapters four, six, and eight of this dissertation.

**Research Design Overview**

The sequential, triangulated mixed method design consisted of three distinct stages of varied data collection, data measurements and data analysis. An overview of the design details is illustrated in Figure 3.2: Detailed Sequential Triangulated Mixed Method Research Design.

In Stage I, qualitative content analysis was used to gather demographic and background data on doctoral students and faculty members. Informatics Department student files were examined to extract the doctoral student data with the intent of addressing the first research question (Research Question 1: *Did the implementation of the revised program structure in Information Science increase doctoral student third-year retention rates and shorten time to candidacy and degree?*). Several University at Albany and Informatics Department documents were uncovered pertaining to faculty members associated with the Information Science Ph.D. program. These documents were used to extract the faculty member demographic and background data for this study.
Figure 3.2: Detailed Sequential Triangulated Mixed Method Research Design

In Stage II, an established web-based survey was distributed to each doctoral student and faculty member identified in Stage I. The intent of the survey was to address
the remaining two research questions. (Research Question 2: What are the levels of student sense of community, student-student connectedness and student-faculty connectedness and did the implementation of the revised program structure in Information Science increase these levels?; Research Question 3: What are the levels of faculty sense of community, faculty-faculty connectedness and faculty-student connectedness and did the implementation of the revised program structure in Information Science increase these levels?). Additional background student and faculty data were collected in this stage of the study pertaining to academic and social experiences during their journey in the Information Science doctoral program.

The final stage of this study, Stage III, consisted of semi-structured interviews of doctoral students and faculty members selected from the Stage I and II samples. The intent here was to cross check and explain findings presented in the first two stages of this study in hopes of better understanding the research questions.

The details of data collection, design methods, and the strengths and weaknesses of the specific methods used in each of the three stages are provided in chapters four, six and eight.

**Conflict of Interest Issues**

The objective of this study was to examine the affect that the implementation of a revised doctoral program structure had on the experiences of both the students and faculty in the program. Through multi-method data analysis, the study revealed details of the student and faculty member experiences before and after the program implementation took place and enhanced the understanding of various student and faculty member
attributes that may well influence a sense of community and connectedness among community members and doctoral student retention and time-to-degree measures. Furthermore, the study considered the association of these attributes with the value and benefit participants find in communities of practice as a result of program elements embedded into the revised Information Science Ph.D. Program at the University at Albany.

During the past several years, from the fall of 2008 through the spring 2011 semester, the researcher had the unique opportunity to be a participant observer as a doctoral student and as a co-teacher of the research seminar. Reinharz (2011) defines a participant observer as being a researcher in a social setting for the purpose of studying phenomena that occur there. Bryman (2008) defines the participant observer as a researcher who immerses herself in a group for an extended period of time. Bryman (2008) also defines the “complete participant” as one whose identity as a researcher was unknown to the group being observed, which was the case for this dissertation study.

The researcher’s intent initially was not as a researcher but merely as a student in the Information Science doctoral program. She interacted with people like any other participant with no interest or goal in researching them for close to three years. It was not until she firmed up her doctoral research proposal in early 2011 that she recognized herself as a participant observer in her research endeavors. In the spring of 2010 she teamed up with professors David Andersen, Deborah Andersen, and Jennifer Goodall, all closely affiliated with the Information Science Ph.D. program, to design a research study aimed at examining the effects of the newly revised Ph.D. program on student retention rates and time to degree. Institutional review board (IRB) approval was requested during
the summer of 2010 to examine Ph.D. student files and to administer an online survey to
the students. The original intention was to produce a co-authored publishable paper.
During the fall of 2010, student files were examined and data were coded by faculty
members Deborah Andersen, and Jennifer Goodall. The student research member was
excluded from collection because of identifiable data. Finally, the PhD. students
indentified and studied earlier in the fall, were administered the online survey in the
spring of 2011. It was at this time the student researcher realized her intended dissertaion
plan which included this research.

Information gathered by the researcher as a complete participant consisted of
personal notes taken in the classroom and personal reflections on past experiences both in
and outside the classroom between students and faculty members. She participated fully
starting in the first semester of the doctoral program but had no intention of collecting
data. There was no effect on the people involved, no ethical repercussions, and no need
for institutional review board (IRB) approval until the dissertation plan was proposed.

The method of participant observation is appropriate for studying most aspects of
human interaction and is especially suitable for the researcher who has gained access to a
setting which is limited in size and location (Jorgensen, 1989). Babbie (1992) described
the method of participant observation as “the most natural technique for doing social
research” (p.9) where the researcher joined other people in academic and social situations
thus allowing a unique perspective from the “inside”. This before-and-after, student-to-
researcher/student method enabled the researcher to develop a familiarity with the
cultural environment, within the community of practice, which proved invaluable
throughout the research project. It provided the researcher with a nuanced understanding of context that can come only from personal experience.

The Wenger (1998) and Tinto (1997) frameworks helped guide the researcher in organizing her notes and reflections as a complete participant. As a reminder, the essential elements that should exist in a community of practice are:

- a domain of knowledge of committed members which inspires community members to participate and contribute;
- a community of people who feel a sense of belonging and regularly interact; and
- a shared practice of culture and a language that community members are developing to be effective in this domain (Wenger, 1998)
- and a search for positive interaction within both the academic and social systems (Tinto, 1997).

This was a very natural, unstructured, and narrow social setting, constrained to only students and faculty the researcher studied from the fall of 2008 through the spring 2011 thus providing limited data (Brewer & Hunter, 2006). Additionally the researcher was a part-time student further limiting participation within the community due to time constraints. Even though the researcher did not interact and study participants in the traditional role as a full-time student she was able to observe the strong sense of community among the student and faculty participants. Regardless of varied academic disciplines and experiences there existed a domain of knowledge unique to the community of practice which closely bound the community. Both the academic and the social systems within the community were solid with many of the participants interacting regularly.
Despite the negative views of covert participant observation as being unethical and in violation of participant informed consent, Jorgensen (1989) maintains that this methodology does not have true “human subjects” but rather “situations”. It is a method in which human beings are not manipulated or controlled, but merely observed in natural situations (Jorgensen, 1989).

Data obtained through participant observation served as a check against participants’ subjective reporting of what they believe and do. This was especially valuable during the final research stage during the interviews. The researcher was free to really “see” the situation and the unstructured format allowed for a better chance of uncovering issues (Bryman, 2008). Conversely, the researcher’s class notes were incomplete and lacking and she was not able to ask participants to reconstruct a situation or set of circumstances which occurred during her first years in the doctoral program. Nonetheless, the researcher contends that her role as a participant observer enhanced and enriched the data collected.

During the fall 2010 and spring 2011 semesters when the researcher assumed the role of a faculty member as a co-teacher of the four-semester Ph.D. research seminar, three of the nine participants interviewed by the researcher during the final research stage in 2012 were invited by the class to speak of their current research. In her role as a participant observer the researcher was unaware of which participants would qualify as potential interviewee participants since the final stage of her dissertation research project was not to begin until late fall 2011.

The researcher was intent on providing the research participants with all the information necessary in order for them to make an informed decision about whether or
not they chose to participate in the study. Additionally, it was of utmost importance to the researcher that she never intentionally deceived or caused any harm to any research participant. All research data were appropriately recorded, and will be archived for a reasonable length of time on an external storage device, and be available for review. All participant information will be kept in the strictest of confidence.

Details of the human subject reviews for each of the three research stages are provided in chapters four, six, and eight.

**Strengths of the Study**

By using both quantitative and qualitative methods along with triangulating three complimentary methods the researcher achieved a richer, more comprehensive and convincing picture of the research problem. Triangulation provided a validation of the study’s data and results by combining data sources and methods. Possible biases in one method could counteract biases of another method. For example, the survey measurements could have resulted in a misrepresentation of levels of sense of community and connectedness whereas the answers to the interview questions could shed light on better explaining these measures. Conversely the answers to the interview questions could have been misinterpreted by the researcher whereas the survey measurements could be considered more reliable having come from well-used and tested scales. Certainly the researcher was able to look at the research problem from different perspectives resulting in a better understanding of the phenomena transpiring throughout the study. Also, partial identification with the participants as a doctoral student in the program and as a co-
teacher of the four-semester research seminar for two semesters allowed the researcher to understand the nature and complexity of the processes taking place.

The University at Albany Informatics Department Ph.D. program represents a stable and secure sample of doctoral students and faculty in an interdisciplinary field. The collected data were gathered in a New York State accredited university setting indicating a reliable and reputable source of data which in turn speaks to the validity of the data collected in this study. Furthermore, case study research is especially useful for studying social processes over time and provides a good understanding of the phenomena.

Limitations of the Study

The researcher, being a student, had some experience in research methods in general which increased the complexity and time of the study, and left a question of the appropriateness and effectiveness of mixing multiple methods. In any mixed method design research questions concerning the problems and struggles of paradigm mixing and how to interpret conflicting results remain.

Because only so much information was available the study examined a limited number of background and experience measures. It is possible that variables not included in this study may have contributed to program doctoral students and faculty members decisions to participate in a community of practice. Also, the small sample sizes increased the probability of sampling error. Due to non-responsive faculty member participants, the respondent pool for this group was even smaller than that of the doctoral students thus pointing to a possible limited sampling frame for doctoral faculty members.
The findings of this dissertation study are limited to a single university department where the sample was drawn. Caution should be made not to generalize the study results to all interdisciplinary doctoral programs. This dissertation serves as a case study of one particular solution to the problems of attrition and time to degree completion in interdisciplinary programs.

As discussed earlier in this chapter, in the conflict of interest issues section, due to the researcher being a participant observer, consideration must be given to possible bias and subjectivity concerns. She knew, quite well, several of the doctoral student participants and faculty member participants for years and understood their commitment to and personal views of the newly revised program. Furthermore, consideration must be given to the possible improper interpretation of interview data since the researcher either personally knew the participants or at least was informed about them.

**Chapter Summary**

This chapter provided the reader with an overview of the research design and methods, the study’s populations and sampling frames, and the data collection processes. It also discussed the researcher’s role as a participant observer in the research study and the possible conflict of interest issues resulting from her involvement with both students and faculty members in the University at Albany’s Information Science doctoral program. The final section of the chapter addressed the strengths and limitations of this research.
Following this chapter a comprehensive discussion of the research design methods and detailed results are provided for each of the three stages. Chapters four, six, and eight contain the design methods used for Stage I, II, and III respectively. Chapters five, seven, and nine discuss the detailed results from Stage I, II, and III respectively.
Focus of Stage I Research Design

The purpose of Stage I of this study was to research the Information Science Ph.D. program history and to gather and analyze doctoral student and faculty members’ demographic and background data. Figure 4.1: Stage I Research Design presents an overview of the research design for Stage I. Qualitative content analysis was performed to determine the data samples used in the Stage II research and to answer the first research question.

**Figure 4.1: Stage I Research Design**

The specific research hypothesis and research question addressed in Stage I were:

**Research Question 1**

*Did the implementation of the revised program structure in Information Science increase doctoral student third-year retention rates and shorten time to candidacy and degree?*
Hypothesis 1

Third-year retention\(^7\) rates are positively related to the implementation of the revised program structure in Information Science. Furthermore, students in the program after the implementation of the revised program structure in Information Science will realize shortened time to candidacy and degree than those in the program before the revision.

Populations and Sampling Frames

The population for this research stage was University at Albany documents pertaining to [1] doctoral students matriculated in the Information Science Ph.D. program and to [2] university faculty members affiliated with the Information Science Ph.D. program. For the purposes of this dissertation research, data were collected from documents of Ph.D. students who were matriculated in the University at Albany Information Science Ph.D. program between the years 2003 and 2007 and faculty members of the University at Albany Informatics Department, or affiliated with the department, between the years 2004 and 2008.

Only doctoral students in cohorts from two years before and two years after the development of the revised Ph.D. program in 2005 were selected for this research. This five year window was selected for two reasons. First, the researcher wanted to study the effects of a new doctoral program structure on students’ time to graduation in the program thus requiring a sample from students matriculated in the program both before and after the program restructuring which began in 2005. Secondly the researcher was

\(^7\) The key, measurable variables have been underlined.
interested in exploring third-year doctoral retention rates thus limiting the sample to student cohorts formed at or before 2007 who had reached the third-year retention mark.

University at Albany faculty members affiliated with the Information Science Ph.D. program between the years 2004 through 2008 were considered for this study. The researcher was interested in collecting data pertaining to faculty members in a similar five–year window. Since the revised Ph.D. program implementation was not official until 2006 and most new program faculty members were not hired until the fall of 2004, the researcher chose a five-year window beginning in 2004. There were no research variable limitations for faculty, unlike the doctoral student third year retention rate data, thus allowing for more flexibility in choosing the years considered for collecting data.

**Document Data Collection**

University at Albany Informatics Department documents, specifically Information Science Ph.D. student program applications, student college degree transcripts, and individual student Information Science Ph.D. Program Plans\(^8\) were examined to extract data from all doctoral students who were matriculated in the Information Science Ph.D. program between the years 2003 and 2007. Of particular interest was to identify student demographic data and individual student characteristics related to advancement in the program as addressed Research Question 1. The instrument used for this content analysis can be found in Appendix A: Student Data Extraction Sheet. A total of forty-one students met the requirements for the sample and a data extraction sheet for each participant was completed during Stage I of this research study. Two faculty members on the original

\(^8\) The Information Science Ph.D. Program plan, outlining the planned course of study for the degree, is required to be submitted to the Department by the student for approval.
2010 research team, Deborah Andersen and Jennifer Goodall, examined the doctoral students’ files, collected the data, and completed the data extraction sheet for each participant. Student confidentiality was protected by removing names and replacing them with a unique student code before the data were passed on to the researcher. Data from the extraction sheets were transferred into the Student SPSS data set (Statistical Package for the Social Sciences) and subsequently analyzed.

The instrument, Appendix A: Student Data Extraction Sheet, was used to record the specific data elements which led to student data collection in Stage I of this research. The process of document content analysis yielded thirty-four Information Science doctoral student variables. See Table 4.1: Research Stage I Doctoral Student Variables for Data Collection and Analysis indicating the resultant variable list.

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Variable Definition</th>
<th>Source Document</th>
</tr>
</thead>
<tbody>
<tr>
<td>studentCode</td>
<td>Unique student identifier</td>
<td>Generated by researchers</td>
</tr>
<tr>
<td>Gender</td>
<td>Student gender</td>
<td>Student Application</td>
</tr>
<tr>
<td>Age</td>
<td>Student age at entry into the program</td>
<td>Student Application</td>
</tr>
<tr>
<td>GREV</td>
<td>GRE/GMAT exam (verbal score)</td>
<td>Student Application</td>
</tr>
<tr>
<td>GREQ</td>
<td>GRE/GMAT exam (quantitative score)</td>
<td>Student Application</td>
</tr>
<tr>
<td>GREA</td>
<td>GRE/GMAT exam (writing score)</td>
<td>Student Application</td>
</tr>
<tr>
<td>TOEFL</td>
<td>TOEFL exam score</td>
<td>Student Application</td>
</tr>
<tr>
<td>admitYear</td>
<td>Year admitted into the program</td>
<td>Student Application</td>
</tr>
<tr>
<td>matricYrSem</td>
<td>Semester &amp; Year Matriculated</td>
<td>Student Application</td>
</tr>
<tr>
<td>Foreign</td>
<td>Foreign or Domestic student</td>
<td>Student Application</td>
</tr>
<tr>
<td>BA</td>
<td>BA/BS Degree Program name</td>
<td>Student Application</td>
</tr>
<tr>
<td>MA</td>
<td>MA/MS Degree Program name</td>
<td>Student Application</td>
</tr>
<tr>
<td>MA2</td>
<td>Second MA/MS Degree Program name</td>
<td>Student Application</td>
</tr>
<tr>
<td>MAinst</td>
<td>MA/MS Degree Institution</td>
<td>Student Application</td>
</tr>
<tr>
<td>MAinst2</td>
<td>Second MA/MS Degree Institution</td>
<td>Student Application</td>
</tr>
<tr>
<td>MAyear</td>
<td>MA/MS Year graduated</td>
<td>Student Application</td>
</tr>
<tr>
<td>MAyr2</td>
<td>Second MA/MS Year graduated</td>
<td>Student Application</td>
</tr>
<tr>
<td>Degree</td>
<td>Years since prior degree</td>
<td>Student Application</td>
</tr>
<tr>
<td><strong>Variable Name</strong></td>
<td><strong>Variable Definition</strong></td>
<td><strong>Source Document</strong></td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>LOA</td>
<td>Leave of Absence (semester &amp; year &amp; length)</td>
<td>Student Transcript</td>
</tr>
<tr>
<td>INFcourses</td>
<td># of INF Courses completed at matriculation</td>
<td>Student Transcript</td>
</tr>
<tr>
<td>UAcredits</td>
<td># of UA credits at matriculation</td>
<td>Student Transcript</td>
</tr>
<tr>
<td>withdrawalDate</td>
<td>Semester &amp; Year of Withdrawal</td>
<td>Student Transcript</td>
</tr>
<tr>
<td>retentionY3</td>
<td>3rd year retention</td>
<td>Student Transcript</td>
</tr>
<tr>
<td>fullTimeMatric</td>
<td>Full or Part-time at matriculation</td>
<td>Student Transcript</td>
</tr>
<tr>
<td>fullTimeY1</td>
<td>Full or Part-time Year1</td>
<td>Student Transcript</td>
</tr>
<tr>
<td>candidacyDate</td>
<td>Semester &amp; Year of Candidacy</td>
<td>Student Transcript</td>
</tr>
<tr>
<td>Graduation</td>
<td>Semester &amp; Year of Graduation</td>
<td>Student Transcript</td>
</tr>
<tr>
<td>degreePlanDate</td>
<td>Year of 1st degree plan submission</td>
<td>Student Program Plan</td>
</tr>
<tr>
<td>programPlan</td>
<td>Program plan year</td>
<td>Student Program Plan</td>
</tr>
<tr>
<td>compsYear</td>
<td>First Year of Comps</td>
<td>Internal INF Department document</td>
</tr>
<tr>
<td>compsGrade</td>
<td>Comps Grade (first year)</td>
<td>Internal INF Department document</td>
</tr>
<tr>
<td>compsYear2</td>
<td>Second Year of Comps</td>
<td>Internal INF Department document</td>
</tr>
<tr>
<td>compsGrade2</td>
<td>Second Comps Grade</td>
<td>Internal INF Department document</td>
</tr>
<tr>
<td>married</td>
<td>Marital status at matriculation</td>
<td>Internal INF Department document</td>
</tr>
</tbody>
</table>

**Table 4.1:** Research Stage I Doctoral Student Variables for Data Collection and Analysis

Following the collection of doctoral student data, emergent data collection was performed to facilitate the extraction of faculty demographic data and identification of individual faculty characteristics related to involvement in the Information Science Ph.D. program at the University at Albany from September 1990, when the Ph.D. in Information Science was first approved to be offered, through May 2011, the date the researcher began gathering the data. The researcher defines “emergent data” as previously unclassified, unorganized information not readily available for data collection purposes. At the outset, the researcher informally interviewed key administrative
individuals and university library archivists to uncover official department and program
documents relevant to the origin of the Information Science Ph.D. program and the
Informatics Department. This investigation allowed the researcher to better understand
the program structure and context within the university. The researcher examined
documents such as:

- University at Albany graduate bulletins
- University at Albany website information
- internal Informatics Department project and program meeting minutes, memos
  and reports
- Informatics Department program manuals and program reviews
- internal Informatics Department documents listing Program Guidance faculty
  advisors and dissertation faculty advisors
- the researcher’s personal notes from the four-semester Research Seminar in
  Information Science classes identifying faculty guest speakers and the annual
  research conference participants.

A total of thirty-seven faculty members were identified as being involved in the
Information Science Ph.D. program between the years 2004 through 2008. A data
extraction coding sheet for each faculty member participant was completed. See
Appendix B: Faculty Data Extraction Sheet. Data from the extraction sheets were
transferred into the Faculty SPSS data set and subsequently analyzed.

The instrument, Appendix B: Faculty Data Extraction Sheet, was used to record the
specific data elements which led to faculty member data collection in Stage I of this
research. The process of document content analysis yielded fifteen Informatics
Department Ph.D. faculty variables. See Table 4.2: Research Stage I Doctoral Faculty Variables for Data Collection and Analysis, indicating the resultant variable list. The following section will address in detail the research methods used.
<table>
<thead>
<tr>
<th><strong>Variable Name</strong></th>
<th><strong>Variable Definition</strong></th>
<th><strong>Source Document</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Faculty member name</td>
<td>UA Graduate Bulletins&lt;br&gt;INF PhD Manuals&lt;br&gt;Internal INF Department documents&lt;br&gt;UA website, <a href="http://www.albany.edu/informatics/6766.php">http://www.albany.edu/informatics/6766.php</a></td>
</tr>
<tr>
<td>gender</td>
<td>Faculty member gender</td>
<td>(same as name variable)</td>
</tr>
<tr>
<td>INFfac04</td>
<td>INF Faculty member in 2004</td>
<td>UA 2004-2005 Graduate Bulletin</td>
</tr>
<tr>
<td>INFfac08</td>
<td>INF Faculty member in 2008</td>
<td>INF PhD Manual 2008-2009</td>
</tr>
<tr>
<td>Core</td>
<td>Core, affiliated or split-line faculty member in 2005</td>
<td>Internal INF Department document</td>
</tr>
<tr>
<td>Rank</td>
<td>Faculty member academic rank in 2005</td>
<td>Internal INF Department document</td>
</tr>
<tr>
<td>Dept</td>
<td>Primary field/department in 2005</td>
<td>Internal INF Department document</td>
</tr>
<tr>
<td>SemPres</td>
<td>Pro-seminar presenter in 2008</td>
<td>Researcher’s personal class notes</td>
</tr>
<tr>
<td>DeptComm</td>
<td>Number of INF department committee memberships</td>
<td>Internal INF Department document</td>
</tr>
<tr>
<td>CommLead</td>
<td>Number of INF department committee leads</td>
<td>Internal INF Department document</td>
</tr>
<tr>
<td>INF7XX</td>
<td>Pro-seminar instructor</td>
<td>Internal INF Department document</td>
</tr>
<tr>
<td>PhDadv</td>
<td>Number of INF doctoral student advisees 2005-2010</td>
<td>Dissertations @ SUNY Albany database <a href="http://library.albany.edu/db/resource/?id=3503">http://library.albany.edu/db/resource/?id=3503</a></td>
</tr>
<tr>
<td>PhDcomm</td>
<td>Number of INF doctoral student committees 2005-2010</td>
<td>Dissertations @ SUNY Albany database <a href="http://library.albany.edu/db/resource/?id=3503">http://library.albany.edu/db/resource/?id=3503</a></td>
</tr>
</tbody>
</table>

**Table 4.2:** Research Stage I Doctoral Faculty Variables for Data Collection and Analysis
Content Analysis – a Social Research Method

The documents and other sources of textual communication were used to generate the data used in Stage I of this research study. Content analysis is broadly defined as the analysis of human communication mostly through the analysis of texts (Babbie, 1992). In this study the researcher primarily did this using a qualitative rather than a quantitative content analysis approach. Quantitative content analysis is more concerned with quantifying the data by arranging it into specific, coded categories (Bryman, 2008). It tends to be more rigid with a predefined set of procedures and a predetermined coding sheet (Hesse-Biber & Leavy, 2008). Qualitative content analysis is more of a discovery approach where the analysis is performed in an emergent manner over a period of time in order to uncover themes and trends in the data (Bryman, 2008; Hesse-Biber & Leavy, 2008).

As explained earlier in the Document Data Collection section of this chapter, doctoral student data were recorded into predefined extraction sheets (Appendix A: Student Data Extraction Sheet) then forwarded to the researcher. Although the data collection procedures and coding sheet were determined before any data was collected, indicating a quantitative approach, there were several predetermined codes which were elaborated on in the extraction sheets resulting in some new, unanticipated coded variables such as the graduation date and second graduate degree program details. Furthermore, the documents that were anticipated in revealing the desired doctoral student data were found to be lacking at times and additional documents were referred to in order to collect the necessary data. Once collected, the data were transferred into SPSS resulting in thirty-four Information Science doctoral student variables. Individual
variables SPSS names, descriptions, and their source document(s) are listed in this chapter (Document Data Collection section) in Table 4.1: Research Stage I Doctoral Student Variables for Data Collection and Analysis.

The process of the Informatics Department faculty content analysis was a far more arduous, recursive process between data collection and data analysis. The researcher began the process by informally interviewing key Informatics Department administrators. As documents were discovered and analyzed the Faculty Data Extraction Sheet (Appendix B) emerged. Twenty-one documents were located across three University at Albany campuses dating from 2000 to 2010. Additionally, five distinct websites were uncovered on the University at Albany’s server and another website, the WaybackMachine, an Internet archive located at http://archive.org/web, offered snapshots of the University at Albany’s home website from as far back as 1996.

To facilitate managing the large quantity of documents the researcher used several strategies. First, copies of any electronic materials and screenshots of pages on websites were printed to provide hard copies of all materials. Hand written notes and printed documentation were then organized chronologically. This information was summarized into a single word-processing file to get a “big picture” of the story behind the revision of the Informatics Department Ph.D. program. Individual faculty members identified in the documents were organized alphabetically in a spreadsheet file and as data emerged for each faculty member, they were entered into the file.

This analysis identified the fifteen Informatics Department Ph.D. faculty variables as seen in Table 4.2: Research Stage I Doctoral Faculty Variables for Data Collection and
Analysis which can be found in this chapter in the Document Data Collection section. The data were then transferred into the Faculty SPSS data set for further data analysis.

All coded data were also managed and organized within Microsoft Excel spreadsheets, where they could be categorized and grouped more easily to look for patterns and sequences within the data. The actual data analysis is in Chapter 5: Stage I Findings.

**Human Subjects Review**

Stage I of this research study, which involved living human subjects, was reviewed and approved by the University at Albany’s Office of Regulatory Research Compliance institutional review board (IRB). IRB Protocol Number 10-180 covered the collection of Information Science Ph.D. student data and was approved in July 2010. An Annual Continuing Request for IRB approval to continue the research was submitted and approved by the Office of Regulatory Research Compliance in July 2011. See Appendix G: Institutional Review Board (IRB) Protocol Submission for Student Data Extraction and Online Survey. Appendix A: Student Data Extraction Sheet was used to collect pertinent data. It should be noted that in order to maintain the confidentiality of the student records and with IRB approval (Appendix G: Institutional Review Board Protocol Submission for Student Data Extraction and Online Survey), the researcher, a doctoral student in the Informatics Department Ph.D. Program from the fall of 2008, did not collect the doctoral student data. Two University at Albany faculty members were identified as research team members who collected and coded each of the forty-one data extraction sheets, eliminating student names and replacing them with unique student
codes for each participant. Copies of the completed data extraction sheets were forwarded to the researcher for data analysis.

IRB Protocol Number 11-115 covered the collection of Informatics Department Ph.D. faculty member data and was approved in June 2011. See Appendix H: Institutional Review Board (IRB) Protocol Submission for Faculty Data Extraction and Online Survey. Appendix B: Faculty Data Extraction Sheet was used to collect relevant data. Due to the emergent nature of collecting faculty data the final version of the extraction sheet was not finished until document analysis was exhausted.

The digital data remain secure in files on a private computer. All digital data files were furthered secured by storing copies through an online storage service. The original student data extraction sheets are securely stored in the Informatics Department office at the University at Albany. Original completed faculty data extraction sheets are kept securely in a personal, private office. They, along with the copies of the completed student data extraction sheets, will be kept for a reasonable length of time then will be securely disposed of.

**Strengths of Content Analysis for this Research**

As is true with any research method, content analysis has its advantages and disadvantages. It is an unobtrusive research method (Babbie, 1992; Bryman, 2008; Weber, 1990) whereby the participants are unaware of the data collected and are not required to actually participate in any way. Neither the students nor the faculty members were ever contacted during this stage of the research. This leads to another advantage, that of being economical both in time and money for the researcher (Babbie, 1992). In
research Stage I none of the data collection required an expense, although the time required in collecting the faculty data turned out to be much longer than the researcher expected. Nonetheless, the time involved in collecting and analyzing the data, as compared to the other research methods used in this study, was considerably less.

Bryman (2008) suggests that this research method is highly flexible where the researcher can access many documents through many different media. The data collected on the Informatics Department faculty members were accessed by means of hard copy documents, electronic documents, and the Internet.

Most scholars agree that this method results in data which are reliable due to the ability to replicate them (Babbie, 1992; Bryman, 2008; Hesse-Biber & Leavy, 2008). Provided that University and Informatics Department data are preserved, most, if not all the data collected in this stage can be reproduced. The documents from which the data were collected, although not centrally located, are presently archived and accessible through the University at Albany. The collected data were gathered in a New York State accredited university setting which also speaks to the validity of the data (Bryman, 2008).

Both Hesse-Biber and Leavy (2008) and Weber (1990) agree that using both quantitative and qualitative analysis on documents can result in a better understanding of the problem being studied. By initially canvasing documents to complete the coding sheets the researcher was presented with a more comprehensive picture and took advantage of collecting richer data resulting in additional variables for the samples being studied.
Limitations of Content Analysis for this Research

Document analysis is limited by the availability of material (Babbie, 1992; Bryman, 2008) which in this research especially affected the collection of faculty demographic and background data. The documents found were scattered across three University at Albany campuses in department offices, personal computers, and library archives. The researcher often stumbled across useful documents through the emergent nature of the data collection process and could have easily missed discovering crucial content. Better and more complete records of the doctoral students existed and were far more centralized in a single Informatics Department office. This limitation leads to a related disadvantage of content analysis that being the potential misrepresentation and invalidity of the data (Bryman, 2008). As mentioned in the method strengths section of this chapter, since this research was conducted in a university setting the data are considered accurate. Bryman (2008) defines data credibility as being error-free and unbiased. Caution is necessary while considering the documents without error or bias. The doctoral student coding sheets were completed by two Informatics Department faculty members then subsequently passed on to the researcher for analysis, thus raising the possibility of different interpretations of the coded data. Several of the Informatics Department faculty-related documents were personal documents, raising the concern of factual accuracy and bias. Due to this study’s qualitative content analysis there is a better chance of not being able to reproduce the data hence causing the data to be less reliable (Hesse-Biber & Leavy, 2008).
In general, document analysis is merely a descriptive method unable to reveal the answers to questions discovered in the data (Bryman, 2008). The researcher can only speculate on puzzling results revealed after analyzing the collected data.

**Chapter Summary**

This chapter provided an account of the gathering of demographic and background data of Information Science Ph.D. students and faculty members. Qualitative content analysis was the research method used to collect, over a period of time, the pertinent documents. Thirty-four doctoral student variables and fifteen Informatics Department faculty variables were identified.

The next chapter, Chapter 5, describes the analysis performed while examining these variables and the relations between them in Stage I of this study followed by a discussion of the findings from Stage I of this research study.
Chapter 5: Stage I Findings from Demographic and Background Data

Introduction

This chapter presents the findings from Stage I of this study. The goals of this research stage were to identify the data samples to be used in the Stage II research and to answer the first research question. The population for this research stage was University at Albany documents pertaining to [1] doctoral students matriculated in the Information Science Ph.D. program and to [2] university faculty members affiliated with the Information Science Ph.D. program. For the purposes of this dissertation research, data were collected from documents of Ph.D. students who were matriculated in the University at Albany Information Science Ph.D. program between the years 2003 and 2007 and faculty members of the University at Albany Informatics Department, or affiliated with the department, between the years 2004 and 2008. The research question addressed in this stage was: “Did the implementation of the revised program structure in Information Science increase doctoral student third-year retention rates and shorten time to candidacy and degree?” The process of analyzing and coding the data was described earlier, in Chapter 4: Stage I Research Design Methods.

To answer the research question and test the corresponding hypothesis, the collected data were converted into SPSS variables. This was done in order to measure doctoral student third-year retention rates, time to candidacy, and graduation rates. To address the population to study, purposive sampling was conducted. Purposive sampling, a non-probability sampling method, was chosen to address the overall aims of this research (Babbie, 1992; Bryman, 2008) which was to explore the impact of the
University at Albany Informatics Department Ph.D. program structure on student and faculty scholarly communities. All matriculated Information Science doctoral students and faculty members in the determined data collection windows of opportunity were selected as described in Chapter Four.

As a reminder to the reader, this study was guided by a search for presence of the essential elements that should exist in a community of practice:

- the domain of knowledge of committed members;
- the community of people who feel a sense of belonging and regularly interact;
- the shared practice that the community members are developing to be effective in this domain (Wenger, 1998) and
- a search for positive interaction within both the academic and social systems (Tinto, 1997).

**Characteristics of the Doctoral Student Sample**

The first population for this research stage was University at Albany doctoral students matriculated in the Information Science Ph.D. program. The sample needed to contain students matriculated in the program both before and after the program restructuring in 2005 to study the effects of a new doctoral program structure on students’ time to candidacy and graduation. Furthermore the sample could only include student cohorts formed at or before 2007 to study the effects of the new program on third-year retention rates. Therefore the researcher limited the sampling frame to doctoral students in cohorts from two years before and two years after the development of the revised Ph.D. program in 2005.
The content analysis revealed a sample of forty-one Informatics Department Ph.D. students. The process of document content analysis yielded thirty-four Informatics Department doctoral student variables as seen in Table 4.1: Stage I Doctoral Student Variables for Data Collection and Analysis in Chapter 4. The demographic makeup of the student data is shown in Table 5.1: Doctoral Student Sample Demographics. In general, the sample was close to equally divided between gender, domestic versus international student status, and marital status.

<table>
<thead>
<tr>
<th>Gender</th>
<th></th>
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</tr>
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<tbody>
<tr>
<td>Female</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>24</td>
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<thead>
<tr>
<th>Nationality</th>
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<td>Domestic</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>International</td>
<td>18</td>
<td></td>
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<table>
<thead>
<tr>
<th>Marital Status</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.1: Doctoral Student Sample Demographics

Of this sample, twenty-one students were matriculated into the Informatics Department Ph.D. program before the fall of 2006 and the remaining twenty after the official implementation of the new program in the fall of 2006, indicating a sample equally distributed between before and after the Informatics Department program implementation. Table 5.2: Doctoral Student Cohort Numbers by Year, presents the number of students in the cohorts for each of the five years. Ages of this sample ranged from twenty-three to fifty-four with an average age of thirty-five and a standard deviation of 8.7. Table 5.3: Before and After Ph.D. Program Implementation–Student by Age,
presents a classification of student ages at entry into the program. Twenty-five of the forty-one students were full-time students at matriculation with this number increasing to twenty-six students after the completion of the first year in the program. Table 5.4: Before and After Ph.D. Program Implementation—Student Enrollment Status, categorizes the students’ indication of whether they are a full-time or part-time student. Additional differences in backgrounds of students matriculated into the program before and after the revised program implementation are presented in Table 5.5: Before and After Program Implementation-Doctoral Student Sample Background Information.

<table>
<thead>
<tr>
<th>Year</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Doctoral Students in the cohort</td>
<td>4</td>
<td>9</td>
<td>7</td>
<td>13</td>
<td>8</td>
</tr>
</tbody>
</table>

**Table 5.2: Doctoral Student Cohort Numbers by Year**

<table>
<thead>
<tr>
<th>Student Age at Entry</th>
<th>20-29</th>
<th>30-39</th>
<th>40-49</th>
<th>50-59</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Doctoral Students Before the Program Implementation</td>
<td>9</td>
<td>6</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Number of Doctoral Students After the Program Implementation</td>
<td>4</td>
<td>9</td>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

**Table 5.3: Before and After Ph.D. Program Implementation - Students by Age**

---

9 No age was reported for two of the students.
### Table 5.4: Before and After Ph.D. Program Implementation – Student Enrollment Status

<table>
<thead>
<tr>
<th>Enrollment Status</th>
<th>At Matriculation</th>
<th>At Year One</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Full-time</td>
<td>Part-time</td>
</tr>
<tr>
<td>Number of Doctoral Students Before the Program Implementation</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>Number of Doctoral Students After the Program Implementation</td>
<td>11</td>
<td>9</td>
</tr>
</tbody>
</table>

### Table 5.5: Before and After Ph.D. Program Implementation - Doctoral Student Sample Background Information

Of notice in Table 5.5 is the much higher number (2 versus 6) of students matriculated after the implementation of the revised program that took a leave-of-absence from the program and/or withdrew from the program. Of these six students who were granted a leave-of-absence from the program, four of them eventually withdrew from the program. Also notable is the greater number (3 versus 1) of students matriculated before

---

10 No status was reported for one student at year one.
the implementation of the revised program who did not pass the comprehensive exams the first time around (Table 5.5). Only twelve students of the forty-one in the sample had graduated from the Informatics Department Ph.D. program in the five-year window in which the sample was taken (Table 5.5). This will be further discussed in the Findings section of this chapter. Table 5.6: Before and After Ph.D. Program Implementation- Number of Years since Prior Degree, presents a classification which is fairly evenly distributed between the two halves of the sample.

<table>
<thead>
<tr>
<th>Number of Years since Prior Degree&lt;sup&gt;11&lt;/sup&gt;</th>
<th>0-1</th>
<th>2-4</th>
<th>5-9</th>
<th>10-14</th>
<th>&gt;14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Doctoral Students Before the Program Implementation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Number of Doctoral Students After the Program Implementation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>7</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Table 5.6:** Before and After Ph.D. Program Implementation - Number of Years since Prior Degree

As discussed earlier in Chapter 2: Literature Review, a Case Study and Hypotheses, in the Undesirable Doctoral Program Attrition section, there are a variety of factors which contribute to doctoral degree progress. Factors common in the literature on doctoral attrition are both race and gender. Female doctoral students generally have been shown to have higher attrition rates than male students do. Foreign students, those whose student status is international in this dissertation study, are often cited in the literature as having higher attrition rates also. Considering both factors in this study (female Gender and International Student Status) there can be seen a slight increase in attrition in the number

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<sup>11</sup> Information was not available for three students.
of female students and an even greater increase in attrition in foreign students after the implementation of the revised program.

**Characteristics of the Doctoral Faculty Member Sample**

The second population for this stage was University at Albany Informatics Department faculty members and faculty affiliated with the Information Science Ph.D. program. The researcher limited the sampling frame to University at Albany faculty members affiliated with the Information Science Ph.D. program between the years 2004 through 2008 to reflect a sample similar to the doctoral student five–year window. Since the revised Ph.D. program implementation was not official until 2006 and most new program faculty members were not hired until the fall of 2004, the researcher chose the five-year window beginning in 2004.

The content analysis revealed a sample of thirty-seven Informatics Department Ph.D. faculty members affiliated with the Information Science Ph.D. program as seen in Table 4.2: Research Stage I Doctoral Faculty Variables for Data Collection in Chapter 4. The demographic makeup of the faculty data, n=37, is shown in Table 5.7: INF Ph.D. Faculty Member Sample Demographics. The categorical variable indicating Informatics Department Ph.D. faculty member’s program involvement level was coded at three levels for Very Involved, Minimally Involved, and No Involvement. This variable was calculated based on the number of voluntary activities (e.g. activities not assigned by an administrator) performed during the years 2004 through 2008 from which this sample was taken. The following variables were used to count the number of activities:

- INF seminar presenter 2008
- NTIR 2007 participation
- NTIR 2008 participation
- Number of Department committees (if this was the only activity, the participant was given a status of “no involvement” as this was normally an assigned department task)
- Number of Department committee leads
- Core Course instructor
- Number of doctoral student advisees since 2005
- Number of doctoral student committees since 2005
- Involved in developing revised program

_Very Involved_ was indicated for those faculty members whose activities numbered five or more. _Minimally Involved_ was those faculty members with a minimum of one activity. _No Involvement_ indicated those faculty members who never undertook an assignment which was not required of them.
<table>
<thead>
<tr>
<th>Gender</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>12</td>
<td>32.4%</td>
</tr>
<tr>
<td>Male</td>
<td>25</td>
<td>67.6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Faculty Member INF PhD Program Level of Involvement</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Involved</td>
<td>13</td>
<td>35.1%</td>
</tr>
<tr>
<td>Minimally Involved</td>
<td>8</td>
<td>21.6%</td>
</tr>
<tr>
<td>No Involvement</td>
<td>16</td>
<td>43.3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>School of Computing &amp; Information Faculty member type 2006-2007</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Core</td>
<td>8</td>
<td>21.6%</td>
</tr>
<tr>
<td>Affiliated</td>
<td>21</td>
<td>56.8%</td>
</tr>
<tr>
<td>Split Line</td>
<td>8</td>
<td>21.6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Faculty Member Academic Rank in 2005(^{12})</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistant Professor</td>
<td>11</td>
<td>30.6%</td>
</tr>
<tr>
<td>Associate Professor</td>
<td>15</td>
<td>41.7%</td>
</tr>
<tr>
<td>Full Professor</td>
<td>10</td>
<td>27.7%</td>
</tr>
</tbody>
</table>

Table 5.7: INF Ph.D. Faculty Member Sample Demographics

The faculty members associated with the Informatics Department’s Ph.D. program were considered core faculty members if their home school (or college) was in the College of Computing and Information. The eight faculty members listed with a member type of split-line were hired at or around the time when the newly revised doctoral program went into effect. These faculty members were hired by two separate University at Albany departments one of which was the Informatics Department. It is notable that only two of the original eight split-line faculty members are still with the University at Albany at the time of writing this dissertation in the summer of 2012 having resigned

\(^{12}\) One faculty member, who was described as a Research Associate, was not included in this table.
from their positions. This represents a very high resignation rate among the three faculty member types identified in this study.

There were twenty different home departments and research centers from which the thirty-seven faculty members were listed as seen in Table 5.8: INF Ph.D. Faculty Member Home Departments.

<table>
<thead>
<tr>
<th>Information Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geology</td>
</tr>
<tr>
<td>Public Administration and Policy</td>
</tr>
<tr>
<td>Educational Theory and Practice</td>
</tr>
<tr>
<td>Information Technology Management</td>
</tr>
<tr>
<td>Computer Science</td>
</tr>
<tr>
<td>Geography and Planning</td>
</tr>
<tr>
<td>Information Technology Management</td>
</tr>
<tr>
<td>Educational Administration and Policy Studies</td>
</tr>
<tr>
<td>Center for Technology in Government</td>
</tr>
<tr>
<td>Accounting and Law</td>
</tr>
<tr>
<td>Communication</td>
</tr>
<tr>
<td>Sociology</td>
</tr>
<tr>
<td>Physics</td>
</tr>
<tr>
<td>Political Science</td>
</tr>
<tr>
<td>Music and Art</td>
</tr>
<tr>
<td>Management</td>
</tr>
<tr>
<td>Management and Behavior</td>
</tr>
<tr>
<td>Center for Policy Research</td>
</tr>
<tr>
<td>Criminal Justice</td>
</tr>
</tbody>
</table>

Table 5.8: INF Ph.D. Faculty Member Home Departments

According to the National Center for Education Statistics (NCES) (2010), academic rank for full-time faculty at degree-granting institutions is more evenly distributed than indicated in Table 5.7: INF Ph.D. Faculty Member Sample Demographics. NCES shows
full professors making up thirty-seven percent of total faculty, associate and assistant professors each making up approximately thirty-one and one-half percent of total faculty. The sample for this dissertation research was not as evenly distributed showing full Professors making up less than twenty-eight percent of the total Informatics Department faculty teaching staff.

**Measures**

To measure the doctoral student third-year retention rates, time to candidacy and graduation rates, the researcher used data gathered through document analysis of data pertaining to Information Science Ph.D. students between the years 2003 and 2007 at the University at Albany. These were the three primary variables used to answer the first research question. Thirty-four variables were identified through the process of document analysis (see Table 4.1: Research Stage I Doctoral Student Variables for Data Collection and Analysis in Chapter 4, Document Data Collection section).

In this stage of the research study the dependent variable was the year the student was matriculated into the doctoral program. The independent variables explored were:

- Year of graduation
- Number of semesters in the program to admission to candidacy
- Third-year retention rate
- Gender
- Student status (international or domestic)
- Part-time versus full-time status at matriculation.
To answer the research question and test the corresponding hypothesis, the data were converted into SPSS variables.

**Findings**

As a reminder to the reader, the purpose of Stage I of this research study was to address research question one and the corresponding hypothesis:

Research Question 1 - *Did the implementation of the revised program structure in Information Science increase doctoral student third-year retention rates and shorten time to candidacy and degree?*

Hypothesis: *Third-year retention rates are positively related to the implementation of the revised program structure in Information Science. Furthermore, students in the program after the implementation of the revised program structure in Information Science will realize shortened time to candidacy and degree than those in the program before the revision.*

Of the forty-one doctoral students in the sample twelve, 29.2%, had graduated by the spring of 2011 when the sample was collected. Due to the small number of graduates in the sample it was impossible to determine if the implementation of the revised Information Science program structure reduced doctoral student time to degree. Figure 5.1: Graduation Dates by Year Matriculated presents the distribution of the twelve students’ graduation dates by the year they matriculated into the program.
Figure 5.1: Graduation Dates by Year Matriculated

More data were available to measure the effect the revised program had on students’ time to candidacy. Close to 60% of the entire, undivided doctoral student sample had been admitted to candidacy. Using the year of program matriculation and the date of candidacy the researcher computed the numbers of semesters the doctoral students completed before their admission into candidacy.

Figure 5.2: Mean Semesters to Candidacy by Year Matriculated, displays the average number of semesters to program candidacy for each of five cohorts. Figure 5.3: Number of Semesters to Candidacy by Year Matriculated presents the same data for individual students. Unfortunately at the time of data collection only one student, of the eight in the 2007 cohort, had attained candidacy thus the researcher was not able to provide a true picture of that year’s cohort’s time to candidacy.
Figure 5.2: Mean Semesters to Candidacy by Year Matriculated

Figure 5.3: Number of Semesters to Candidacy by Year Matriculated
Only using the first four years of data and eliminating year 2007 the findings (as indicated in figure 5.3) indicate that students in the program after the implementation of the revised program structure in Information Science realized a shortened time to candidacy compared to those in the program before the revision. As a note to the reader, in 2003 only three of the four students achieved candidacy status; one student withdrew from the program. In 2005 only five of the seven students achieved candidacy status; two students withdrew from the program. In 2006 only six of the thirteen students achieved candidacy status; four students withdrew from the program and three had not yet attained candidacy status.

As indicated in Figure 5.4: Third-Year Retention Rates, the doctoral student retention rates at year three in the program dropped in the five years the data were collected. Hence the hypothesis “third-year retention rates are positively related to the implementation of the revised program structure in Information Science” could not be supported.
As previously discussed in the section on Characteristics of the Doctoral Student Sample of this chapter, there are a variety of factors contributing to increasing rates of doctoral student attrition including gender and race. Based on her review of the literature, the researcher was interested in determining if there was indeed a relationship between retention and the aforementioned factors.

Of the twenty-one students pre-2006 (before the implementation of the revised Information Science Ph.D. program) two students withdrew from the program. Both students were male, not supporting the existing literature which maintained that females have higher attrition rates. One of the two students was domestic, the other student was foreign, again not supporting the existing literature which maintained that foreign students have higher attrition rates.
Of the twenty students post-2006 six students withdrew from the program, a much higher rate of attrition than those student pre-2006. Four of the six students were female, supporting the existing literature which maintained that females have higher attrition rates. All six of the students were domestic unequivocally not supporting the existing literature which maintained that foreign students have higher attrition rates.

Two factors potentially affecting retention rate at this point in the research study come to mind. First, in an attempt to strengthen and broaden the Information Science Ph.D. program the revised program requirements were made more demanding and the coursework more challenging as compared to the original Ph.D. program. Students who were not able to keep pace with the ambitious demands of the revised program requirements may have decided to leave the program before the close of their third year.

Second, the revised program pushes the students in their first two years of the program to complete the core courses and complete the research requirement at which point they are expected to take the comprehensive exam. In the pre-2006 Ph.D. program the curriculum requirements and schedule were not as demanding resulting in less pressure to perform at the higher standards. Consequently students may have been less inclined pre-2006 to realize at the third-year mark that this program, or even this degree, was not an appropriate match for them. Of the twenty-one students matriculated into the pre-2006 Ph.D. Information Science program, eleven had not graduated as of spring 2011 and four of these eleven students had withdrawn from the program within a range between three and thirteen semesters (mean of 7.25 semesters). The twenty students matriculated into the post-2006 Ph.D. Information Science program saw six students withdrawing from the program within a range between two and seven semesters (mean of
4.5 semesters). This indicates that students in the revised program were not only withdrawing from the program at a higher rate but also at a faster rate.

As indicated in Figure 5.5: Mean Semesters to Candidacy by Gender and Year Matriculated, the distribution of male and female students showed little difference regarding gender and time to candidacy. In one of the five years, 2005, there is insufficient data as the entire cohort was male. In the final year, 2007, only one student in the cohort, who was male, had gained admission to candidacy.

![Figure 5.5: Mean Semesters to Candidacy by Gender and Year Matriculated](image)

**Figure 5.5**: Mean Semesters to Candidacy by Gender and Year Matriculated
The distribution of international versus domestic students’ number of semesters to candidacy in the program is reasonably evenly distributed as revealed in Figure 5.6: Mean Semesters to Candidacy by International Student Status and Year Matriculated. There is no indication that international student status affected time to degree Candidacy in this sample of doctoral students.

**Figure 5.6**: Mean Semesters to Candidacy by International Student Status and Year Matriculated
The doctoral students in the program, as seen in Figure 5.7: Full-time Status Distribution by Year Matriculated, were frequently full-time students but there remained a noteworthy number of students who matriculated into the program part-time.

![Full or Part-time at Matriculation](image)

**Figure 5.7**: Full-time Status Distribution by Year Matriculated

Again, despite what the past literature implied, findings from this research suggest that there were no significant differences pre/post program change regarding students who were full-time or part-time in this program as all students basically took the same amount of time to reach candidacy. These findings are illustrated in Figure 5.8: Mean Semesters to Candidacy by Full-time Status and Year Matriculated.
Figure 5.8: Mean Semesters to Candidacy by Full-time Status and Year Matriculated

Chapter Summary

This chapter began with describing the doctoral students’ and faculty members’ demographics and background information. The research study’s first research question regarding whether the implementation of the revised Information Science program affected doctoral student retention rates and time to program candidacy was resolved. The findings indicated that third-year retention rates were not positively increased to the implementation of the revised program structure but time to candidacy was largely shorter for those students matriculated into the revised Ph.D. program.

Exploration of factors contributing to doctoral degree progress revealed in the review of the literature were examined to determine if a relationship between doctoral
student program retention and three doctoral student variables (e.g. gender, race, and full-time status) existed. No significant results were recognized.

The discussion now moves to Chapter 6, a comprehensive analysis of the research design methods used in Stage II of this dissertation research followed by Chapter 7 which details the findings from research Stage II.
Chapter 6: Stage II Research Design Methods

Focus of Stage II Research Design

The purpose of Stage II of this study was to survey the Information Science Ph.D. students and faculty members identified in Stage I and to analyze the resultant data to address research questions, and to classify and determine the sample for the third research stage. Figure 6.1: Stage II Research Design presents an overview of the research design. Quantitative data analysis was performed to address the second and third research questions. Surveys were distributed to the doctoral students and the faculty members identified in the samples garnered from Stage I of this research. The goal was to measure community and connectedness measures [1] between the faculty members, [2] between the students, and [3] between the faculty members and the students.

Figure 6.1: Stage II Research Design
The specific research hypotheses and research questions addressed in Stage II were:

**Research Question 2**

What are the levels of *student sense of community, student-student connectedness* and *student-faculty connectedness* and did the implementation of the revised program structure in Information Science increase these levels?

**Hypothesis 2**

The levels of *student sense of community*\(^{13}\), *student-student connectedness* and *student-faculty connectedness* are positively related to the implementation of the revised program structure in Information Science.

**Research Question 3**

What are the levels of *faculty sense of community, faculty-faculty connectedness* and *faculty-student connectedness* and did the implementation of the revised program structure in Information Science increase these levels?

**Hypothesis 3**

The levels of *faculty sense of community, faculty-faculty connectedness* and *faculty-student connectedness* are positively related to the implementation of the revised program structure in Information Science.

\(^{13}\) The key, measurable variables have been underlined.
**Populations and Sampling Frames**

The populations for this research stage were the resultant samples of Information Science Ph.D. University students and faculty members identified in Stage I of this dissertation study. As a reminder to the reader, data were collected in Stage I from documents of Ph.D. students who were matriculated in the University at Albany Information Science Ph.D. program between the years 2003 and 2007, and faculty members of the University at Albany Informatics Department, or affiliated with the department, between the years 2004 and 2008.

Each of the forty-one doctoral students was invited to participate in the self-completion, web-based survey as were each of the thirty-seven faculty members.

**Survey Data Collection**

The first self-completion web-based survey was administered to all forty-one Information Science Ph.D. students (see Appendix C: Student Research Survey) during the 2011 spring semester. This forty-eight question survey was based on two corroborated scales, the *Classroom Community Scale* – Rovai (2002a) and the *Doctoral Student Connectedness Scale* (DSCS) – Terrell et al. (2009). These two surveys were selected in order to measure the students’ sense of program community and levels of connectedness with both fellow classmates and program faculty members. The definition of *connectedness* from Rovai (2002b) is the “feeling of belonging and acceptance and the creation of bonding relationships” (p. 322). Rovai (2002b) showed that there is a relationship between a sense of community, emotional connectedness, and cognitive learning to support persistence in student academic goals. In general, this sense of
community involves high levels of engagement, trust and dedication to building a community of practice. Faculty and students together must create this strong community through persistent interactions (Rovai, 2002b; Terrell et al., 2009). Rovai’s *Classroom Community Scale* of twenty questions was designed to specifically measure a student’s sense of community. The *Doctoral Student Connectedness Scale* developed and verified by Terrell et al. (2009) was used to obtain measures of student-student connectedness and student-faculty connectedness. Evidence supports good construct validity and good reliability with both scales (Albion & Erwee, 2011; Rockinson-Szapkiw, 2011; Rovai, 2002a; Rovai, 2002b; Terrell et al., 2009).

Development of the student survey included three rounds of consultation with the researcher’s Dissertation Committee. It was divided into three sections. The first section, titled General Program Specific Questions, was based on Rovai’s *Classroom Community Scale* (2002b) and consisted of twenty five-point Likert-type scale questions (i.e. Strongly agree (SA), Agree (A), Neutral (N), Disagree (D), Strongly disagree (SD)) meant to measure a sense of community in a learning environment. Participants were asked to indicate the response that best reflected their feelings about statements concerning the Information Science Ph.D. program. Adjustments were made to the scale to reflect the researcher’s interest in the Information Science doctoral program rather than a specific course (i.e. the term “course” in several of the questions were replaced with the term “program”). Additionally, in order to include both doctoral students currently in the program and those who either graduated or left the program before completion, modifications were made to include both present and past tense. Higher scores indicated a greater sense of program community.
The second section, titled Dissertation Process Questions, was based on Terrell’s, Snyder’s, and Dringus’s *Doctoral Student Connectedness Scale* (2009) and consisted of eighteen five-point Likert-type scale questions meant to measure both faculty-to-student connectedness and student-to-student-connectedness. The *Doctoral Student Connectedness Scale* is an eighteen item scale with two subscales: faculty-to-student connectedness and student-to-student-connectedness. It also used the same five-point Likert-type scale presented above. Participants were asked to indicate the response that best reflected their feelings about statements concerning the dissertation process. Some minor adjustments were made to the scale to include doctoral students both currently in the program and those who either graduated or left the program before completion (i.e. past tense wording was included). Higher scores reflected a stronger sense of social connectedness.

The last section of the doctoral student survey consisted of ten open-ended questions concerning student and faculty member relationships and demographics. The complete survey of forty-eight questions was administered online using *SurveyGizmo*, an advanced online survey software tool.

Data from the thirty-eight, five-point Likert-type scale questions, sections A and B of the survey (see Appendix C: Student Research Survey) were exported into an XML file and subsequently converted into an Excel spreadsheet. The first twenty questions based on Rovai’s *Classroom Community Scale* (2002b), measured a sense of community in a learning environment. Total scores were computed by adding points assigned to each of the twenty, five-point items. The overall Program Community Scale score therefore
could range from a maximum score of eighty to a minimum score of zero, with higher scores reflecting a stronger sense of community in a learning environment.

The remaining eighteen five-point Likert-type scale questions based on Terrell et al.’s *Doctoral Student Connectedness Scale* (2009) measured both faculty-to-student connectedness and student-to-student-connectedness. Student-to-Faculty Connectedness scores were computed by adding points assigned to each of the following nine, five-point items: 22, 24, 26, 27, 31, 32, 34, 36, and 38. Student-to-Student Connectedness scores were computed by adding points assigned to the remaining nine, five-point items: 21, 23, 25, 28, 29, 30, 33, 35, and 37. Connectedness therefore could range from a maximum score of forty-five to a minimum score of zero, with higher scores reflecting a stronger sense of connectedness. The resultant three variables, Program Community, Student-to-Student Connectedness, and Student-to-Faculty Connectedness were entered into the Student SPSS data set for future analysis.

The ten open-ended questions in section C of the survey yielded seventeen additional Information Science doctoral student variables. Table 6.1: Research Stage II Doctoral Student Variables for Data Collection and Analysis lists the variable names and definitions collected. All listed variables were entered into the Student SPSS data set for future analysis.
<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Variable Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>community</td>
<td>Program Community Scale Score</td>
</tr>
<tr>
<td>sfConnect</td>
<td>Student-to-Faculty Connectedness Score</td>
</tr>
<tr>
<td>ssConnect</td>
<td>Student-to-Student Connectedness Score</td>
</tr>
<tr>
<td>Q39</td>
<td>Have you established personal relationships with one or more students in this program</td>
</tr>
<tr>
<td>Q39a</td>
<td>If YES, how many students total in the program</td>
</tr>
<tr>
<td>Q39b</td>
<td>If YES, how many students in your cohort</td>
</tr>
<tr>
<td>Q40</td>
<td>How many semesters were you in the program before finding your faculty mentor</td>
</tr>
<tr>
<td>Q41</td>
<td>How many semesters were you in the program before finding your dissertation chair</td>
</tr>
<tr>
<td>Q42</td>
<td>How many semesters were you in the program before finding your program advisor</td>
</tr>
<tr>
<td>Q43</td>
<td>If you teach (or have taught), how many semesters did you teach while in the PhD program</td>
</tr>
<tr>
<td>Q44</td>
<td>If you are/were a teaching assistant, how many semesters were you a TA</td>
</tr>
<tr>
<td>Q45a</td>
<td>number of NTIR(^{14}) Posters</td>
</tr>
<tr>
<td>Q45b</td>
<td>number of NTIR Presentations</td>
</tr>
<tr>
<td>Q45c</td>
<td>number of other posters</td>
</tr>
<tr>
<td>Q45d</td>
<td>number of other presentations</td>
</tr>
<tr>
<td>Q45e</td>
<td>number of peer reviewed papers</td>
</tr>
<tr>
<td>Q45f</td>
<td>number of book chapters</td>
</tr>
<tr>
<td>Q46</td>
<td>What is the number of months from when you matriculated until your first published paper?</td>
</tr>
<tr>
<td>Q47</td>
<td>What is the number of academic awards you have received while in the program?</td>
</tr>
<tr>
<td>Q48</td>
<td>what is the year you started the program?</td>
</tr>
</tbody>
</table>

**Table 6.1: Research Stage II Doctoral Student Variables for Data Collection and Analysis**

Next, a similar self-completion web-based survey was administered to all thirty-seven faculty members identified in Stage I during the fall of 2011 (see Appendix D: Faculty Research Survey). This forty-three question survey was based on the survey

\(^{14}\) New Trends in Informatics Research (NTIR) conference.
administered, earlier in the study, to the doctoral students. It also consisted of the same three sections. The first section was altered to reveal faculty member views of a sense of community between the students and themselves and a sense of community with other faculty members in the program. The second survey section was modified to indicate the sense of social connectedness between faculty members and doctoral students, and between individual faculty members. The researcher replaced some words or altered the order of words on the survey questions (e.g. changed “connected to other students” to “connected to other faculty”) in order to measure faculty-to-faculty connectedness and faculty-to-student connectedness. The last section of the doctoral program faculty survey consisted of five open-ended questions concerning current student, alumni, and faculty member relationships and demographics. This survey too was administered online using SurveyGizmo.

Data from the thirty-eight, five-point Likert-type scale questions, sections A and B of the survey (see Appendix D: Faculty Research Survey) were exported into an XML file and subsequently converted into an Excel spreadsheet. Program Community Scale scores, Faculty-to-Student Connectedness scores, and Faculty-to-Faculty Connectedness scores were computed resulting in three variables which were entered into the Faculty SPSS data set for future analysis.

The five open-ended questions in section C of the survey yielded nine additional Information Science doctoral faculty variables. Table 6.2: Research Stage II Doctoral Faculty Variables for Data Collection and Analysis lists the variable names and definitions collected. All listed variables were entered into the Faculty SPSS data set for future analysis.
<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Variable Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>community</td>
<td>Program Community Scale Score</td>
</tr>
<tr>
<td>fsConnect</td>
<td>Faculty-to-Student Connectedness Score</td>
</tr>
<tr>
<td>ffConnect</td>
<td>Faculty-to-Faculty Connectedness Score</td>
</tr>
<tr>
<td>Q39</td>
<td>Have you established personal relationships with one or more faculty members in this program</td>
</tr>
<tr>
<td>Q40</td>
<td>If YES how many faculty members total in the program</td>
</tr>
<tr>
<td>Q41</td>
<td>Have you established personal relationships with one or more program alumni</td>
</tr>
<tr>
<td>Q42</td>
<td>If YES how many program alumni</td>
</tr>
<tr>
<td>Q43</td>
<td>What is the number of papers you co-authored with students in the program</td>
</tr>
<tr>
<td>Q44</td>
<td>What is the number of papers you co-authored with program alumni</td>
</tr>
<tr>
<td>Q45</td>
<td>What is the number of research presentations posters you co-authored with students in the program</td>
</tr>
<tr>
<td>Q46</td>
<td>What is the number of research presentations posters you co-authored with program alumni</td>
</tr>
<tr>
<td>Q47</td>
<td>What is the year you started in the program</td>
</tr>
<tr>
<td>Q48</td>
<td>Have you established personal relationships with one or more faculty members in this program</td>
</tr>
</tbody>
</table>

*Table 6.2: Research Stage II Doctoral Faculty Variables for Data Collection and Analysis*

**Survey Research – a Quantitative Social Research Method**

Two self-completion web-based surveys were administered to collect the data used in Stage II of this research study. Survey research, broadly speaking, is a quantitative method of asking a set of questions to a sample of participants chosen from a population, then using the answers to describe the population (Fowler, 2009). Bryman (2008) further adds that survey research is a method which collects data in a specific, short time frame.
in order to examine data to determine possible relationships between variables. A self-completion survey is one where the participant completes the survey on her own, without the presence of a researcher (Babbie, 1992; Bryman, 2008). Web-based simply means the participant uses a form on the Internet to answer the set of questions (Bryman, 2008; Fowler, 2009).

Self-completion web-based surveys were chosen as an effective, private, quick, and easily distributed research method to determine measures of a sense of community and community connectedness. A review of the literature revealed several tested survey instruments to measure levels of community and connectedness. The researcher determined that the Classroom Community Scale, developed and tested by Rovai (2002a), and the Doctoral Student Connectedness Scale, based on Rovai’s research and developed and tested by Terrell et al. (2009), were applicable for the population and the research questions in this research study. Both reliability and validity testing had been previously performed on these scales, further confirming the usefulness of using these existing question sets.

Stage I of this research study provided the samples for the surveys; every student and faculty member identified in the content analysis was considered a survey participant.

Development of the student and faculty surveys included three rounds of consultation with the researcher’s Dissertation Committee The two question sets were minimally altered as indicated in the previous section, Survey Data Collection, of this chapter to adapt to the samples used in this research. Open-ended questions were added
to the end of the surveys to facilitate the collection of data not obtainable through the method of content analysis in Stage I.

The researcher chose to administer the survey via the Internet, using a webpage form, to accommodate the sample participants. Privacy and anonymity was important as many of the participants knew the researcher personally. The participants were scattered across the University at Albany’s campuses, in different states, and in some cases, overseas. Convenience was also a factor. Participants were comfortable with the technology, many embracing it, thus finding this format to be less time consuming and obtrusive than paper-based surveys.

The first emails to the doctoral students requesting their participation in the survey were sent out in February 2011 (see Appendix K: Email to Student Survey Participants). After three months and three reminder emails sent to non-respondents by a University at the researcher’s Dissertation Chairperson, the researcher was content with a seventy-five percent response rate. Thirty doctoral students (n=40) responded to the survey.

Emails to faculty members requesting their participation in the survey were sent out by the researcher in early September 2011 (see Appendix L: Email to Faculty Survey Participants). Again after three months and three reminder emails to non-respondents, the researcher settled for a forty-three percent response rate. Sixteen of the thirty-seven faculty members responded to the survey.

All variables listed in Table 6.1: Research Stage II Doctoral Student Variables for Data Collection and Analysis, and Table 6.2: Research Stage II Doctoral Faculty Variables for Data Collection and Analysis were entered into the SPSS data sets for analysis. The details of the data analysis are in Chapter 7: Stage II Findings.
Human Subjects Review

Stage II of this research study, which involved living human subjects, was reviewed and approved by the University at Albany’s Office of Regulatory Research Compliance institutional review board (IRB). IRB Protocol Number 10-180 covered the collection of INF Ph.D. student survey data and was approved in July 2010. See Appendix G: Institutional Review Board (IRB) Protocol Submission for Student Data Extraction and Online Survey. An Annual Continuing Request for IRB approval to continue the research was submitted and approved by the Office of Regulatory Research Compliance in July 2011. The doctoral student self-completion web-based survey, Appendix C: Student Research Survey was used to collect the data. The email sent to students requesting their participation in the survey, Appendix K: Email to Student Survey Participants, along with the online consent form, Appendix M: Student Survey Online Consent Form was granted IRB approval. It should be noted that in order to maintain the confidentiality of the doctoral students’ identities the researcher did not email the students directly. The researcher’s Dissertation Chairperson, who also worked with the student data in Stage I of this study, sent the email call for participation to each student with a unique link to the survey. The researcher directly accessed the completed doctoral student surveys which were identified with a unique student code for each participant. Doctoral student names were kept confidential throughout this stage of the research study.

IRB Protocol Number 11-115 covered the collection of INF Ph.D. faculty member survey data and was approved in June 2011. See Appendix H: Institutional Review Board (IRB) Protocol Submission for Faculty Data Extraction and Online Survey. The doctoral
faculty self-completion web-based survey, Appendix D: Faculty Research Survey was used to collect the data. The email sent to faculty members requesting their participation in the survey, Appendix L: Email to Faculty Survey Participants, along with the online consent form, Appendix N: Faculty Survey Online Consent Form was granted IRB approval.

**Strengths of Self-Completion Web-Based Surveys for this Research**

As true with any research method, research using a self-completion web-based survey has its strengths and limitations. As compared to interviewing the participant, surveys are more economical and quicker to administer (Babbie, 1992; Bryman, 2008). This was especially the case in this research study as the sample participants were widely scattered, some as far as overseas. Although the surveys were quickly distributed to the students and faculty members over the Internet, it took several months and much badgering via emails for some of the participants to return the completed survey.

Bryman (2008) maintains that surveys offer less desirability bias than is found in interviewing. The participant is more likely to disclose uncomfortable, sensitive, or socially unacceptable actions when there is no personal contact with the researcher (Babbie, 1992; Bryman, 2008; Hesse-Biber & Leavy, 2008). Many of the participants in this research study knew the researcher personally which may have further hindered the data collection process if only an interviewing method were used.

Each participant was asked the exact same question; there was no variability in the question wording or the order in which the questions were asked. The survey, being self-completion, was convenient for the participants in that the entire survey, or even a portion
of it, could be completed at any time of their choosing (Babbie, 1992; Bryman, 2008). Most if not all the participants were quite comfortable with using the Internet, so the friendliness of the user interface and the ease of submitting the survey were most likely appreciated, even welcomed, by them (Hesse-Biber & Leavy, 2008).

A survey, as opposed to interviewing, was more suitable for the research samples used and was more useful for precisely measuring the sense of community and connectedness variables which was the primary goal in this stage of the research (Fowler, 2009).

**Limitations of Self-Completion Web-Based Surveys for this Research**

If a survey question was unclear the participant had no means to ask for clarification. Similarly, the researcher was unable to ask participants to elaborate on or clarify an open-ended question they answered (Babbie, 1992; Bryman, 2008; Fowler, 2009; Hesse-Biber & Leavy, 2008). Partially answered open-ended questions, or questions left blank, are more likely to occur since participants have no one looking over their shoulders. In this research study a returned survey missing any of the Likert-scale question responses would preclude determining a measure of either, or both, community and connectedness levels for that participant. No personal contact with the participant, and the demands that a participant may sense with a researcher present, tend to lower survey response rates to unacceptable levels (Babbie, 1992; Bryman, 2008).

Surveys that tend to be redundant or too complicated may dissuade participants from completing the survey without carefully reading each question or even completing the entire question set (Babbie, 1992; Bryman). While the survey scales used in this
research study were well established and tested, both scales were meant to measure a participant’s connections and involvement within a community of scholars. Thereby one must consider the possibility of redundancy in some of the Likert-scale questions.

Finally, since there was no personal contact with the participants, the researcher could never be absolutely sure who completed the survey or who might have had assistance or help in answering the questions.

**Chapter Summary**

This chapter provided an account of the survey research method, and the subsequent data collected used to answer the second and third research questions of this dissertation. Measures obtained were community and connectedness levels between the Information Science Ph.D. faculty members, between the doctoral students, and between the faculty members and the students. Additionally, the survey participants from both the student sample and the faculty member sample were used in determining the sample used in Stage III, semi-structured interviewing, of this research study. Two surveys were administered [1] to Information Science Ph.D. students and [2] Information Science faculty members with response rates of [1] seventy-five percent and [2] forty-three percent respectively. The data collected resulted in twenty-six additional variables identified for this study.

The next chapter describes the analysis performed while examining all the study’s variables and the relations between them. The resultant findings of the analysis of Stage II of this this study is presented in Chapter 7.
Chapter 7: Stage II Findings; Quantifying Community and Connectedness

Introduction

This chapter presents the findings from Stage II of this study which entailed surveying the Information Science Ph.D. students and faculty members. The goals of this research stage were to answer the second and third research questions and to aid in determining the sample to be used in Stage III, semi-structured interviewing, of this research study. Research Question 2 posed: “What are the levels of student sense of community, student-student connectedness, and student-faculty connectedness and did the implementation of the revised program structure in Information Science increase these levels?” Research Question three asked: “What are the levels of faculty sense of community, faculty-faculty connectedness, and faculty-student connectedness, and did the implementation of the revised program structure in Information Science increase these levels?” The process of collecting and coding the data from the surveys was described earlier, in Chapter 6: Stage II Research Design Methods.

To answer the research questions and test the corresponding hypotheses, the collected survey data were converted into SPSS variables. This was done in order to measure doctoral student and faculty community and connectedness measures.

The samples, garnered from Stage I of this research study, were forty-one doctoral students and thirty-seven faculty members. Two surveys were distributed. The first survey was offered to each of the forty-one Information Science Ph.D. students identified in Stage I of this research. The second survey was distributed to each of the thirty-seven
Information Science Ph.D. faculty members, the sample obtained from research Stage I. Thirty doctoral students responded to the survey as did sixteen faculty members.

**Quantitative Measures of the Doctoral Student Sample**

A forty-eight question survey (see Appendix C: Student Research Survey) was used in collecting the quantitative data to measure the Information Science Ph.D. students’ sense of community in the program and the levels of connectedness between the students and between the students and the program faculty members. Two validated survey instruments, based on scales introduced by Rovai (2002a) and Terrell et al. (2009), were used in this study, Rovai’s *Classroom Community Scale* and Terrell’s, Snyder’s, and Dringus’s *Doctoral Student Connectedness Scale*.

The *Classroom Community Scale* was intended to assess a sense of community while taking a college course. The researcher modified the twenty question survey to focus on a sense of community within a program rather a specific course; otherwise the items were left intact. Each statement is followed by a five-point Likert-type scale of responses. Ten of the questions (items 4, 5, 8, 9, 10, 12, 14, 17, 18, and 20) are negatively worded and use the scale strongly agree=0, agree=1, neutral=2, disagree=3, and strongly disagree=4. Statements such as “I do not feel a spirit of community” and “I feel reluctant to speak openly” were asked. The remaining ten questions (items 1, 2, 3, 6, 7, 11, 13, 15, 16, and 19) use the scale strongly agree=4, agree=3, neutral=2, disagree=1, and strongly disagree=0. Positively worded statements included “I trust others in this program” and “I feel that students in this program care about each other”. To calculate the Program Community Scale score the weights of all twenty items were added. The score could
range from zero to eighty with a higher score indicating a greater sense of community in the Information Science doctoral program. This twenty-item scale yielded an average Program Community score of 52.5 with a standard deviation of 13.6.

The Doctoral Student Connectedness Scale was developed to measure a doctoral student’s connection to faculty and to peers. The resulting instrument consisted of eighteen questions divided into two subscales, [1] feelings of student-to-student connectedness and [2] feelings of student-to-faculty connectedness. On a five-point Likert-type scale, 5=strongly agree, 4= agree, 3=neutral, 2=disagree, and 1=strongly disagree, students were asked to select the response that came closest to indicate how they felt about the program’s dissertation process or their relationships with individuals during the dissertation process. Half of the items (questions 1, 3, 5, 8, 9, 10, 13, 15, and 17) consisted of statements meant to measure student-to-student connectedness such as “I communicate regularly with other students who are working on their dissertation”. The remaining items (questions 2, 4, 6, 7, 11, 12, 14, 16, and 18) were statements meant to measure student-to-faculty connectedness such as “I feel that the feedback that I receive from the faculty is valuable”. To calculate the score the weights of each of the nine items were added. The connectedness scores could range from zero to forty-five with a higher scores indicating greater connectedness in the doctoral program. This eighteen-item scale yielded an average Student-to-Student Connectedness score of 24.6 with a standard deviation of 6.8 and an average Student-to-Faculty Connectedness score of 18.6 with a standard deviation of 6.7.

The remaining ten questions in the forty-eight question survey (see Appendix C: Student Research Survey) were open-ended questions whose purpose was to collect data
which was unavailable through content analysis or to verify data from Stage I of this research study. For example, questions such as “How many semesters were you in the program before finding your academic advisor?” and “What is the year you started the program?” were asked.

Quantitative Measures of the Doctoral Faculty Member Sample

A forty-three question survey (see Appendix D: Faculty Research Survey) was used in collecting the quantitative data to measure the Information Science Ph.D. faculty members’ sense of community in the program and the levels of connectedness between program faculty and between the faculty members and the doctoral students. This survey was directly adapted from the doctoral student survey discussed earlier in the section titled Quantitative Measures of the Doctoral Student Sample of this chapter.

A number of the first twenty questions, aimed at determining a sense of community with in the Information Science Ph.D. program, were altered to consider program community from the perspective of the faculty member rather than that the doctoral student. Instead of the statement “I feel it is hard to get help when I have a question”, the faculty member was asked the statement “I feel that it is hard for students to get help when they have a question”. Other survey items were left intact (e.g. “I feel that this program is like a family”).

The next group of questions, eighteen items meant to measure connectedness within the Information Science program, were all changed to measure a faculty member’s connection to doctoral students and to their peers. Instead of only focusing on the dissertation process and the relationship with individuals during the dissertation process,
the questions were altered to consider the all-inclusive student doctoral experience within the program. Instead of the statement “I feel that I am receiving adequate support from the faculty while I am working on my dissertation”, which was asked of the doctoral students, the faculty member was asked the statement “I feel that I am offering adequate support to the students in the program”.

The three measures, sense of Program Community, Faculty-to-Faculty Connectedness, and Faculty-to-Student connectedness, were calculated in the same manner as were the measures in the student survey by simply summing the points assigned to each of the five-point items. The twenty-item Program Community scale yielded an average faculty Program Community score of 55.4 with a standard deviation of 4.5. The eighteen-item Connectedness scale yielded an average Faculty-to-Student Connectedness score of 20.0 with a standard deviation of 4.9 and an average Faculty-to-Faculty Connectedness score of 24.0 with a standard deviation of 6.3.

The remaining five questions in the forty-three question survey (see Appendix D: Faculty Research Survey) were open-ended questions whose purpose was to collect data which was unavailable through content analysis or to verify data from Stage I of this research study. For example the following questions were asked: “What is the number of papers you co-authored with students in the program?”, “What is the number of papers you co-authored with program alumni?”, and “What is the year you started in the program?”
Quantitative Findings of the Doctoral Students

The data collected were first examined by generating graphs. Frequency distributions of the data were generated for each of the three measures of interest. A distribution of the Program Community Scale scores, Figure 7.1: Doctoral Student Program Community Scale Score Distribution, indicated scores ranging from a low score of 24 (n=0) to a high score of 79 (n=80) with an average of 52.5. The distribution of the Student-to-Faculty Connectedness scores, Figure 7.2: Doctoral Student-to-Faculty Connectedness Scale Score Distribution, showed a mean score of 18.6 with scores ranging from 8 (n=0) to 31 (n=45). Figure 7.3: showed the distribution of the Student-to-Student Connectedness scores, with a mean of 24.6, and a range of scores from a low of 9 to a high of 37. Table 7.1: Descriptive Statistics for the Doctoral Student Survey provides the reader with a summary of the descriptive statistics for the three measures of interest.
Figure 7.1: Doctoral Student Program Community Scale Score Distribution

Figure 7.2: Doctoral Student-to-Faculty Connectedness Scale Score Distribution
Figure 7.3: Doctoral Student-to-Student Connectedness Scale Score Distribution

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Community Scale Score</td>
<td>30</td>
<td>24</td>
<td>79</td>
<td>52.47</td>
<td>13.561</td>
<td>183.913</td>
</tr>
<tr>
<td>Student-to-Faculty Connectedness Score</td>
<td>30</td>
<td>8</td>
<td>31</td>
<td>18.63</td>
<td>6.703</td>
<td>44.930</td>
</tr>
<tr>
<td>Student-to-Student Connectedness Score</td>
<td>30</td>
<td>9</td>
<td>37</td>
<td>24.63</td>
<td>6.835</td>
<td>46.723</td>
</tr>
</tbody>
</table>

Table 7.1: Descriptive Statistics for the Doctoral Student Survey

The Doctoral Student Program Community Scale Score Distribution histogram (see Figure 7.1) indicated some cases quite different to other cases prompting the researcher to generate a boxplot graph to spot possible outliers and examine the resultant quartiles.
One outlier was detected, case 2. After checking the raw data and determining that this case was correctly entered and thus valid, the researcher removed the outlier and regenerated the boxplot graph to determine how this case affected the data distribution (see Figure 7.5: Doctoral Student Program Community Scale Score Boxplot with Outlier Removed). After examining the upper quartiles for years 2004, 2005, 2006, and 2007, and the lower quartiles for years 2005, 2006, and 2007, the researcher was curious to examine the effect of further transforming the skewed data by replacing the highest scores in years 2004, 2005, 2006, and 2007 with the next highest score plus one.
Similarly, she replaced the lowest scores in years 2005, 2006, and 2007 with the next lowest score minus one. The resulting graph, Figure 7.6: Doctoral Student Program Community Scale Score Boxplot with Outlier Removed, and High and Low Scores Transformed, indicated a more evenly distributed dataset, but did this transformed data result in a different relationship between each participant’s individual Program Community scores and the year they were admitted into the Information Science Ph.D. program?

**Figure 7.5:** Doctoral Student Program Community Scale Score Boxplot with Outlier Removed
To analyze Research Question 2 independent t-tests were performed. First, in order to visualize the relationships between each participant’s scores on the dependent variables and the year he or she was admitted into the Information Science Ph.D. program, scatterplots graphs were generated. Figure 7.7: Student Program Community Scores vs. Program Admit Year Scatterplot showed each doctoral student’s Program Community Scale score against the year he or she was admitted into the program using the original, unaltered, dataset. A regression line summarized the relationship between the two variables.
Beginning in 2004, the graph clearly shows the wide distribution of both high and low Program Community scores indicating students who either felt a very strong sense of community within the doctoral program or felt a very poor sense of community. The regression line suggested that the doctoral students after the implementation of the revised Information Science Ph.D. program experienced a slightly decreased sense of community in the program.

This same scatterplot graph was generated, Figure 7.8: Student Program Community Scores vs. Program Admit Year Scatterplot with Outlier Removed, and High and Low Scores Transformed, using the transformed dataset with the outlier case removed and high and low scores changed. A regression line summarized the relationship
between the two variables. Although the graph showed more evenly distributed Program Community scores, the regression line similarly suggested that the doctoral students after the implementation of the revised Information Science Ph.D. program experienced the same slightly decreased sense of community in the program. The researcher concluded that even with an uneven distribution of Program Community scores and some widely variable scores, the original, unaltered, dataset accurately represented the students’ sense of community in the Information Science Ph.D. program from 2001 through 2007.

![Graph showing Student Program Community Scores vs. Program Admit Year Scatterplot with Outlier Removed, and High and Low Scores Transformed](image)

**Figure 7.8:** Student Program Community Scores vs. Program Admit Year Scatterplot with Outlier Removed, and High and Low Scores Transformed

An independent t-test was conducted to compare the difference between means of the two groups of doctoral students with respect to the dependent variable Program
Community. Table 7.2: T-Test Summary Statistics for Research Question 2: Program Community provides summary statistics for the group of students admitted into the doctoral program before the implementation of the revised Information Science Ph.D. program and for the group admitted after the implementation of the program.

<table>
<thead>
<tr>
<th>Year Admitted to the Program</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Community &gt;= 2005</td>
<td>18</td>
<td>52.67</td>
<td>16.13</td>
<td>3.8</td>
</tr>
<tr>
<td>Program Community &lt; 2005</td>
<td>11</td>
<td>52.73</td>
<td>9.31</td>
<td>2.81</td>
</tr>
</tbody>
</table>

**Table 7.2: T-Test Summary Statistics for Research Question 2: Program Community**

Despite almost identical Program Community mean scores between the before and after program implementation, there is a much higher variability among scores in the after group. The independent t-test test failed to reveal a statistically reliable difference between the mean number of program community measures that the students admitted before 2005 had (M = 52.73, s = 9.31) and that the students admitted after 2005 had (M = 52.67, s = 16.13), t(27) = .013, p = .99, α = .05. There is not sufficient evidence to conclude that doctoral students before or after the program implementation have different levels of a sense of program community. Details of the t-test are provided in Table 7.3: T-Test Results for Research Question 2: Program Community.
<table>
<thead>
<tr>
<th>Program Community Scale Score</th>
<th>F</th>
<th>Sig.</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
<th>Std. Error Difference</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal variances assumed</td>
<td>4.816</td>
<td>.037</td>
<td>-.011</td>
<td>27</td>
<td>.991</td>
<td>-.061</td>
<td>5.357</td>
<td>-11.052</td>
<td>10.931</td>
</tr>
</tbody>
</table>

**Table 7.3:** T-Test Results for Research Question 2: Program Community

Further analyzing data for Research Question 2, the researcher generated a graph showing each doctoral student’s Student-to-Faculty Connectedness Scale score against the year he or she was admitted into the program, Figure 7.9: Student-to-Faculty Connectedness Scores vs. Program Admit Year Scatterplot.
The scatterplot showed a wide distribution of both moderately high to very low Student-to-Faculty Connectedness scores, which could range from a low of 0 to a high score of 45. The graph indicated that students either felt reasonably connected to faculty members within the doctoral program or felt very disconnected to faculty members. The regression line suggested that the doctoral students after the implementation of the revised Information Science Ph.D. program experienced a slight decreased feeling of connectedness with faculty members in the program.

The Student-to-Faculty Connectedness scores scatterplot (see Figure 7.9) indicated some cases quite different to other cases prompting the researcher to search for possible outliers and remove and/or correct the scores. After completing this additional analysis
the researcher determined almost identical results with the doctoral students after the implementation of the revised Information Science Ph.D. program experiencing a slight decreased feeling of connectedness with faculty members in the program.

An independent t-test was conducted to compare the difference between means of the two groups of doctoral students with respect to the dependent variable Student-to-Faculty Connectedness. Table 7.4: T-Test Summary Statistics for Research Question 2: Student-to-Faculty Connectedness provides summary statistics for the group of students admitted into the doctoral program before the implementation of the revised Information Science Ph.D. program and for the group admitted after the implementation of the program.

<table>
<thead>
<tr>
<th>Year Admitted to the Program</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;= 2005</td>
<td>18</td>
<td>17.89</td>
<td>6.534</td>
<td>1.540</td>
</tr>
<tr>
<td>&lt; 2005</td>
<td>11</td>
<td>19.36</td>
<td>7.298</td>
<td>2.200</td>
</tr>
</tbody>
</table>

Table 7.4: T-Test Summary Statistics for Research Question 2: Student-to-Faculty Connectedness

The independent t-test failed to reveal a statistically reliable difference between the mean number of student-to-faculty connectedness measures that the students admitted before 2005 had (M = 19.36, s = 7.30) and that the students admitted after 2005 had (M = 17.89, s = 6.53), t(27) = .564, p = .58, α = .05. There is not sufficient evidence to conclude that doctoral students before or after the program implementation have different levels of connectedness between the doctoral students and the program faculty members. Details of the test are provided in Table 7.5: T-Test Results for Research Question 2: Student-to-Faculty Connectedness.
To complete the analysis of data for Research Question 2, the researcher generated a graph showing each doctoral student’s Student-to-Student Connectedness Scale score against the year he or she was admitted into the program, Figure 7.10: Student-to-Student Connectedness Scores vs. Program Admit Year Scatterplot.
The scatterplot again showed a wide distribution of both high to low Student-to-Faculty Connectedness scores, with a potential range of a low score 0 to a high score 45. The regression line suggested that the doctoral students after the implementation of the revised Information Science Ph.D. program experienced an increased feeling of connectedness with other doctoral students in the program.

The Student-to-Student Connectedness scores scatterplot (see Figure 7.10) indicated some cases quite different to other cases prompting the researcher to search for possible outliers and remove and/or correct the scores. After completing this additional analysis the researcher determined almost identical results with the doctoral students after
the implementation of the revised Information Science Ph.D. program experiencing a slight increased feeling of connectedness with fellow students in the program.

An independent t-test was conducted to compare the difference between means of the two groups of doctoral students with respect to the dependent variable Student-to-Student Connectedness. Table 7.6: T-Test Summary Statistics for Research Question 2: Student-to-Student Connectedness provides summary statistics for the group of students admitted into the doctoral program before the implementation of the revised Information Science Ph.D. program and for the group admitted after the implementation of the program.

<table>
<thead>
<tr>
<th>Year Admitted to the Program</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;= 2005</td>
<td>18</td>
<td>24.39</td>
<td>7.293</td>
<td>1.719</td>
</tr>
<tr>
<td>&lt; 2005</td>
<td>11</td>
<td>24.73</td>
<td>6.620</td>
<td>1.996</td>
</tr>
</tbody>
</table>

**Table 7.6: T-Test Summary Statistics for Research Question 2: Student-to-Student Connectedness**

The independent t-test failed to reveal a statistically reliable difference between the mean number of Student-to-Student Connectedness measures that the students admitted before 2005 had (M = 24.73, s = 6.62) and that the students admitted after 2005 had (M =24.39, s = 7.29), t(27) = .125, p = .90, α = .05. There is not sufficient evidence to conclude that doctoral students before or after the program implementation have different levels of connectedness among each other. Details of the test are provided in Table 7.7: T-Test Results for Research Question 2: Student-to-Student Connectedness.
### Table 7.7: T-Test Results for Research Question 2: Student-to-Student Connectedness

<table>
<thead>
<tr>
<th>Student-to-Student Connectedness Score</th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal variances assumed</td>
<td>0.195 (.662)</td>
<td>-0.125 (2-tailed)</td>
<td>0.901 (-0.338)</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>0.128 (22.92)</td>
<td>0.899 (2-tailed)</td>
<td>0.338 (2.634)</td>
</tr>
</tbody>
</table>

### Quantitative Findings of the Doctoral Faculty Members

The data collected from the faculty survey were first examined by generating graphs. Frequency distributions of the data were generated for each of the three measures of interest. A distribution of the Program Community Scale scores, Figure 7.11: Doctoral Faculty Program Community Scale Score Distribution, indicated scores ranging from a low score of 47 to a high score of 64 with an average of 55.4. The sense of program community for the faculty members is slightly higher, three points, than that of the doctoral students’ sense of program community mean of 52.4 suggesting that the faculty members felt a somewhat greater sense of community than did the doctoral students. The distribution of the Faculty-to-Student Connectedness scores, Figure 7.12: Doctoral Faculty-to-Student Connectedness Scale Score Distribution shows a mean score of 20.0 with scores ranging from 10 to 28. The average Student-to-Faculty Connectedness score was also somewhat lower than the average Faculty-to-Student Connectedness score.
(mean of 18.6 versus a mean of 20.0) pointing toward faculty members feeling more connected to students than students with the faculty. Figure 7.13: Doctoral Faculty-to-Faculty Connectedness Scale Score Distribution showed the distribution of the Faculty-to-Faculty Connectedness scores, with a mean of 24.0, and a range of scores from a low of 16 to a high of 36. The average Faculty-to-Faculty Connectedness score and the average Student-to-Student Connectedness score were nearly identical (mean of 24.0 versus a mean of 24.6) implying similar feelings of connectedness among their peers. Table 7.8 provides the reader with a summary of the descriptive statistics for the three measures of interest.

**Figure 7.11:** Doctoral Faculty Program Community Scale Score Distribution
Figure 7.12: Doctoral Faculty-to-Student Connectedness Scale Score Distribution

Figure 7.13: Doctoral Faculty-to-Faculty Connectedness Scale Score Distribution
### Table 7.8: Descriptive Statistics for the Doctoral Faculty Survey

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Community Scale score</td>
<td>16</td>
<td>47</td>
<td>64</td>
<td>55.44</td>
<td>4.531</td>
</tr>
<tr>
<td>Faculty-to-Student Connectedness score</td>
<td>16</td>
<td>10</td>
<td>28</td>
<td>20.00</td>
<td>4.926</td>
</tr>
<tr>
<td>Faculty-to-Faculty Connectedness score</td>
<td>16</td>
<td>16</td>
<td>36</td>
<td>24.00</td>
<td>6.250</td>
</tr>
</tbody>
</table>

To analyze the data for Research Question 3 independent t-tests were performed. The independent variable used to group the doctoral faculty members was the first year they were in the Information Science Ph.D. program. Unlike the doctoral students surveyed, many of the faculty members who were involved in the program from the beginning were still in the program when they took the survey thus making it difficult to make a true distinction between feelings of connectedness and a sense of community before and after the doctoral program implementation. The researcher determined that the “First Year in Program” variable would best measure feelings of connectedness and a sense of community between the group of faculty who were familiar with the original doctoral program and with the new, revised program and the group of faculty who only worked with the revised program.

Before conducting the t-tests, scatterplots graphs were generated in order to visualize the relationships between each participant’s individual scores of the dependent variables and the faculty member’s first year in the Information Science Ph.D. program. Figure 7.14: Faculty Program Community Scores vs. Program Start Year Scatterplot shows each faculty member’s Program Community Scale score against the year he or she
started the program. A regression line summarized the relationship between the two
variables.

The graph showed a wide distribution of both high and low Program Community
scores indicating faculty who felt a strong sense of community within the doctoral
program as well as those who felt a poor sense of community. The regression line
suggested that the doctoral faculty members realized a slight decreased sense of
community in the program over the years. The cause for this slight decline cannot be
ascertained using the data collected here.

Figure 7.14: Faculty Program Community Scores vs. Program Start Year Scatterplot
An independent t-test was conducted to compare the difference between means of the two groups of faculty members with respect to the dependent variable Program Community. Table 7.9: T-Test Summary Statistics for Research Question 3: Program Community provides summary statistics for the group of faculty members who started working with the Information Science Ph.D. program after the development of the revised program and for the group who had worked with earlier revisions of the program.

<table>
<thead>
<tr>
<th>First Year in Program</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom Community</td>
<td>&gt;= 2004</td>
<td>5</td>
<td>54.00</td>
<td>5.196</td>
</tr>
<tr>
<td>Scale score</td>
<td>&lt; 2004</td>
<td>11</td>
<td>56.09</td>
<td>4.300</td>
</tr>
</tbody>
</table>

Table 7.9: T-Test Summary Statistics for Research Question 3: Program Community

The independent t-test failed to reveal a statistically reliable difference between the mean number of community measures that the faculty members in the program before 2004 had (M = 56.1, s = 4.3) and that faculty members who started in the program in 2004 or later had (M =54.0, s = 5.2), t(14) = .848, p = .41, α = .05. There is not sufficient evidence to conclude that faculty members, despite what year they started in the program, have different levels of a sense of program community. Details of the test are provided in Table 7.10: T-Test Results for Research Question 3: Program Community.
Levene's Test for Equality of Variances

t-test for Equality of Means

<table>
<thead>
<tr>
<th>Classroom Community Scale score</th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
</table>

Table 7.10: T-Test Results for Research Question 3: Program Community

Further analyzing the data for Research Question 3, the researcher generated a graph showing each doctoral faculty member’s Faculty-to-Student Connectedness Scale score against the year they started in the program, Figure 7.15: Faculty-to-Student Connectedness Scores vs. Program Start Year Scatterplot.
Figure 7.15: Faculty-to-Student Connectedness Scores vs. Program Start Year Scatterplot

The scatterplot indicates a fairly large distribution of Faculty-to-Student Connectedness scores, which ranged from a low score of 0 to a high score of 45. The single low score of 10, though not identified as an outlier in SPSS, was furthered examined by the researcher. She verified that the value had indeed been calculated and entered correctly. Next she adjusted the low score by changing its value to the next lowest score minus one (e.g. the score was changed from a 10 to a 14) to see if the effect of changing this one extreme score to a more moderate score. This analysis revealed only a very slight difference (less than .01) in $R^2$ still indicating a very weak linear correlation between the two variables.
The regression line in Figure 7.15: Faculty-to-Student Connectedness Scores vs. Program Start Year Scatterplot showed that the doctoral faculty members experienced a slight increase in their feelings of connectedness with the doctoral students with the newer program revisions.

An independent t-test was conducted to compare the difference between means of the two groups of doctoral faculty members with respect to the dependent variable Faculty-to-Student Connectedness. Table 7.11: T-Test Summary Statistics for Research Question 3: Faculty-to-Student Connectedness provides summary statistics for the group of faculty members who started working with the Information Science Ph.D. program after the development of the revised program and for the group who had worked with earlier revisions of the program.

<table>
<thead>
<tr>
<th>First Year in Program</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty-to-Student Connectedness score</td>
<td>&gt;= 2004</td>
<td>5</td>
<td>20.80</td>
<td>5.630</td>
</tr>
<tr>
<td></td>
<td>&lt; 2004</td>
<td>11</td>
<td>19.64</td>
<td>4.822</td>
</tr>
</tbody>
</table>

Table 7.11: T-Test Summary Statistics for Research Question 3: Faculty-to-Student Connectedness

The independent t-test failed to reveal a statistically reliable difference between the mean number of Faculty-to-Student Connectedness measures the faculty members in the program before 2004 had (M = 19.6, s = 4.8) and that faculty members who started in the program in 2004 or later had (M = 20.8, s = 5.6), t(14) = .426, p = .68, α = .05. There is not sufficient evidence to conclude that doctoral faculty members, despite what year they started in the program have different levels of connectedness between the program.
faculty members and the doctoral students. Details of the test are provided in Table 7.12:

### T-Test Results for Research Question 3: Faculty-to-Student Connectedness

<table>
<thead>
<tr>
<th>Faculty-to-Student Connectedness</th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>Equal variances assumed</td>
<td>.296</td>
<td>.595</td>
<td>.426</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>.400</td>
<td>6.809</td>
<td>.701</td>
</tr>
</tbody>
</table>

**Table 7.12: T-Test Results for Research Question 3: Faculty-to-Student Connectedness**

Further analysis of data for Research Question 3 revealed a graph showing each faculty member’s Faculty-to-Faculty Connectedness Scale score against the year he or she started in the program, Figure 7.16: Faculty-to-Faculty Connectedness Scores vs. Program Start Year Scatterplot.
The scatterplot again showed a wide distribution of both high and low Faculty-to-Faculty Connectedness scores (which can range from a low of 0 to a high score of 45). The graph indicated that there was a large spread among faculty members regarding how connected they felt to their peers within the doctoral program. The regression line suggested that the faculty members who began in the program after the development of the revised Information Science Ph.D. program experienced an increased feeling of connectedness with other faculty members in the program.

An independent t-test was conducted to compare the difference between means of the two groups of faculty members with respect to the dependent variable Faculty-to-Faculty Connectedness. Table 7.13: T-Test Summary Statistics for Research Question 3:
Faculty-to-Faculty Connectedness provides summary statistics for the group of faculty members who started working with the Information Science Ph.D. program after the development of the revised program and for the group who had worked with earlier revisions of the program.

<table>
<thead>
<tr>
<th>First Year in Program</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty-to-Faculty Connectedness score &gt;= 2004</td>
<td>5</td>
<td>28.60</td>
<td>7.733</td>
<td>3.458</td>
</tr>
<tr>
<td>&lt; 2004</td>
<td>11</td>
<td>21.91</td>
<td>4.392</td>
<td>1.324</td>
</tr>
</tbody>
</table>

Table 7.13: T-Test Summary Statistics for Research Question 3: Faculty-to-Faculty Connectedness

The independent t-test failed to reveal a statistically reliable difference between the mean number of Faculty-to-Faculty Connectedness measures the faculty members in the program before 2004 had (M = 21.91, s = 4.39) and that faculty members who started in the program in 2004 or later had (M =28.60, s = 7.73), t(5) = 1.81, p = .13, α = .05. There is not sufficient evidence to conclude that doctoral faculty members, despite what year they started in the program have different levels of connectedness among each other. Details of the test are provided in Table 7.14: T-Test Results for Research Question 3: Faculty-to-Faculty Connectedness.
To complete the analysis of data for Research Question 3, the researcher examined the three scores (Program Community, Faculty-Student Connectedness, Faculty-Student Connectedness) individually for each participant to determine if extreme scores for one measure suggested similar extreme scores for one or both remaining measures (see Figure 7.17: Doctoral Faculty Scores Summary).
This analysis did not see any relationships among the three scores for individual participants. For example, the participant with the lowest Program Community score did not show to have extreme high or low scores for either Faculty-Student Connectedness or Faculty-Student Connectedness.

**Chapter Summary**

This chapter began with describing in detail the instruments used to answer the second and third research questions. Research Question 2 ("What are the levels of student sense of community, student-student connectedness and student-faculty connectedness and did the implementation of the revised program structure in Information Science
increase these levels?”) was answered through the administration of a forty-eight item survey sent to the Information Science Ph.D. students identified in the first stage of this research study. A similar forty-three item survey was administered to the Information Science Ph.D. faculty members also identified in the first stage of this research study. This survey answered Research Question 3: “What are the levels of faculty sense of community, faculty-faculty connectedness and faculty-student connectedness and did the implementation of the revised program structure in Information Science increase these levels?”.

Following the discussion of the measures used in Stage II of this research study, the detailed results were revealed and analyzed. The findings indicated that program community and connectedness measures of both the doctoral students and the faculty members were not statistically significantly related to the implementation of the revised program structure.

The samples of doctoral students (n=30) and of the faculty members (n=16) derived from this stage of the research were used to determine the samples for the final stage of this research study, the semi-structured interviews.

Chapter 8 contains a comprehensive discussion of the research design methods used in Stage III of this dissertation research study followed by Chapter 9 which details the findings from research Stage III.
Chapter 8: Stage III Research Design Methods

Focus of Stage III Research Design

The purpose of Stage III of this study was to interview a select number of the Information Science Ph.D. students and faculty members who participated in the survey in Stage II of this research study. Figure 8.1: Stage III Research Design, presents an overview of the research design. Qualitative interviewing data analysis was performed to clarify and better understand the results from both Stage I and Stage II and get a comprehensive picture to address the problem being studied. The overarching goal of this research was to determine first [1] if the implementation of the revised Ph.D. program structure affected, together, the development of a community of practice and the relationships of both doctoral students and faculty in the program and second [2], if the revised program improved doctoral student retention rates along with shortening time to degree completion. In general the questions asked of the participants concerned his or her experiences in the Information Science Ph.D. program.

![Stage III Research Design Diagram](image)

**Figure 8.1: Stage III Research Design**

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Semi-Structured Interviewing Research – a Qualitative Social Research Method

The researcher chose this design method as she was interested in getting a true perspective of participants concerning his or her experiences in the Information Science Ph.D. program. By bringing together the different methods in this study the researcher was intent on seeing the whole picture of the community of practice within the confines of the Information Science Ph.D. program.

Interviewing was chosen as the final method for collecting data because of its ability to be more flexible and to respond to the direction which the interviewee may take. It allowed for a richer collection of detailed data to compliment and explain the results of the first two stages of this study. Semi-structured interviewing, consisting of a list of open-ended, often vague, questions to be asked of the participants, provided for lots of leeway for both the participant and the researcher; it is a highly flexible method with room to expand on a response or a question (Bryman, 2008).

The Wenger (1998) and Tinto (1997) frameworks guided the development of the semi-structured interview format, with open-ended questions addressing community participation, contributions, and interactions within both the academic and social systems embedded in the program.

Initially using descriptive statistics on the data from the web-based surveys to organize and display data, additional bivariate analysis was used to look for patterns of interaction before and after the implementation of the revised program. As appropriate, qualitative responses from the surveys from Stage II of this study were further analyzed. Exploratory data analysis of data from the content analysis (Stage I of this study) along
with the survey data was reconstructed and further analyzed using a multi-step, recursive coding process to generate descriptive themes and classifications. This analysis technique allowed the researcher to establish inductive categories that were subsequently used to facilitate the selection of the participants for the semi-structured interviews and serve as a source for adjusting the interview guides identified in Appendix E: Student Semi-Structure Interview Guide, and Appendix F: Faculty Semi-Structure Interview Guide.

These guides were pilot tested at a local college with volunteer college students and faculty members not affiliated with the Information science Ph.D. program at the University at Albany. This pilot study revealed problematic questions (e.g. questions or instructions requiring clarification and questions which may have made interviewees feel uncomfortable). Additionally, this provided the researcher with experience in the process of interviewing.

Each interviewee was contacted via email to elicit their commitment to the interview (see Appendix O: Email to Student Interview Participants, and Appendix P: Email to Faculty Interview Participants). The researcher attempted to conduct each interview in a participant’s personal space (e.g. department office, student lounge) ensuring they were in a comfortable, familiar environment. All interviews were digitally recorded and later transcribed, allowing the interviewer to concentrate her entire attention on her participants during the interview.

**Populations and Sampling Frames**

Given the small sample frame, purposive sampling was performed to include a wide range of participant characteristics and eliminate faculty participants who were
intimate with the research being performed in this study, namely faculty members who were on the researcher’s dissertation committee. Purposive sampling is a form of non-probability sampling where the researcher selects participants based on various criteria that she feels will be the most useful and representative (Babbie, 1992; Bryman, 2008).

The populations for this research stage were the resultant samples of Information Science Ph.D. University students and faculty members identified in Stage II of this dissertation research study. As a reminder to the reader, data were collected in Stage II from a survey presented to Ph.D. students who were matriculated in the University at Albany Information Science Ph.D. program between the years 2003 and 2007 and faculty members of the University at Albany Informatics Department, or affiliated with the department, between the years 2004 and 2008.

Of the thirty doctoral students who responded to the survey in Stage II of this study, five were selected to be interviewed by the researcher. To begin the selection of participants, the researcher thought it best to select one student from each of the five years, from 2003 to 2007, in which the students were matriculated into the program (see Figure 8.2: Year Matriculated Distribution of Doctoral Student Population).
Figure 8.2: Year Matriculated Distribution of Doctoral Student Population

Upon further examination of the data, the researcher chose to eliminate cases with extreme data values of the three key variables, sense of program community, student-to-faculty connectedness, and student-to-student connectedness. The researcher thought it best to interview participants who were neither thoroughly unenthusiastic nor overenthusiastic regarding individual views of community and connectedness within the Information Science Ph.D. program. The four participants who answered “no” to the survey question "Have you established personal relationships with one or more students in this program?" were also eliminated since the researcher was interested in exploring students’ experiences with their peers. Finally, after examining the remaining sample frame, the researcher noticed that one student responded that he or she had established
personal relationships with forty students in the program. She concluded that this response was most likely an erroneous answer as it was far larger than any of the other students’ responses. Table 8.1: Doctoral Student Sample Frame was the resulting sample frame which was forwarded to the researcher’s dissertation chairperson to help identify five Ph.D. students willing to be interviewed along with the researcher’s preference of one student chosen from each of the five years indicated.

<table>
<thead>
<tr>
<th>Student Code</th>
<th>Year Matriculated into the Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>30FBK111</td>
<td>2003</td>
</tr>
<tr>
<td>30FKO111</td>
<td>2003</td>
</tr>
<tr>
<td>40FDO111</td>
<td>2004</td>
</tr>
<tr>
<td>40FLA111</td>
<td>2004</td>
</tr>
<tr>
<td>40SMR111</td>
<td>2004</td>
</tr>
<tr>
<td>50FCR111</td>
<td>2005</td>
</tr>
<tr>
<td>50FIO111</td>
<td>2005</td>
</tr>
<tr>
<td>50FWO111</td>
<td>2005</td>
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<tr>
<td>60FAH111</td>
<td>2006</td>
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<td>60FAR111</td>
<td>2006</td>
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<td>2006</td>
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<td>70FKA112</td>
<td>2007</td>
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<tr>
<td>70FRU111</td>
<td>2007</td>
</tr>
<tr>
<td>70FSB111</td>
<td>2007</td>
</tr>
</tbody>
</table>

**Table 8.1: Doctoral Student Sample Frame**

Based on the researcher’s dissertation chairperson suggestions and student demographics collected and analyzed in Stage I of this study, the researcher selected her top five participants, one each from the years 2003 to 2007, for the semi-structured interviews. Demographics considered relevant for providing a useful and representative sample included gender, full-time versus part-time student status, and whether or not the student had graduated from the program.
Of the sixteen Information Science Ph.D. faculty members who responded to the survey in Stage II of this study, five were selected to be interviewed by the researcher. The selection of participants was based on the following criteria: considered those faculty members who started in the program at varied times, eliminated those faculty members on the researcher’s dissertation committee, considered faculty members with close to average community and connectedness scores, and chose faculty members from different departments. Figure 8.3: Distribution of Doctoral Faculty Sample was used to select the top five participants (circled in the chart) with three backup participants (starred on the chart).

Figure 8.3: Distribution of Doctoral Faculty Sample
Semi-Structured Interviewing Data Collection

All interviewing took place during the spring 2012 semester. Each participant was interviewed once, either in-person (i.e. face-to-face) or via the telephone. All of the interviews lasted between fifteen and thirty-eight minutes. The interview questions (see Appendix E: Student Semi-Structure Interview Guide and Appendix F: Faculty Semi-Structure Interview Guide) were designed to hear firsthand the participants’ experiences in the Information Science Ph.D. program during his or her introduction to the program, with the students and/or faculty members they worked with, with students who left the program before finishing, and thoughts on the current (i.e. revised) program and curriculum.

This point in the data collection and data analysis research was pivotal in this study in that it supplied an element of completeness and credibility crucial in any research project. In an attempt to gain access to both the student and faculty participant’s thinking behind their experiences, the researcher endeavored to interpret their experiences through their point of view thus providing a stronger research study of social phenomena (Bryman, 2008). This final stage enabled the researcher to cross-check findings and to clear up any possible misunderstandings which were unveiled earlier in the study.

Although the researcher preferred face-to-face interviews, setting these meetings up proved to be very difficult at times. Each potential interviewee was contacted via email to elicit their commitment to the interview (see Appendix O: Email to Student Interview Participants, and Appendix P: Email to Faculty Interview Participants). Once a response was received, the researcher worked with the participant to determine the best time and location for the interview. Since there was a self-imposed deadline of May 2012, before
the spring 2012 semester ended, the researcher, after several failed attempts at getting the
participant to agree on meeting in person with her, offered to telephone interview the
participant. The researcher unquestionably got the impression that a telephone interview
was preferred over a face-to-face interview due to the participant’s schedule and time
constraints even though the researcher was asking for no more than twenty minutes of
their time. One of the participants was overseas for the year and the researcher did not
have the choice to interview him/her in person due to travel cost limitations. Despite
having preferred to conduct the interviews face-to-face, Bryman (2008) maintains there
are no significant differences in participants’ responses whether the interview takes place
in person or over the telephone.

One of the top five Ph.D. students selected by the researcher to interview did not,
after repeated attempts, respond to the email eliciting his or her commitment to an
interview therefore another potential participant was selected from the sample frame. All
five of the Ph.D. faculty members selected to be interviewed by the researcher agreed to
be interviewed. One of the Ph.D. faculty participants was extremely slow in responding
to repeated emails and phone calls to confirm a meeting time and place. Even after
visiting the participant’s office, the researcher was not able to pin down a definitive time
to conduct the interview. The semester ended and the researcher was no longer able to
communicate with the confirmed participant prompting her to only use the interview data
collected from the completed nine interviews for this study.

Once a meeting time and date was established for the interview, the participant was
forwarded a copy of the Consent for Participation in Interview Research (see Appendix
Q: Consent for Participation in Interview Research) to review. All questions and concerns
of the participant were sufficiently addressed and explained before the actual interview took place. Before the scheduled interview, the researcher reviewed her notes and data on the interviewee and filled in the top section of the interview guide sheet to better prepare her for the interview.

All of the questions were read by the researcher verbatim from the interview guide but the order of the questions was sometimes altered during the interview to best continue a constant flow of thought and conversation with the participant. Other questions were often asked by either the participant or the researcher to clarify a question/answer or to elaborate on a thought. During the interview, the researcher often wrote short notes on the interview guide to help her in guiding the interview and to ensure all questions were adequately answered.

Of the five students interviewed three were female and two were males, one was a foreign student, the year they started in the Ph.D. program ranged from 2003 to 2007, the total number of years in the program ranged from three to six with one student who never completed the program, and all but one of the five students were part-time. Each of the four faculty members interviewed was from different departments. They had a variety of academic ranks and INF faculty types (i.e. either affiliate or split-line) and had a total number of years in the program ranging from eight to twenty-five years.

Once the interview was complete, the researcher completed the last page of the interview guide (the section titled “Following the Interview”) and recorded her personal notes on the interview. The digital recordings were later transcribed by the researcher and backed up on a secure, Internet server.

Details of the data analysis are in Chapter 9: Stage III Findings.
Human Subjects Review

Stage III of this research study, which involved living human subjects, was reviewed and approved by the University at Albany’s Office of Regulatory Research Compliance institutional review board (IRB). IRB Protocol Number 11-249 covered the collection of INF Ph.D. student and faculty interview data and was approved in December 2011 (see Appendix I: Institutional Review Board (IRB) Protocol Submission for Semi-Structured Interviews). The interview guides, Appendix E: Student Semi-Structured Interview Guide and Appendix F: Faculty Semi-Structured Interview Guide, and a digital recording of the interview were used to collect the data. The emails sent to potential interviewees requesting their participation in the interview, Appendix O: Email to Student Interview Participants and Appendix P: Email to Faculty Interview Participants, along with the consent form, Appendix Q: Consent for Participation in Interview Research, was granted IRB approval. It should be noted that in order to complete this stage of the study, the researcher was provided identities of the students selected to be interviewed by the same University at Albany faculty members who worked with the student data Stages I and II of this study. The researcher was then able to access the data collected in the earlier stages for each interviewed participant.

Strengths of Semi-Structured Interviewing for this Research

As true with any research method, interviewing has its strengths and limitations. Interviewing tends to concentrate on events and actions between individuals over time and is not merely measuring relationships between variables as was seen during Stage I, document analysis, and Stage II, surveying the participants, in this study. Semi-structured
interviewing is an unstructured research method which can more successfully get at the true meanings and concepts embedded in the data and are often referred to as “rich” data. (Bryman, 2008).

If an interview question was unclear the participant could easily ask for clarification. Similarly, the researcher was able to ask a participant to elaborate on or clarify an interview question they answered either during the interview or after in the form of a follow-up question (Babbie, 1992; Bryman, 2008; Fowler, 2009; Hesse-Biber & Leavy, 2008).

Coupled with experience with the Information Science Ph.D. program and the opportunity to observe as a participant for several years, interviewing participants was an added strength in this research study. The researcher was better equipped to understand what the participants were saying and was able to relate to stories which were told to her. Furthermore, the researcher was able to uncover issues which were never observed personally by her. The personal contact with each interviewee assured the researcher that each participant was indeed responding to the questions themselves without assistance from others.

Limitations of Semi-Structured Interviewing for this Research

Qualitative research can be somewhat skewed in that it relies heavily on what the researcher thinks is important and notable (Bryman, 2008). Interpretation of the data could easily be argued were influenced by the researcher who personally knew several of the participants and had first-hand knowledge of the policies, structure, and requirements of the Information Science Ph.D. program. Furthermore, being a doctoral student in this
program, the researcher had her own personal views, relationships, and values regarding the program.

Bryman (2008) maintains that interviewing could lead to desirability bias with the participants answering questions that they believe could portray themselves more favorably to others. The participant is less likely to disclose uncomfortable, sensitive, or socially unacceptable responses when there is personal contact with the researcher. Furthermore, they may have been uncomfortable in verbally disclosing sensitive issues or stories with the researcher (Babbie, 1992; Bryman, 2008; Hesse-Biber & Leavy, 2008). As many of the participants in this research study knew the researcher personally desirability bias and not divulging sensitive information could very well have hindered the data collection process.

The interviewing conducted in this research study, although semi-structured, could still be difficult to replicate (Bryman, 2008). Despite having a digital recording of each interview, the researcher also took personal notes which could be difficult, if not impossible to decipher by others.

The often ambiguous process of interviewing data analysis gives question to the validity of the findings (Bryman, 2008). Transcribing the data is a long and arduous process prone to error especially as the researcher alone was responsible for transcribing the digital recordings.

Convenience for the participant could also be a limitation, as was seen in this study. Although there was no difficulty in getting potential interviewees to agree to an interview, it proved to be quite difficult in arranging a time and date convenient for the participant.
It would be difficult to generalize (Bryman, 2008) the findings in this stage of the study with so few cases, though, in the scope of the complete multi-method research design, this might not be considered a weakness.

Chapter Summary

This chapter provided an account of the semi-structured interview research method and the subsequent data collected used to explore the community and connectedness experiences of the students and faculty members in the Information Science Ph.D. program.

Chapter 9 describes the analysis performed while examining the data collected from the interviews. The resultant findings of the analysis of Stage III of this study will be presented in this chapter.
Chapter 9: Stage III Findings; Exploring Experiences

Introduction

This chapter presents the findings from Stage III of this study which entailed interviewing Information Science Ph.D. students and faculty members. The goals of this research stage were to explore the Information Science Ph.D. program experiences of both students and faculty members in order to compare the qualitative and quantitative results, and to validate and explain the results garnered from Stage I and Stage II of this study. The process of collecting and organizing the data from the interviews was described earlier, in Chapter 8: Stage III Research Design Methods.

Qualitative Analysis of the Interview Data

An open-ended, semi-structured interview guide (see Appendix E: Student Semi-Structured Interview Guide and Appendix F: Faculty Semi-Structured Interview Guide) was used in collecting the qualitative data. The researcher prepared transcripts of the digitally recorded interviews and organized her notes taken before and after each interview. Using analytic induction, each transcribed interview question response was coded and indexed then grouped according to common themes to facilitate the reporting the research results.

The researcher examined concepts, themes and events in the data with much of the analysis concentrating on specific events as she was looking for the experiences and personal stories of the participants during his or her time in the program. The researcher further categorized data by looking at explicit terms in the questions that were asked and sought concepts and themes that were mentioned by more than one participant.
The Wenger (1998) and Tinto (1997) frameworks helped guide the researcher in organizing her notes and reflections as a complete participant, one who was already a member of the population being studied in the Information Science Ph.D. program. As a reminder, the essential elements that should exist in a community of practice are:

- a domain of knowledge of committed members which inspires community members to participate and contribute;
- a community of people who feel a sense of belonging and regularly interact;
- a shared practice of culture and a language that community members are developing to be effective in this domain (Wenger, 1998), and
- a search for positive interaction within both the academic and social systems (Tinto, 1997).

After careful and exhaustive analysis of the interview data the researcher sought to organize her approach to the structure of the qualitative findings using a narrative approach with an emphasis on the story behind the development and subsequent revision of the Information Science Ph.D. program, and the players who comprised the program’s community of practice.

**Qualitative Findings from the Doctoral Students’ and Faculty Members’ Accounts of their Experiences in the Information Science Ph.D. Program**

**In the Beginning**

The Information Science Ph.D. program was originally developed to promote research among many different disciplines. Students found it to be a good balance of a
technology-based discipline coupled with another discipline, and were excited to find a doctoral program that fit their research interests. In the words of some students:

I liked the [Information Science Ph.D.] program in that it was a nice blend of computer science and business.

I always wanted to take my learning further and I thought Information Science [Ph.D.] was a great program.

The program was solid…a decent program….enough there that struck my interest… enough pieces that I saw that I thought, OK, there is definitely room for me to figure out which direction I wanted to go to in this particular program.

I want[ed] to do something a little bit different from my original studies which was computer science. I wanted to choose from different areas. It was a good fit.

Although the Information Science Ph.D. faculty members found the interdisciplinary nature of the program a solid concept, they did not always find themselves collaborating and working directly with colleagues from the various disciplines. In the review of the current literature (Chapter 2: Literature Review, a Case Study and Hypotheses) considerable findings indicated that an important component of a quality interdisciplinary doctoral program is one that facilitates diversity, community, integration, and interdisciplinary cooperation among its members (Borrego & Newswander, 2010; Meeuwisse, Severiens, Born, 2010; Newswander & Borrego, 2009). It is necessary for faculty members, the driving force behind interdisciplinary research at the University, to recognize and appreciate each other’s contributions in order to collaborate effectively (Larson et al., 2011; NSF, 2009). Because interdisciplinary programs demand high levels of integration and collaboration, it is essential to encourage this engagement and integration to support scholarly work (Holley, 2009A; Newswander & Borrego, 2009; NSF 2009). The researcher found the faculty members’ involvement
and collaboration with each other to be temporary at best and often times fleeting. This was true whether they were working with Ph.D. students and their dissertation committee or agreeing to co-teach an Informatics Department seminar course.

The researcher got the impression that for faculty teaching a program-required seminar, although they enjoyed it, was considered a sacrifice on their part. It was time intensive and took valuable time away from their “real job” in their home department. It was often times a struggle among the faculty members to “stay true” to their home departments. In the words of some faculty members:

The program founders had this idea that the study of information wasn’t stuck within a discipline, which was a great idea, but an idealistic notion.

I had no real interaction [with other faculty]… being an affiliate [faculty member], you just don’t consider that a major obligation.

I didn’t get to know them [the other faculty members] very well. [We would ask ourselves] what is our goal here? What are we doing here? [Are we] trying to split ourselves between two departments?

All the [INF department] faculty members have a home [department] that we are responsible to and that’s our tenure homes. And there is always tension between time spent in your home department and the time spent in the Ph.D. program, and if it was not a pleasant experience people simply wouldn’t do it. There is no money. We never got paid. [It is] a commitment to a concept.

As colleagues [other faculty members], they have been always welcoming and kind. On the other hand, it was hard to make myself understood as a junior faculty. They were trying to be as supportive as they can, but when it comes to business, they were not able to direct me or understand what I was trying to do.

I don’t want them [the INF department] to see me as being one of their faculty….really this is my home school [Business school]….I don’t mind doing something like this [teaching a Ph.D. course] on occasion….but it’s overtime.

[I agreed to] take over one of the INF 1-credit technology modules. [I then] decided that while I really enjoyed doing it, they were time sinks.
When the program was first started, in 1990, the atmosphere among the founding members and the involved faculty was highly collegial. In one faculty member’s words:

[There was a] real family type atmosphere in the early days among the faculty involved.

There was a solid group of individuals who interviewees referred to as the “program founders” who were pivotal in getting the original Information Science Ph.D. program realized. There was definitely an air of excitement and determination in creating this innovative, exceptional, cutting-edge program with visions of it being a big success for the university. One faculty member noted that:

There was lots of good will in the program among its founders. They were generous people and together they donated their time….they made it happen.

But, there were some difficulties identified soon thereafter. Student interviewees spoke at length concerning some of their peers who felt lost in the program. Some students could not find a faculty advisor or a faculty member with their research interests. There was a mention of the lack of consistency with administering students concerning suitable research topics and previous course work acceptance. In the words of some students:

I think, if my memory is right, there was one student early in the program she left because, she would tell me, that she could never find a faculty [member] for her research interest.

[I know one student] was having problems finding someone to be his advisor and get a [program] committee together. With my cohort there was not a lot of consistency in the program. You had to be very motivated to seek out your own committee members otherwise you could linger there [in the program] forever …if you weren’t aggressive enough it would have been very easy to get lost and give up.
The same story was heard from faculty members. They recalled students who were stuck in the program, unable to progress. Similar to the student accounts, they spoke of students who could not find faculty members interested in their research topic. What stood out among the faculty members was their agreement that some of the students were left to their own painful demise and essentially were quietly ignored. In the words of some faculty members:

Some [students] left the program because they picked the wrong program to be in. They left because they realized that they were not getting the topic area they were looking for or the faculty interest changed or the faculty themselves had changed. Other people [students] did this on their own fruition but other people got squeezed out, or rather, they were not advised to leave, but, they withered….they were sort of neglected for a long time.

We had a student who was in the program forever…kept getting extensions and extensions….eventually sort of finally dropped out.

The program had been too gentle [with the students]; that sort of benign neglect. They were allowed to take leaves or change their topic … after a few more years they weren’t any further along.

The next section provides the reader with the accounts and reflections of the students and faculty regarding the current program.

**The Revised Information Science Ph.D. Program**

After numerous meetings and retreats by the faculty, the Department of Informatics Ph.D. program, as it exists now, was accepted by faculty in November 2005. Although the revised program retained its focus on the campus-based interdisciplinary core program, key program elements were updated and strengthened. Interdisciplinary fields were refocused to reflect current trends in research. Admission requirements were strengthened and broadened to consider the varied educational backgrounds of incoming
students. The program requirements were updated to strengthen the in-step student cohort for the first two years and to verify competency in computer and information technologies. Five interdisciplinary pro-seminars were designed for reflection on information theory, policies, and organization. Required course work and mandatory participation in an annual conference (New Trends in Informatics Research) promised better student preparation in using varied research methods. In the first two years in the program, the in-step student cohorts were to be exposed to a clearly defined program which would prepare them for future dissertation research.

In general, the revised doctoral program aimed to form a stronger and closer academic community among the varied interdisciplinary backgrounds of both students and faculty members engaged in the program in the hopes of increasing student retention rates and shortening time to degree completion.

Some students caught in the transition to the revised Information Science Ph.D. program found this to be frustrating and confusing. They argued that their colleagues who had matriculated before the implementation of the revised program had different, less thorough, requirements. One student remarked:

You know that [program] transition where we didn’t have the research seminars then all of a sudden we had the seminars? [That was] a little confusing for me at the beginning.

Much empirical evidence attributes student program departure to feelings of isolation due to a lack of faculty and peer interactions and support (Ali & Kohun, 2009; Ferrer de Valero, 2001; Golde 2005; Herzig, 2004; Hoyle & Torres, 2008; Lovitts 2001; Nettles & Millett 2006; Rovai, 2002b; Shacham, Od-Cohen, 2009; Terrell, Snyder, &
Dringus, 2009; Ugrin, Odom, & Pearson, 2008; Varney, 2010; Washburn, 2002). One student, who officially left the program of his/her own accord, partially blamed the Informatics Department administration for not facilitating and supporting him/her through this transition enough.

The program evolved and changed as I was taking it …I was stuck in an old program plan that I had to mesh into a new program plan and it was difficult for me…I sometimes wonder if there was another push from the other side [the program administrators] that it would have ended differently.

For the most part, the students were very pleased with the structure and content of the revised program. They appreciated being forced to stick together with their cohort their first two years until the comprehensive exam or until they reached candidacy. Students spoke of the excitement of sharing experiences and knowledge with their colleagues and the faculty. The varied disciplines the students brought to the program allowed for rich and invigorating conversations. The interdisciplinary pro-seminar courses and the four-semester research seminar, taught by the Andersen team of professors, were a big hit with the students. The in-step student cohorts were, and are still, impressively enduring as suggested in the interview data; a true sense of community prevailed. Many of the students became quite dependent on their peers for support and direction. In the words of the Ph.D. students:

It [the program] was a socialization ….I was not alone….the road had lots of ups and downs and if it wasn’t for my cohort, who were there when I didn’t want to do this anymore and helped me through, I wouldn’t have been able to get through the program.

I really liked the core [pro-seminar] courses I took … super interesting. My connection with my cohort…thought it was great.
After going through all the seminars [the first two years], I thought the experience was amazing…just getting back into the conversation at that level.

Another positive experience I would say was the Andersens…whether you want to call them the den parents…the program would not have been anywhere near as enjoyable, pleasant, [or] supportive if it wasn’t for the two of them.

Meeting [with my cohort] for the comp exams was a great experience with everybody. Also [my cohort] group studies, when we would meet in the library, study for exams, have discussions…that was a great experience. The NTIR conference, you know the one we have every year? That was a great experience too. Really got to know each other and work with the other students [in the program]. Really a sharing experience and [sharing] knowledge and helping each other.

Conversations in the core classes were wonderful; having that level of discourse with these other disciplines was the most positive…just a different way of looking at things.

I had good experiences with all of my cohort; we worked very well [together].

The researcher probed even further by asking the student interviewees what they thought some of the strengths of the current program were. Again there were many references to the Andersens and their being instrumental in getting through those first, tough years in the program. The requirement of publishing was also welcomed by many. The coursework requirements were hailed by many students, including the secondary specialization “elective” course requirements. The students remarked on the strengths of the program:

The core courses were great; the interdisciplinary nature of the program; all different backgrounds which gave to different conversations.

[The strengths of the program included] the forcing of cohorts to stick together until the comps; the social events at the Andersens; things like the lunch-and-learns.
I can’t say I know the new program well but I get the sense that it is more organized …clearer what you need to do to get through the program. One of the [revised program] requirements was to have a publishable paper …I actually though that was a really good idea! I didn’t have a publication until after my dissertation.

I think the research seminars were great….just opened up the importance of publishing. The core courses, some of them were really helpful. The electives allowed you to explore what you like. The NTIR conference was great too.

I needed courses to fill in my program plan…would have not taken them otherwise and one of them is what I ended up using for my dissertation! Kind of a serendipity sort of thing.

Interdisciplinary nature of course work was great; just great classes; I was really pleased.

I really like the potluck at the Andersen’s every semester. It is much more than a potluck ….students get to meet…that is very important…getting connected with others.

Faculty members were also very pleased with the revised program structure and the updated requirements, though the researcher did not detect the higher level of connectedness and community among the faculty members that she saw among the students. Even faculty members who did not feel a sense of belonging in this community remained impressed with the energy of the program leaders and with the program’s end results. Several interviewees spoke very highly of the energy and dedication of Jennifer Goodall, Assistant Dean, and Peter Bloniarz, Dean. In the words of the faculty members:

The pro- seminars also gets the students launched on to their research…the first two years is a well-defined meat grinder that insists this is what you [the Ph.D. student] are going to do or else you are going to be in trouble…that part of it [the program] is very impressive.

[Student job] placements are pretty good…they [the INF Department] graduates people…the program has a pretty good track record.
I find the interdisciplinary nature of the program most attractive. Working with people in multiple departments, working with faculty, gives fresh air to my thinking...a very big plus with me.

[Although I am] friendly on campus [with the INF faculty members] I am not really involved [in the INF department]...only a couple [of INF faculty members] do I consider my colleagues.

Some of the junior faculty [members] are more involved [than I am] ... I mostly consider my [home] department as my colleagues.

I think the faculty, in general, are pretty strong and Peter [College of Computing and Information Dean] has done a pretty good job...he is pretty energetic.

Not all remarks regarding their colleagues were positive. It was mentioned that joint appoints with the Informatics Department were very hard and time consuming. It was a struggle to keep involved with the students, other faculty members, and the committees and events associated with the program. It was evident that some faculty felt that several of their colleagues were not putting in an effort and were shirking their responsibilities to the students and to the department. One interviewee remarked:

Sometimes, less than committed colleagues seemed to forget their responsibility to their students. We have to be there...helping the students along.

When faculty interviewees were asked about their experiences with the doctoral students in the program, there was very little discussion. Most were exceptionally vague in their responses or could not think of anything to say. The researcher got the impression that the faculty did not feel connected to the students. One said:

[There are] very few students I have stayed in touch with after the classes I taught ... I really do not keep in touch with them.

Each of the faculty members interviewed had taught the students in the program, either teaching one of the required pro-seminars courses or one of the technology
competency one-credit modules. The same theme emerged after the revised program implementation as did in the earlier days of the Information Science Ph.D. program. Affiliated faculty members felt that teaching in the program was too time consuming and required too much effort. In one faculty member’s words “they were time sinks”. Another commented that “teaching the pro-seminars was a chore”.

Some of the student interviewees found a faculty member who they strongly connected to, so much so, that the students hailed their mentor as pivotal to their success in the Information Science Ph.D. program. Two students commented:

[I had] a super experience with one core faculty member …she/he was fantastic …I do kind of credit him/her for me passing the comps.

The conversations I had with my chairperson were just amazing….wow.

Other students were not so fortunate in establishing connections to faculty. With the exception of the Andersen professors’ positive presence in the first two years of the student’s program, each student was able to give an account of at least one disappointing occurrence. In the words of the students:

Scheduling aspects with some faculty was very difficult. Sometimes people would never respond to emails. [It was] a tough thing.

I know some faculty, who I know are very smart, but aren’t necessarily great teachers. Some people you can tell are researchers they are not really teachers…not dynamic in the classroom. So some classes were a little more painful.

This may not have been typical…I had one instance where I felt as if [the faculty member] was threatened [by me]… she/he was teaching down to me.

Quite often actually [I was] ignored [by faculty]. Sometimes I felt a little depressed about this. I sent emails to professors and they never responded….I needed to send an email two or three times before they responded.
The researcher heard the frustrations of the students and the Ph.D. Program faculty through her interviews with them. The faculty members were torn between their commitment to their home departments and their desire to be involved and active in the Ph.D. program. They were aware of giving less than what was deserved or expected to the doctoral students and felt that their time commitment at times was too great. Hence the connections between the faculty and students were not necessarily strong.

Having looked at faculty and student perceptions of the program, the next section discusses the weaknesses of the current Information Science Ph.D. program identified by the interviewees and their suggestions for improving the program.

**Suggestions for the Future of the Information Science Ph.D. Program**

On the one hand, we have doctoral students who have found it difficult to find an advisor or connect to a faculty mentor with similar research interests, so difficult that some have left the doctoral program. Contrasted with this are faculty who feel that the program can be too gentle with the students with respect to leaves-of-absence and topic changes. One student remarked:

> We do offer a lot of specializations [in the program] but I don’t think there are a lot of faculty members [on campus] who can really help out people [students].

So what is a student to do if he or she is unable to connect to a faculty member who is [1] unwilling to work with an INF Ph.D. student and [2] has no interest in the research area the student wishes to pursue? Students can feel as though the faculty members are not there for them and they feel ignored. The majority (58.6%) of the INF faculty members were affiliates, or joint appointments. These faculty members were saying that
They were primarily responsible to their “tenure homes”. They felt that their joint appointments were time consuming and required uncompensated work. What does the faculty member do if he or she is approached by an INF Ph.D. student to work with her but his or her home department has other ideas? The remaining INF faculty members were either core (21.6%) or split-line (21.6%). The split-line faculty members were hired by the INF Department at the same time as the revision of the program was taking place. Most of the split-line faculty members are no longer working at the University at Albany, and those who have remained are firmly situated in their home departments and have not taught an INF course in years. In the words of one confused split-line faculty member:

What is our goal here [in the Informatics Department]? What are we doing here, trying to split ourselves between two departments?

This faculty member related to the researcher his/her delight in working with the Ph.D. students in the program. In his/her words:

My time at [the University at] Albany came to an end…. Honestly [I] have not been very happy there for the last few years….The most rewarding things [while at Albany], [were] I got to work with doctoral students.

There appears to be a conflict of interest here. It is no wonder that the students and faculty alike are frustrated and not particularly connected to each other, as the survey in Stage II of this study revealed (see Chapter 7: Stage II Findings; Quantifying Community and Connectedness).

Students who were interviewed suggested that the INF Department increase the number of faculty to work with the Ph.D. students in their chosen specializations. As one student remarked:
We do offer a lot of specializations [in the program] but I don’t think there are a lot of faculty members [on campus] who can really help out people [students].

Other students suggested that the INF Department add to the number of INF courses taught at the university. A Ph.D. student talked about this as a systemic problem:

We [the INF Department] do not own many of our own courses. We are forced to go to other departments. We lose contact with the [department] professors. We could have stronger relationships within this program with our faculty and with each other [our peers] if the courses belonged to our program.

Both of these suggestions need INF Department dedicated faculty members to make this happen.

One student suggested trying to physically locate students and faculty closer together. In her/his words:

What would help is if everyone [faculty and students] was together. Offices are all over. Other [faculty] on multiple lines aren’t even in the department. The interdisciplinary nature of the department kind of makes it hard…we don’t have an Informatics faculty.

In Chapter 2: Literature Review, a Case Study and Hypotheses of this study, substantive findings were identified that suggested that program success is enhanced by providing a dedicated space for classes, offices and a lounge area for students (Benbasat & Gass, 2002; Lovitts, 2001). Furthermore, an NSF report on the Impact of Transformative Interdisciplinary Research and Graduate Education on Academic Institutions (2009) advised the university to provide physical spaces to pull faculty and student communities together.

Both the doctoral students and the faculty members alike suggested that the current comprehensive exam, where one question is answered over a period of days, be
reassessed. They argued that the interdisciplinary breadth is not evident in the exam and questioned whether this assessment tool should be used to evaluate the student. In their words:

The comprehensive exams…is that really something that evaluates whether someone can be an effective Ph.D. researcher or not? It is limited to the questions you can answer. I think it is a lot better [in the revised program] than it used to be. Maybe they [program leaders and faculty] could re-think it [the comprehensive exam] a bit with focus groups of students or other faculty or other Ph.D. programs.

The comps are a little weird…..the problem is there is only one question [answered], so there is the weakness. They [the students] have done all the seminars [and] gotten good grades in the seminars. The fact is that the breadth is not there [in the comprehensive exam].

Several students suggested that it is difficult to engage with program students and faculty, and embed themselves into the department culture as a part-time student. They suggested a need for more flexibility especially with respect to the University’s Full-Time Study in Residence requirement. In the words of the students:

The full-time residency requirement is hard to do. I don’t think it [the program] is geared toward part-timers. Yeah I struggled a lot with that. I needed to take time off [from work]. I think it would good if it [the program] could be scheduled for people who work full-time. That would be one improvement.

[It was] hard to fit in [the program culture] if not a full-time student. [For example] the “lunch & learn” activities were not an option.

Where it got challenging was the two semesters fulltime [residency requirement]. They [program administration] were not willing to budge for me…it was ugly [working fulltime and in the program fulltime].

It was tough to fit it…hard to embed yourself into the culture [because I was not a fulltime student]. It was difficult to be able to contribute [to the students in my cohort].

Another student was very concerned about the language and cultural barrier when he/she first started the program; he/she struggled that first semester. Foreign students
especially need additional support with their language barrier both culturally and academically. The existing literature supports this reality. Empirical evidence revealed that students with culturally similar backgrounds tend to have greater attrition rates (e.g. Ali & Kohun, 2009; Bowen & Rudenstine 1992; Herzig 2004; Lott et al., 2009; Lovitts 2001; Most, 2008; Nettles & Millett 2006). In this student’s words:

[The] first semester was getting used to life here [in this country]. Everything was new …language was a big issue….I was scared.

One student suggested that the INF department reconsider mixing the Computer Science and INF doctoral students at the NTIR conferences and at social INF Department gatherings. She/he argued that the INF Ph.D. students struggle enough as it is to remain a focused community. In her/his words:

We need to be integrated first before trying to integrate us with other students in the CCI College.

Finally, several students spoke of the difficulties of completing the Ph.D. program after attaining candidacy status. They felt that there was not enough pressure on them to finish the program after they finished the first two years. They suggested the need for additional structure, more than just sponsoring, and requiring students to present at the annual NTIR conference for the beyond-second-year doctoral student. In their words:

Not enough pressure to finish [the Ph.D.]. After the second year we need more structured brown-bags for third year [students] and beyond.

I did not like being alone after my defense proposal…but it is nature of the end product.

What I lost, when I defended the proposal, and finished the coursework, well, you are by yourself….I did not like that…I missed the socialization.

I knew at the beginning that PhD life is a lonely life ….you need to find something in common with your cohort to stay together…. but after the third year we rarely met.
Chapter Summary

This chapter started with a discussion of the qualitative analysis of the interview data used during this stage of the research study. Using a narrative approach with an emphasis on the story behind the development and subsequent revision of the Information Science Ph.D. program, the qualitative findings of the doctoral students’ and faculty members’ accounts of their experiences in the Information Science Ph.D. program were described in detail in the last section of this chapter.

Next is the final chapter of this dissertation which provides the reader with a summary and discussion of this study. This chapter concludes with the researcher’s final thoughts and reflections concerning her research.
Chapter 10: Summary and Discussion

Introduction

To summarize and understand the implications of this study, this concluding chapter reviews the hypotheses and methods used. This chapter is designed to review the study’s results, discuss the implications for the field, and provide recommendations for future research.

This study, which explores the impact of program structure on student and faculty scholarly communities in interdisciplinary Ph.D. programs, stems from my experiences as a professor and a doctoral student. Having taught in STEM (science, technology, engineering and mathematics) related fields in higher education for several years, and subsequently immersing myself in the Information Science Ph.D. program at the University at Albany, provided me with the impetus to study the highly interdisciplinary Information Science doctoral program design at the University at Albany in depth. This dissertation explores both the effect a program structure has on the formation of scholarly communities among the students and faculty members involved, and whether specific program modifications influenced doctoral student retention rates and time to degree completion.

The University at Albany Information Science Ph.D. program went through a major revision in 2006 in hopes of strengthening the program and incorporating much needed curricular updates. Although the program retained its focus on the campus-based interdisciplinary core program, major program features were updated and strengthened. Each of the existing fields (or specializations) had its requirements updated to reflect
current national standards. Some new fields were added to reflect present-day research programs at the University at Albany. The core pro-seminar courses were updated to include five, quarter-length two-credit courses which would be completed by each incoming cohort during the first two years in the program. Core coursework was further expanded to include four one-credit research seminars, and a four-credit research course, Research Design in Information Science, was introduced as a core requirement. This research sequence was expected to be completed by each incoming cohort during their first two years in the program with the additional requirement of presenting at the annual, on campus, New Trends in Informatics Research (NTIR) conference.

**Problem and Methodology**

This study focused on the implementation of a revised interdisciplinary Information Science doctoral program aimed at increasing third-year retention rates and shortening time to candidacy and degree completion. The intervention of the revised program centered on forming a stronger and closer academic community among the varied interdisciplinary backgrounds of both students and faculty members engaged in the program.

A mixed methods research design was chosen to provide multiple perspectives and different forms of data collection and analysis. The research was performed sequentially in three distinct stages. Stage I performed qualitative content analysis on Information Science doctoral student and Informatics department documentation. Stage II consisted of quantitative data collection and analysis of web-based surveys presented to the doctoral students and Informatics Department faculty members. Stage III completed the research
study with qualitative Information Science Ph.D. program student and faculty interviews followed by an analysis of the collected data.

Following are the hypotheses and research questions that guided this study.

**Research Question 1**

*Did the implementation of the revised program structure in Information Science increase doctoral student third-year retention rates and shorten time to candidacy and degree?*

Case study research was performed in Stage I of the study to [1] research the University at Albany’s Information Science Ph.D. program history and to [2] gather and analyze doctoral student and faculty members’ demographic and background data. The data collected were used to address the first research question.

**Hypothesis 1**

*Third-year retention rates are positively related to the implementation of the revised program structure in Information Science. Furthermore, students in the program after the implementation of the revised program structure in Information Science will realize shortened time to candidacy and degree than those in the program before the revision.*

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15 The key, measurable variables have been underlined.
Research Question 2

What are the levels of student sense of community, student-student connectedness and student-faculty connectedness and did the implementation of the revised program structure in Information Science increase these levels?

Measures of student sense of community, student-student connectedness and student-faculty connectedness were extracted from web-based surveys in Stage II of the project. These measures were intended to answer the second research question.

Hypothesis 2

The levels of student sense of community, student-student connectedness and student-faculty connectedness are positively related to the implementation of the revised program structure in Information Science.

Research Question 3

What are the levels of faculty sense of community, faculty-faculty connectedness and faculty-student connectedness and did the implementation of the revised program structure in Information Science increase these levels?

Measures of faculty sense of community, faculty-faculty connectedness and faculty-student connectedness were extracted from web-based surveys in Stage II of the project. These measures were intended to answer the third research question.
Hypothesis 3

The levels of faculty sense of community, faculty-faculty connectedness and faculty-student connectedness are positively related to the implementation of the revised program structure in Information Science.

The final stage in this study, Stage III, involved interviewing doctoral students and faculty members to clarify and better understand the results from both Stage I and Stage II and get a comprehensive picture to address the overarching goals of the research. This point in this study was pivotal in that it supplied an element of completeness and credibility crucial in any research project. In an attempt to gain access to both the student and faculty participants’ thinking behind their experiences, the researcher endeavored to interpret their experiences through their point of view thus providing a stronger research study of social phenomena.

The researcher chose this final design method as she was interested in getting a true perspective of participants concerning their experiences in the Information Science Ph.D. program. By bringing together the multiple methods in this study, the researcher was intent on seeing the whole picture of the community of practice within the confines of the Information Science Ph.D. program.
Summary and Interpretation of the Results

Research Question 1: Did the implementation of the revised program structure in Information Science increase doctoral student third-year retention rates and shorten time to candidacy and degree?

The findings from Stage I of the study, doctoral student, doctoral faculty members, and INF Department document analysis, tested the first research question. The doctoral student retention rates at year three in the program dropped in the five years the data were collected. Hence the hypothesis “third-year retention rates are positively related to the implementation of the revised program structure in Information Science” could not be supported.

Two factors potentially affecting retention rate in the research study came to mind. First, in an attempt to strengthen and broaden the Information Science Ph.D. program the revised program requirements were made more thorough and the required coursework more extensive as compared to the original Ph.D. program. Students who were not able to keep pace with the additional demands of the revised program requirements may have decided to leave the program before the close of their third year.

Second, the revised program required the students in their first two years of the program to complete the core courses and complete the research requirement at which point they are expected to take the comprehensive exam. In the pre-2006 Ph.D. program the curriculum requirements and schedule were not as thorough resulting in less pressure to perform at the higher standards. Consequently students may have been less inclined pre-2006 to realize at the third-year mark that this program, or even this degree, was not
an appropriate match for them. Of the twenty-one students matriculated into the pre-2006 Ph.D. Information Science program, eleven had not graduated as of spring 2011 and four of these eleven students had withdrawn from the program within a range between three and thirteen semesters (mean of 7.25 semesters). The twenty students matriculated into the post-2006 Ph.D. Information Science program saw six students withdrawing from the program within a range between two and seven semesters (mean of 4.5 semesters). This indicates that students in the revised program were not only withdrawing from the program at a higher rate but also at a faster rate.

To measure “shortened time to candidacy” only the first four of the five years of data were used because at the time of data collection only one student, of the eight in the final year cohort, had attained candidacy and the researcher felt this one data point did not represent a complete picture of that year’s cohort’s time to candidacy. The findings indicated that the hypothesis “students in the program after the implementation of the revised program structure in Information Science will realize shortened time to candidacy” was supported.

The final hypothesis for Research Question 1, “students in the program after the implementation of the revised program structure in Information Science will realize shortened time to degree” was not measurable within the sample and therefore was not tested.

While these data did not support the hypotheses or were unable to be tested, this may be due in large part to the limited sample of doctoral students matriculated into the program by the year 2007. It would interesting to analyze additional data collected from the doctoral students matriculated into the Information Science Ph.D. program beyond
2007 and to re-evaluate the measures of third-year retention, time to candidacy, and especially time to graduation, as this measure was not tested due to the lack of available data.

Regardless of the limited data collected, there were ancillary findings nonetheless revealed in this stage of the research. The current literature maintains that both female students and foreign students realized higher attrition rates. The data presented here verified that women did indeed have greater attrition rates at year three in the program with an even distribution of men and women in the program. However, there were far more domestic students leaving the program before their third year than foreign students despite the even distribution of international versus domestic students in the program. This phenomenon could not be explained based on the data collected.

**Research Question 2: What are the levels of student sense of community, student-student connectedness and student-faculty connectedness and did the implementation of the revised program structure in Information Science increase these levels?**

Measures of student sense of community, student-student connectedness and student-faculty connectedness were obtained from web-based surveys in Stage II of the project. These measures were intended to answer the second research question.

The definition of *connectedness* from Rovai (2002b) is the “feeling of belonging and acceptance and the creation of bonding relationships” (p. 322). Rovai (2002b) showed that there is a relationship between a sense of community, emotional...
connectedness, and cognitive learning to support persistence in student academic goals. In general, this sense of community involves high levels of engagement, trust and dedication to building a community of practice. Faculty and students together create this strong community through persistent interactions (Rovai, 2002b; Terrell et al., 2009).

No statistically significant differences in the level of a sense of program community were found between the doctoral students before or after the program implementation. Despite removing outliers and transforming high and low scores of the student-sense-of community measure, the findings indicated only a slight decrease in the students’ sense-of-program-community in the five years the data were collected. Hence the hypothesis “the level of student sense of community is positively related to the implementation of the revised program structure in Information Science” could not be supported.

Similarly, no statistically significant differences in the levels of student-to-student connectedness or student-to-faculty connectedness were found between the doctoral students before or after the program implementation. The researcher removed outliers and transformed unusually high and low scores of the connectedness measures. After completing this additional analysis the researcher determined that the doctoral students after the implementation of the revised Information Science Ph.D. program experienced a slight decreased feeling of connectedness with faculty members in the program and a slight increased feeling of connectedness with their fellow students in the program. Hence the hypothesis “the levels of student-to-student connectedness and student-to-faculty connectedness is positively related to the implementation of the revised program structure in Information Science” could not be supported.
While these data indicated no significantly different levels of student sense of community, student-to-faculty connectedness, nor student-student connectedness between the doctoral students pre-2006 and those after the implementation of the revised Ph.D. program, this may be due in large part to the limited sample of doctoral students admitted to the program by the year 2007. It would interesting to analyze additional data collected from the doctoral students admitted into the Information Science Ph.D. program beyond 2007 and to re-evaluate the measures studied here.

Regardless of the limited data collected there were, nonetheless, ancillary findings revealed here as well, in this stage of the research. The current literature maintains that a sense of community is crucial in retaining doctoral students in the program. The data presented here verified that students who departed from the program before their third year, reported lower levels of student sense of community as would be expected as indicated in the literature. Furthermore, the data analysis revealed a slight decrease in the student sense of community after the implementation of the revised program and a more dramatic decrease in retention rate post program revision. This finding helps explain the lower retention rates after the implementation of the revised program as the level of the students’ sense of community fell.
Research Question 3: What are the levels of faculty sense of community, faculty-faculty connectedness and faculty-student connectedness and did the implementation of the revised program structure in Information Science increase these levels?

Measures of faculty sense of community, faculty-faculty connectedness and faculty-student connectedness were obtained from web-based surveys in Stage II of the project. These measures were intended to answer the third research question.

The findings indicated that program community and connectedness measures of the doctoral faculty members were not statistically significantly related to the implementation of the revised program structure. Despite removing outliers and transforming high and low scores of the faculty-sense-of community measure, the faculty-faculty connectedness measure and faculty-student connectedness measure, findings indicated only minor measurement adjustments - a slight decrease in the faculty members’ sense-of-program-community, and slight increases of connectedness levels in the five years the data were collected. Hence the hypothesis “the levels of faculty sense of community, faculty-faculty connectedness and faculty-student connectedness are positively related to the implementation of the revised program structure in Information Science” could not be supported.

While these data did not support the hypothesis, this may be very well due to the limited sample of faculty members; only sixteen (43.2%) faculty members responded to the survey. Causes for the slight variations in the three measures in the five-year window could not be ascertained using the data collected through Stage II of the study.
Interviewing for a Better Understanding of the Study Results

In Stage III of this study, a select number of the Information Science Ph.D. students and faculty members who participated in the survey in Stage II were interviewed. Qualitative interviewing data analysis was performed to clarify and better understand the results from both Stage I and Stage II and get a comprehensive picture to address the problem being studied.

As a review to the reader, the results from the first two stages of this study supported only one hypothesis. It was found that the doctoral students in the program after the implementation of the revised program realized shortened time to candidacy. The findings did not support a decline in third-year student retention rates and, due to a limited data sample, student shortened time to degree completion was not tested. Moreover, the hypothesis that both doctoral students and faculty members after the implementation of the revised program would realize increases in the sense of community and connectedness was not supported.

The data collected and analyzed in Stage III of this study sought to explore the Information Science Ph.D. program experiences of both students and faculty members and to explain the apparent discrepancies between the quantitative and qualitative data. The researcher found these data rather enlightening.

Interviewees’ accounts of students’ leaving the Ph.D. program helped explain the decline in third-year student retention rates found earlier in the study. Students were [1] often not able to identify faculty members willing or able to be an advisor or a committee chairperson, and/or [2] not able to pass the comprehensive exam. Retention rates did not
begin to decline until 2005, close to the time of the transition to the revised Ph.D. program and the hiring of several new split-line INF faculty members. Students caught in the transition were often confused and further frustrated with the pressures associated with the new program. The new faculty members were only just experiencing dividing themselves between two departments and getting familiar with a complex Ph.D. program structure. It is possible that students felt lost in the confusion of the two years following the implementation of the revised program without a faculty mentor and felt the need to leave the program. (One student interviewee attributed her success in passing the comprehensive exam the second time to her faculty mentor. Students without a faculty mentor, perhaps, were not so fortunate to retake and pass the comprehensive exam the second time.) Without collecting and analyzing additional doctoral student data beyond 2007 these propositions cannot be verified.

Doctoral student data collected in the first two years of this study saw no students withdrawing from the program. Faculty interviewees related accounts of students lingering in the Ph.D. program far too long without making any progress. Before the implementation of the revised program, students were not under the same pressure as the post-implementation students were, to advance in the program or stay in synch with their cohort thus finding no need to leave the program. This suggests that the revised program structure did indeed more closely track and pressure the students to move forward.

Both student and faculty interviewees applauded the significantly reorganized revised program for keeping students closely together with their cohort in their first two years in the program and preparing them well for future dissertation research. The
Interviewee accounts closely agreed with the findings of a shortened time to candidacy after the implementation of the revised Ph.D. program.

Required course work and mandatory participation in an annual conference assured better student preparation in using varied research methods. In the first two years in the program in-step student cohorts were to be exposed to a clearly defined program which would prepare them for completing the program during the ABD stage.

The quantitative findings from Stage II of this study, although not statistically significant, indicated slight decreases in both the doctoral students’ sense of community and doctoral faculty members’ sense of community. The interview data analysis revealed that students and faculty alike did not necessarily feel connected to each other. Students indicated that they felt overlooked by faculty members and faculty members stated they felt a stronger allegiance to their home departments with INF department obligations a lower priority. Thus the findings from the interviews reinforced the findings disclosed in the surveys.

All of the student interviewees felt a strong connection with their student cohorts. The students more positioned in the newly revised program plan had closer, more enduring relationships with their peers as compared to those students firmly entrenched in the original Information Science Ph.D. program. Although the student-to-student connectedness measure (determined from the doctoral survey in Stage II of this study) was not statistically significant, there was a slight increase in the measure for students after the implementation of the revised program coinciding with what was found in the interviews with the students.
Implications for Practice

Findings from this study include several implications for interdisciplinary, Information Science Ph.D. programs and generally for any interdisciplinary academic program. This study describes critical program content and structure for interdisciplinary doctoral programs that can seamlessly be applied across interdisciplinary undergraduate and graduate programs as well.

Current gaps in the literature pertaining to the topic of doctoral attrition, and doctoral faculty and student sense of community and connectedness in the interdisciplinary sciences were identified in Chapter 2: Literature Review, a Case Study and Hypotheses of this study. The researcher contends that this study does indeed contribute to the literature on doctoral education, especially interdisciplinary, science Ph.D. programs.

• A Sense of Community

It is clear from the literature that community is vitally important for retaining doctoral students in their programs and even more so for students engaged in interdisciplinary college programs. Wenger and Tinto identified four key elements that are essential for an effective, working community of practice: domain, community, practice, and interaction. For Wenger (1998) the domain of knowledge is the community of practice’s inspiration. It defines the identity of the community and the value of its achievements to its members and to others. For this study’s community of students and faculty members, their domain, their primary interest, is producing successful interdisciplinary information science scholars who move on to graduate. In pursuing their domain, members build a community though engaging in joint activities, helping each
other, and learning from each other in this setting (Wenger, 1998). The third element of a community of practice relates to the practice itself, a shared repertoire of experiences, stories, tools, and ways of addressing recurring problems - in short, a shared practice (Wenger, 1998) that community members are developing in order to be effective in their domain. This community searches for positive interactions (Tinto, 1997) within both the academic and social systems of their shared practice. Each of these important elements is essential for a true community of practice to thrive and provide an ever-growing legacy for future members of the community.

Although the revision of Information Science Ph.D. program recognized these four elements as important to integrate into the content and structure of the program, a fundamental piece was not realized. Despite the Informatics Department efforts to form a stronger and closer academic community among the faculty and students in the doctoral program only the students, among themselves, felt a fairly strong connection with their fellow students in the program. Students and faculty members alike did not “connect” and a true community was not formed. Exasperating this phenomenon was the suggested lack of community among the program faculty.

- **Program Structure and Leadership**

  Program structure and solid, consistent leadership are strong forces in program success. In this research there was program structure and visible leadership, but different structure and leadership, before and after 2006. The original program had full-time leadership in place and sufficient funding. Perhaps not surprisingly, students and faculty did not see an increase in connectedness or community in this study due to the loss of
full-time leadership and sufficient funding despite the strengthening of the program structure.

- **Faculty Integration and Collaboration**

  Students seeking a willing and suitable faculty advisor (creating a partnering in which both parties can endure a successful relationship) is not easy if the number of faculty to select from is too small. Despite the large number of program faculty listed on “paper”, few were willing to work closely with an Informatics Department doctoral student let alone adopting one as a Ph.D. advisee. While the students were enrolled in an interdisciplinary program, the affiliated faculty members were largely bound to their disciplinary departments. The split-line faculty members either left the university or were firmly attached to their discipline departments. Without a doctoral advisor, students will leave their Ph.D. program.

  Previous literature maintains that interdisciplinary curriculum courses are best taught by a collaborative team of faculty from multiple disciplines rather than a single instructor (ASHE, 2009). Affiliate faculty members felt their joint appointments were often time consuming and required too much uncompensated work, leaving the program’s courses to be taught by a handful of core faculty members further expanding the gap of connectedness between faculty and students.

- **Social and Academic Participation**

  Offering numerous social and academic interactions for the students makes a difference in their sense of community and connectedness. Although the revised program structure was very well defined in the first two years of study and lauded by both students and faculty, students found themselves suddenly working alone without the frequent daily...
social interactions and communication with their peers and faculty after completing the competency exam. Previous literature maintains that a well-defined program structure in the final stage of the dissertation program can increase the rate of retention among the students (Ali & Kohun, 2009). Students need continued support that could be gained by communicating with other students who are also working on their dissertations. To retain students during the ABD stage, it is important to keep them attached to the community with informal brown-bag get-togethers and more structured gatherings where students and faculty alike can share their research work. The researcher can personally attest to the importance of structured, informal gatherings as she found tremendous support in the ACRIDAT Learning and Instruction Forum through the School of Education while working on her dissertation proposal.

- **Student Funding**

  Offering enough funding to keep the students employed (and fed) through the long, often tedious journey to graduation is extremely important. The literature claims that attrition rates are higher in the STEM fields making it necessary to be extra diligent.

- **The Foreign Student**

  All doctoral programs should separately consider the foreign student, especially those with language and culture barriers due to being new to this country. This research suggests to start early in the first semester of study, or even better yet, before the first semester starts. International students especially are prone to feelings of isolation.

- **Program Organization and Delivery**

  Program organization and delivery are especially important for retaining students in their programs of choice. This study found that exposing the doctoral students in their
first two years to a clearly defined program, required interdisciplinary coursework, and formidable research requirements with mandatory research conference participation, promised better student preparation for future dissertation work. Open and timely communication with all department faculty regarding student progress and especially attrition rates is critical in keeping the academic community informed and focused on the ultimate goal to see the students graduate from the program. Otherwise the faculty will be unaware of the attrition problem as most students leave quietly and unnoticed.

- **Student Retention**

  Interdisciplinary programs are especially prone to retention problems. The need for a solid sense of community is even more important as departments and faculty are usually scattered. Students can encounter feelings of isolation and being lost very quickly; diversity, integration, and cooperation within the faculty cohort are vitally important.

  Not all PhD students will finish a program. A critical issue is when they make the decision to leave and how they discover that the program is not right for them. The research appeared to uncover this issue in the differences between the original and revised Ph.D. programs. In the revised program students were engaged in a weekly seminar for their first two years in the program. It was hard to avoid the specifics of program requirements, and, one might hypothesize, that individual fit, or lack of it, was more obvious than in the original program where students did not have program requirements discussed on a weekly basis.

- **Department Integration and Collaboration**

  Faculty members need to collaborate effectively, recognize and appreciate each other’s contributions. Successful interdisciplinary programs require sustained
collaboration and cooperation among faculty members who traditionally have been invested in their individual discipline or department (Aboelela et al., 2007; Holley, 2009A; Larson et al., 2011; NSF, 2009). The faculty members require a well-defined and deliberate process to promote interdisciplinary integration which cannot be achieved by departments alone (Holley, 2009A). Holley’s research found significant tension between departmental interdisciplinary programs and the predominantly disciplinary structure of the university. She and others (Newswander & Borrego, 2009) found organizational elements such as a full-time faculty program director, dedicated campus space, financial resources and cultural support from the Office of the Provost, and a core group of dedicated faculty absolutely necessary in achieving faculty collaboration in graduate interdisciplinary programs. The university needs to recognize interdisciplinary research equally in tenure and promotion standards in order to encourage research endeavors among department faculty (Holley, 2009B; Newswander & Borrego, 2009).

An important take away from this research is that it is hard to fully engage faculty in a multidisciplinary program when that program is second to their home departments. Tenure, faculty meetings and day-to-day interactions tend to be within, not across, departments. Extra effort in leadership and activities is needed to keep interdisciplinary faculty cohesive in light of these other forces.

As previously mentioned, interdisciplinary curriculum courses are best taught by a collaborative team of faculty from multiple disciplines rather than a single instructor. Until Informatics Department faculty members adopt collaboration between discipline-based departments and gather the institutional support necessary for this to happen,
students might very well struggle to get all the support and attention that they need to succeed in a PhD program.

- **Dedicated Campus Space**

  Scholarly communities are influenced by physical positioning of students and faculty. Previous research indicates that interdisciplinary programs succeed when provided dedicated campus space (ASHE, 2009; Holley, 2009A; Holley, 2009B). This space not only provides independence and legitimacy within the university but also acknowledges much needed institutional support for interdisciplinary research and programs.

  This study suggested that split-line faculty hires were especially prone to feelings of isolation with their faculty cohort resulting in the absence of collaboration, integration, and cooperation with their colleagues. Co-authoring papers with students and working on research together are important. Outside departments affiliated with the program need to be responsible for enhancing engagement of faculty by encouraging the use of each other’s courses. They need to develop new models of organizational structure and funding to facilitate the interdisciplinary community. Likewise the interdisciplinary program needs to recognize the outside departments as instrumental in the success of their program: graduating a student should credit all departments who participated in the success of this one student. At the university level, administrators need to add more flexibility to allow faculty to move seamlessly between departments. Physical space for faculty offices and department classes helps tremendously.
Study and Method Limitations

The leading limitation of this study was the limited population size, particularly for doctoral students. Data expanding beyond those students who were matriculated in the program in 2007 would have not only increased the doctoral student sample size in the first two stages of this study, but would have provided a larger picture of doctoral student retention rates beyond the study’s five-year window. Furthermore the additional data would have facilitated the testing of the hypothesis “students in the program after the implementation of the revised program structure in Information Science will realize shortened time to candidacy and degree than those in the program before the revision”.

Another identified limitation to this study was the survey instrumentation. As a reminder to the reader the statistical analysis from Stage II of this student did not reveal any significant relationships. The survey administered to both the doctoral students and the INF faculty members was based on two corroborated scales, the Classroom Community Scale – Rovai (2002a) and the Doctoral Student Connectedness Scale (DSCS) – Terrell et al. (2009). Rovai’s Classroom Community Scale was designed to specifically measure a student’s sense of community in online educational environments. The Doctoral Student Connectedness Scale developed and verified by Terrell et al. (2009) was used to obtain measures of student-student connectedness and student-faculty connectedness in online and limited-residency doctoral programs. The evidence which supported good construct validity and good reliability with both connectedness scales (Albion & Erwee, 2011; Rockinson-Szapkiw, 2011; Rovai, 2002a; Rovai, 2002b; Terrell et al., 2009) were predominately in online educational environments. Therefore the
possibility of the survey instrumentation not being a good match for the on-campus INF doctoral program participants is very real.

Additionally, Terrell’s instrument items concerned the dissertation process and asked the participants to rate their feelings with respect to statements that most likely were not applicable to the doctoral student who was not in the ABD stage of their doctoral studies. For example students responding to the statement “I feel that students currently working on their dissertation care about each other” may have answered the question lower on the scale because they may have felt they could not adequately answer it. Since some of Terrell’s survey items were derived from Rovai’s Classroom Community Scale there was some replication of the survey instrument which may have confused and/or frustrated the survey participants.

Finally, some of the open-ended questions at the end of the doctoral student survey were found to be confusing by at least one participant based on an email sent to the researcher after the survey was completed.

I just filled out the online survey. Some answers to you may be confusing. For example: I prepared for a peer-reviewed journal article in the third year of my study in the program (2009). However, the paper was accepted last June (2010), and the paper will be published in this coming April (2011). Therefore, there is a question asking how many months for me to get my first journal publication since my matriculation. I just entered 45 months.

A major limitation to this study was the lack of doctoral faculty participants in the last two stages of the study. In the second stage, surveying faculty members returned a small number of responses. The final stage, in which a qualitative approach was going to be used to further explain the results from the faculty surveys and document analysis,
used only a small number of participants. Actually, it would have made a stronger study if the number of both doctoral faculty and student participants interviewed in the final stage were larger. While the interviews brought to life the experiences of the doctoral students and faculty in the Information Science Ph.D. program the answers to the research questions would be stronger with more cases.

There was some design method limitations noted as well. In Stage I of this study, document analysis, the researcher measured INF PhD Faculty Members Program Involvement Level by merely counting the number of academic, program related, activities a member volunteered for or activities they were assigned to (e.g. department committees) and did not focus on the quality or usefulness of the activity.

In the third stage of the study, interviewed participants were asked to recall experiences that in some cases were several years old. Therefore the semi-structured interview question responses may have been influenced by hindsight or failure to accurately recall experiences.

The researcher only measured a sense of community and connectedness using single measures. The fact that the researcher found no significant differences between the doctoral students matriculated into the revised Ph.D. program and those matriculated after makes the case for questioning if the scales used were appropriate. As discussed above, it is possible that these measures are more appropriate for online educational environments only.
Recommendations for Future Research

The researcher recommends extending the present study to include more current data beyond the 2007 window chosen for this research study. The construction of survey instrumentation specific to test community and connectedness measures among predominately face-to-face interdisciplinary Ph.D. programs would be invaluable to enhance the present study. It would be interesting to examine interdisciplinary Ph.D. program structure in other similarly sized universities and to compare these findings with the findings from this study.

To extend the present study, researchers could study patterns of doctoral student attrition and time-to-degree by Ph.D. granting department programs focusing specifically on department and program factors. Additionally, researchers could explore the doctoral student motivations and barriers to participating in a community of practice similar to the community considered in this study. Lastly, a study examining strategies which promote undergraduate students to be prepared to do research and have sufficient knowledge in a discipline to undertake interdisciplinary research in graduate school would benefit the interdisciplinary higher education field of study.

Reflections

As a complete participant observer, one who was a member of the studied population, the researcher had her own, personal perspective of the revised program and the individual participants who were a part of the study. She, along with many of the INF students and faculty members she met during her academic journey, thought very highly of the INF Ph.D. program (which had been revised before she began the program). After
experimenting with two other Ph.D. programs at the University at Albany, the researcher believed she had found the perfect match with the Information Science Ph.D. program. The first two years in the program were exhausting but extremely delightful (in hindsight). The coursework was rewarding and stimulating. The faculty challenged her intellect daily. Her cohort was instrumental in getting through the first two years of the program both academically and socially and to this day are still there for her. Student mentors from earlier cohorts were always eager to help her out by answering questions, giving advice, and supplying critical feedback regarding her research. Faculty mentors from both the INF and ETAP (Educational Theory and Practice) departments at the University at Albany were extremely valuable and effective in shaping the researcher’s dissertation proposal. The researcher attended numerous brown-bag monthly get-togethers in the School of Education (formally known as the ACRIDAT Learning and Instruction Forum) which encouraged and guided her through her dissertation research.

A notable feature in this study was the relationship among the researcher and her dissertation committee. Each committee member was, as was the researcher, highly invested in the Information Science Ph.D. program at the University. Both Jennifer Goodall and Deborah Andersen were graduates of the original Ph.D. program. Each committee member held important leadership positions that guided and shaped the program structure and organization. David and Deborah Andersen were the guiding force behind the doctoral students’ progress in their first two years in the program as the instructors of the Research Seminars.

The story behind the development and subsequent revision of the Information Science Ph.D. program turned out to be much more complex than the researcher and her
dissertation committee realized. We all misjudged the numerous factors that played a crucial role in shaping this story. The actual story was not the structure of the Ph.D. program but the inconsistent program funding, the leadership changes, the retirements of key players, the death of a University President, the variable staff support, the program enrollment pattern, the external job market, the fluctuating Graduate Assistantship support, and the on-campus climate regarding interdisciplinary programs and departments.

In closing, the researcher would like to share the insights she garnered through her dissertation research journey. There needs to be a coherent perspective between the INF program faculty and students. Some mutual adaptation that gives us interdisciplinary doctoral programs where each individual is considered a worthy contributor and individuals feel respected, feel a sense of belonging and being valued, and feel successful is necessary. All students’ and faculty members’ work needs to be recognized as valuable, significant and respected despite the gap produced by scattered departments, multiple disciplines and multiple schools of thought in the varied fields.
References


Appendix A: Student Data Extraction Sheet

Researcher Name: _____________________________  Date: _____________________________

NOTE: If an answer is not applicable enter “NA”

Student Code: ________________________________________________________________

<table>
<thead>
<tr>
<th>Application</th>
<th>Transcript</th>
<th>Program Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (M,F):</td>
<td>Leave of Absence Date:</td>
<td>Date of 1st degree plan submission:</td>
</tr>
<tr>
<td>Age at Entry:</td>
<td># of INF Courses completed @matric:</td>
<td>Program plan date16:</td>
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<tr>
<td>GRE/GMAT (quan):</td>
<td># of UA credits @matric15:</td>
<td></td>
</tr>
<tr>
<td>GRE/GMAT (verbal):</td>
<td>Date of Withdrawal:</td>
<td>Other Source</td>
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<tr>
<td>GRE/GMAT (analy):</td>
<td>3rd year retention18 (Y,N):</td>
<td></td>
</tr>
<tr>
<td>TOEFL:</td>
<td>Full or Part-time19 @matric:</td>
<td></td>
</tr>
<tr>
<td>Year Admitted:</td>
<td>Date of Candidacy:</td>
<td>2nd Year of Comps:</td>
</tr>
<tr>
<td>Year Matriculated:</td>
<td>Date of Graduation:</td>
<td>2nd Comps Grade (P,F):</td>
</tr>
<tr>
<td>Foreign or Domestic20:</td>
<td>Marital status @matric (M.S):</td>
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<tr>
<td>BA/BS Degree Program:</td>
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<td></td>
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<tr>
<td>First MA/MS Program:</td>
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<td>Second MA/MS Program:</td>
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<td>First MA/MS Institution:</td>
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<td>Second MA/MS Institution:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First MA/MS Year:</td>
<td></td>
<td>@matric At matriculation</td>
</tr>
<tr>
<td>Second MA/MS Year:</td>
<td></td>
<td>@Y1 At end of year 1</td>
</tr>
<tr>
<td>Years since prior degree:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

16 (signed by Director)
17 Specialization and/or core, but not another graduate degree from UA
18 Still here at start of third year
19 (FT,PT)
20 (F,D)
#Appendix B: Faculty Data Extraction Sheet

<table>
<thead>
<tr>
<th>Background Information</th>
<th>Student Information</th>
<th>PhD Program Participation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (M/F):</td>
<td>Y1\textsuperscript{21} number of program advisees:</td>
<td>Y3 INF seminar presentation: (Y/N):</td>
</tr>
<tr>
<td>1\textsuperscript{st} Year in Program:</td>
<td>Y2 number of program advisees:</td>
<td>Y4 INF seminar presentation: (Y/N):</td>
</tr>
<tr>
<td>Core/Affiliated Faculty (Y/N):</td>
<td>Y3\textsuperscript{22} number of program advisees:</td>
<td>Y3 NTIR participation (Y/N):</td>
</tr>
<tr>
<td>Age:</td>
<td>Y4 number of program advisees:</td>
<td>Y4 NTIR participation (Y/N):</td>
</tr>
<tr>
<td>Academic Rank:</td>
<td>Y1 number of ABD students:</td>
<td></td>
</tr>
<tr>
<td>Primary Field (department):</td>
<td>Y2 number of ABD students:</td>
<td>Y3 number of ABD students:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y4 number of ABD students:</td>
</tr>
</tbody>
</table>

**Program Meeting Minutes**

(only while in the program)  
Y4 number of ABD students: 

# of meetings present: 

# of meetings absent: 

**Emergent data from other sources:**

\textsuperscript{21} Y1 & Y2: the two years before the implementation of the new curriculum in 2006  
\textsuperscript{22} Y3 & Y4: the two years after the implementation of the new curriculum in 2006
Appendix C: Student Research Survey

Directions for Sections A & B:
Below, you will see a series of statements concerning the Informatics PhD program you are presently in or have recently completed. Read each statement carefully and choose an option to the right of the statement that comes closest to indicating how you feel about the program. There are no correct or incorrect responses. If you neither agree nor disagree with a statement or are uncertain, choose the neutral (N) option. Do not spend too much time on any one statement, but give the response that seems to describe how you feel. Please respond to all items.

Section A – General Program Specific Questions

Strongly agree (SA), Agree (A), Neutral (N), Disagree (D), Strongly disagree (SD)

1. I feel/felt that students in this program care about each other
2. I feel/felt that I am encouraged to ask questions
3. I feel/felt connected to others in this program
4. I feel/felt that it is hard to get help when I have a question
5. I do not/did not feel a spirit of community
6. I feel/felt that I receive timely feedback
7. I feel/felt that this program is like a family
8. I feel/felt uneasy exposing gaps in my understanding
9. I feel/felt isolated in this program
10. I feel/felt reluctant to speak openly
11. I trust others in this program
12. I feel/felt that this program results in only modest learning
13. I feel/felt that I can rely on others in this program
14. I feel/felt that other students do not help me learn
15. I feel/felt that members of this program depend on me
16. I feel/felt that I am given ample opportunities to learn
17. I feel/felt uncertain about others in this program
18. I feel/felt that my educational needs are not being met
19. I feel/felt confident that others will support me
20. I feel/felt that this course does not promote a desire to learn
Section B – Dissertation Process Questions

Strongly agree (SA), Agree (A), Neutral (N), Disagree (D), Strongly disagree (SD)

21. I feel/felt that students currently working on their dissertation care/cared about each other.
22. I feel/felt that I am/was encouraged to ask questions of the faculty about the dissertation process.
23. I feel/felt connected to other students in the program who are/were working on their dissertation.
24. I feel/felt a spirit of community between the faculty and myself while I am/was working on my dissertation.
25. I feel/felt like I can/could easily communicate with other students about the dissertation process.
26. When I ask/asked questions or submit/submitted work to my dissertation advisor, I feel/felt like I receive/received timely feedback.
27. I communicate/communicated with faculty members about the dissertation process on a regular basis.
28. I feel/felt like fellow students who are/were working on their dissertation are/were like a family.
29. I communicate/communicated regularly with other students who are/were working on their dissertation.
30. I feel/felt I can/could trust other students who are/were working on their dissertation.
31. I feel/felt that I am/was receiving adequate support from the faculty while I am/was working on my dissertation.
32. I feel/felt that the feedback I receive/received from the faculty is/was valuable.
33. I feel/felt a spirit of community between other students and myself while I am/was working on my dissertation.
34. I feel/felt confident that the faculty will/would support me while I am/was working on my dissertation.
35. I feel/felt like I can/could rely on other students who are/were working on their dissertation for support.
36. I feel/felt I can/could trust the faculty while I am/was working on my dissertation (e.g., rely on faculty members to follow through on commitments, keep confidences, treat people with respect and help me learn).
37. I feel/felt like I can/could easily communicate with other students who are/were working on their dissertations.
38. I feel/felt like I can/could easily communicate with faculty about the dissertation.

Section C – Open Ended Questions

Directions for Section C:
Please answer the following questions.

39. Have you established personal relationships with one or more students in this program? Y or N
   a. If YES, how many students total in the program? How many students in your cohort?

40. How many semesters were you in the program before finding your faculty mentor?
41. How many semesters were you in the program before finding your program advisor?
42. How many semesters were you in the program before finding your dissertation chair?
43. If you teach (or have taught), how many semesters did you teach?
44. If you are/were a teaching assistant, how many semesters were you a TA?
45. During the first three years of your program did you prepare (authored or co-authored) any professional publications? If yes, answer the following questions. If no, please skip to question #47.
   • What is the number of NTIR posters?
   • What is the number of NTIR presentations?
   • What is the number of other posters?
   • What is the number of other presentations?
   • What is the number of peer reviewed papers?
   • What is the number of book chapters?

46. What is the number of months from when you matriculated until your first published paper?

47. What is the number of academic awards you have received while in the program?
48. What is the year you started the program?
Appendix D: Faculty Research Survey

Directions for Sections A & B:

Below, you will see a series of statements concerning the Informatics PhD program you are (or were) a member of. Read each statement carefully and choose an option to the right of the statement that comes closest to indicating how you feel about the program. There are no correct or incorrect responses. If you neither agree nor disagree with a statement or are uncertain, choose the neutral (N) option. Do not spend too much time on any one statement, but give the response that seems to describe how you feel. Please respond to all items.

Section A – General Program Specific Questions

Strongly agree (SA), Agree (A), Neutral (N), Disagree (D), Strongly disagree (SD)

1. I feel/felt that students in this program care about each other
2. I feel/felt that I encourage students to ask questions
3. I feel/felt connected to other faculty members in this program
4. I feel/felt that it is hard for students to get help when they have a question
5. I do not/did not feel a spirit of community
6. I feel/felt that I offer timely feedback to students
7. I feel/felt that this program is like a family
8. I feel/felt uneasy exposing gaps in my understanding of program matters
9. I feel/felt isolated as a faculty member in this program
10. I feel/felt reluctant as a faculty member to speak openly
11. I trust other faculty members in this program
12. I feel/felt that this program results in only modest student learning
13. I feel/felt that I can rely on other faculty members in this program
14. I feel/felt that students do not help each other learn
15. I feel/felt that both student & faculty members of this program depend on me
16. I feel/felt that I am given ample opportunities to facilitate student learn
17. I feel/felt uncertain about other faculty members in this program
18. I feel/felt that student educational needs are not being met
19. I feel/felt confident that other faculty members will support me
20. I feel/felt that this program does not promote a desire for students to learn
Section B – Program and Dissertation Process Questions

Strongly agree (SA), Agree (A), Neutral (N), Disagree (D), Strongly disagree (SD)

21. I feel/felt that faculty members currently in the program care/cared about each other.
22. I feel/felt that I / encouraged students to ask questions about the dissertation process.
23. I feel/felt connected to other faculty members in the program.
24. I feel/felt a spirit of community between the students and myself.
25. I feel/felt like I can/could easily communicate with other faculty members about program matters.
26. When students ask/asked questions or submit/submitted work to me, I feel/felt like I offer/offered timely feedback.
27. I communicate/communicated with students about the dissertation process on a regular basis.
28. I feel/felt like fellow faculty members in this program are/were like a family.
29. I communicate/communicated regularly with other faculty members in this program.
30. I feel/felt I can/could trust other faculty members in this program.
31. I feel/felt that I am/was offering adequate support to the students in the program.
32. I feel/felt that the feedback I offer/offered to students is/was valuable.
33. I feel/felt a spirit of community between other faculty members and myself while I am/was in this program.
34. I feel/felt confident that I will/would support students while they are/were working on their dissertation.
35. I feel/felt like I can/could rely on other faculty members who are/were in this program.
36. I feel/felt I students can/could trust me while they are/were working on their dissertation (e.g., rely on me to follow through on commitments, keep confidences, treat people with respect and help them learn).
37. I feel/felt like I can/could easily communicate with other faculty members who are/were in this program.
38. I feel/felt like I can/could easily communicate with students about their dissertation.
Section C – Open Ended Questions

Directions for Section C:

Please answer the following questions.

39. Have you established personal relationships with one or more faculty members in this program? Y or N
   a. If YES, how many faculty members total in the program?

40. Have you established personal relationships with one or more program alumni? Y or N
   a. If YES, how many program alumni?

41. What is the number of papers you co-authored with students in the program?
   a. What is the number of papers you co-authored with program alumni?

42. What is the number of research presentations & posters you co-authored with students in the program?
   a. What is the number of research presentations & posters you co-authored with program alumni?

43. What is the year you started in the program?
Hello <name of participant>, thank you for taking the time today to speak with me concerning the INF Ph.D. program here at UAlbany. This is very helpful for my dissertation research and I do not expect to take more than 20 minutes of your time today. In general the questions will concern your experiences in the program. Your answers will be kept in strict confidence.

1. Please tell me about your introduction to the program.

1a. Was this a positive experience? Why or why not?

2. Please tell me about your positive experiences in the program with your cohort and with other students in the program.
2a. If you have had less than positive experiences with program students, could you tell me, without naming names, the nature of these experiences and what you did about them?

2b. Tell me about positive/negative experiences with program faculty.

3. Do you know of any students who left the program? Y / N

3a. If yes, why do you believe this occurred?

4. What are some of the strengths of the current program (curriculum)? This includes courses, other requirements, activities, structure, etc.

4a. What are some of the weaknesses?
Following the interview:

I would like to thank you very much for your help in answering the questions this morning/afternoon/evening. I may have a few follow-on questions. Would you be agreeable to my contacting you again at some later time?  Y / N

length of the interview and time of day

________________________________________

time of day of the interview

________________________________________

Do I feel the participant connected with me?  Y / N

Were there any distractions or interruptions?  Y / N

If yes, list the distractions or interruptions:

________________________________________

________________________________________

________________________________________

________________________________________

________________________________________
Appendix F: Faculty Semi-Structure Interview Guide

Name ____________________________________________________________________________

gender M / F

academic rank ______________________________________________________________________

number of years in the program ______________________________________________________________________

primary field of study (department) ______________________________________________________________________

Hello <name of participant>, thank you for taking the time today to speak with me concerning the INF Ph.D. program here at UAlbany. This is very helpful for my dissertation research and I do not expect to take more than 20 minutes of your time today. In general the questions will concern your experiences in the program. Your answers will be kept in strict confidence.

1. Please tell me about your introduction to the program.

1a. When did this start? ______________________________________________________________________

1b. How did you get involved and why?

2. Please tell me about your positive experiences in the program with your colleagues.
2a. If you have had less than positive experiences with colleagues, could you tell me, without naming names, the nature of these experiences and what you did about them?

2b. Tell me about positive/negative experiences with students in the program.

3. Do you know of any students who left the program? Y / N

3a. If yes, why do you believe this occurred?

4. What are some of the strengths of the current program (curriculum)? This includes courses, requirements, activities, structure, etc.

4a. What are some of the weaknesses?
Following the interview:

I would like to thank you very much for your help in answering the questions this morning/afternoon/evening. I may have a few follow-on questions. Would you be agreeable to my contacting you again at some later time?  Y / N

length of the interview and time of day

_____________________________________

time of day of the interview

_____________________________________

Do I feel the participant connected with me?  Y / N

Were there any distractions or interruptions?  Y / N

If yes, list the distractions or interruptions:

_____________________________________

_____________________________________

_____________________________________

_____________________________________

_____________________________________

_____________________________________

_____________________________________

_____________________________________

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Appendix G: Institutional Review Board (IRB) Protocol Submission for Student Data Extraction and Online Survey

Institutional Review Board: DHHS FWA00001970
Notice of Approval
IRB Protocol Number: 10-180

Date: July 22, 2010
Principal Investigator: Lenore Horowitz and Jennifer Goodall
Title: Building Effective Doctoral Cohorts in Information Science PhD Programs: Practical Techniques for Enhancing Third Year Retention in Program and Shortening Time to Degree

Review Type: ☐ Full ☑ Expedited Approval Type: New IRB # 1 Expedited Category # 7

Approval Date: July 21, 2010 Expiration Date: July 21, 2011 Review Cycle: 1 Year

1. Provisions of Approval: n/a
2. Consent Forms: All subjects must receive a copy of the consent form as approved with the University at Albany Institutional Review Board stamp. Copies of the signed consent form must be kept on file unless a waiver has been granted.
3. Adverse Events: Any adverse event(s) or unexpected event(s) that occur in conjunction with this study must be reported to the Office of Research Compliance within 10 calendar days of the occurrence.
4. Principal Investigator Responsibilities: It is the responsibility of the PI to ensure that all investigators and staff associated with this study meet the training requirements for conducting research involving human subjects, follow the approved protocol, use only the approved forms, keep appropriate research records, and comply with all University at Albany Policies, federal, state and local laws, Declaration of Helsinki and the Belmont Report.
5. Research Records: Accurate and detailed research records must be maintained. All research records (including all IRB correspondence) must be kept for a minimum of 3 years after the completion of the research. This research is subject to an audit under the terms of the IRB’s Quality Improvement Program.
6. Changes: Any changes in the above referenced study may not be initiated without prior IRB review and approval. Changes include (but are not limited to) study personnel, consent forms, protocol, procedures, addition of funding source.
7. Lapse of Approval: If approval for this project lapses, all research must stop IMMEDIATELY until continuation approval is granted. If approval lapses before the continuation is reviewed, your project must be resubmitted as a new protocol.
8. Yearly IRB Approval Continuation: Approval is valid until the expiration date above. You are required to obtain annual IRB approval continuations prior to your expiration date for as long as the study is active. An annual continuation reminder will be sent to you, but it is your responsibility to ensure that you submit and receive the yearly approval in a timely manner. Up to 4 yearly continuations will be granted after which a new protocol must be submitted for review.
9. Funded Research: If your research is funded, you must also submit sponsor information and a copy of the grant/funding application for IRB review with the human subjects section(s) highlighted. This is true whether the source of funding is internal or external.
10. University Permissions: A.) Institutional Research, Planning and Effectiveness (IRPE) permission may be required if your research participants are recruited from the UAlbany campus. It is the responsibility of the investigator to contact IRPE at (518) 437-4791 for a determination. B.) All UAlbany permissions (e.g., classroom, team or organization permissions) must be kept on file with your research records.
11. Posters or Flyers: All flyers posted to recruit participants must have the IRB stamp. If posters or flyers are to be posted on the UAlbany campus, they must be registered with the Office of Student Involvement and Leadership in Campus Center 130 prior to posting on the academic Podium.
12. External Permissions: All external permissions (e.g., schools, businesses, organizations, etc.) must be kept on file with your research records.

Upon receipt of this letter you may begin your research. The IRB wishes you success with your research.

Mark Muraven, Ph.D.
IRB Chairperson
On behalf of the Institutional Review Board

Cc: David Andersen
Appendix H: Institutional Review Board (IRB) Protocol Submission for Faculty

Data Extraction and Online Survey

Institutional Review Board: DHHS FWA00001970
Notice of Approval
IRB Protocol Number: 11-115

Date: June 15, 2011  Incentive? □ Yes  □ No  n/a

Principal Investigator: Lenore Horowitz

Title: Exploring the Impact of Program Structure on Student and Faculty Scholarly Communities in Interdisciplinary Ph.D. Programs

Review Type: □ Full  □ Expedited  Approval Type: New  Expedited Category # 7

IRB Board000000589

Approval Date: June 1, 2011  Expiration Date: June 1, 2012  Review Cycle: 1 Year

1. Provisions of Approval: n/a
2. Consent Forms: All subjects must receive a copy of the consent form as approved with the University at Albany Institutional Review Board stamp. Copies of the signed consent form must be kept on file unless a waiver has been granted.
3. Adverse Events: Any adverse event(s) or unexpected event(s) that occur in conjunction with this study must be reported to the Office of Research Compliance within 10 calendar days of the occurrence.
4. Principal Investigator Responsibilities: It is the responsibility of the PI to ensure that all investigators and staff associated with this study meet the training requirements for conducting research involving human subjects, follow the approved protocol, use only the approved forms, keep appropriate research records, and comply with all University at Albany Policies, federal, state and local laws, Declaration of Helsinki and the Belmont Report.
5. Research Records: Accurate and detailed research records must be maintained. All research records (including all IRB correspondence) must be kept for a minimum of 3 years after the completion of the research. This research is subject to an audit under the terms of the IRB’s Quality Improvement Program.
6. Changes: Any changes in the above referenced study may not be initiated without prior IRB review and approval. Changes include (but are not limited to) study personnel, consent forms, protocol, procedures, addition of funding source.
7. Lapse of Approval: If approval for this project lapses, all research must stop IMMEDIATELY until continuation approval is granted. If approval lapses before the continuation is reviewed, your project must be resubmitted as a new protocol.
8. Yearly IRB Approval Continuation: Approval is valid until the expiration date above. You are required to obtain annual IRB approval continuations prior to your expiration date for as long as the study is active. An annual continuation reminder will be sent to you, but it is your responsibility to ensure that you submit and receive the yearly approval in a timely manner.
9. Funded Research: If your research is funded, you must also submit sponsor information and a copy of the grant/funding application for IRB review with the human subjects section(s) highlighted. This is true whether the source of funding is internal or external.
10. University Permissions: A.) Institutional Research, Planning and Effectiveness (IRPE) permission may be required if your research participants are recruited from the UAlbany campus. It is the responsibility of the investigator to contact IRPE at (518) 437-4791 for a determination. B.) All UAlbany permissions (e.g., classroom, team or organization permissions) must be kept on file with your research records.
11. Posters or Flyers: All flyers posted to recruit participants must have the IRB stamp. If posters or flyers are to be posted on the UAlbany campus, they must be registered with the Office of Student Involvement and Leadership in Campus Center 130 prior to posting on the academic podium.
12. External Permissions: All external permissions (e.g., schools, businesses, organizations, etc.) must be kept on file with your research records.

Upon receipt of this letter you may begin your research. The IRB wishes you success with your research.

Mark Muraven, Ph.D.
IRB Chairperson
On behalf of the Institutional Review Board

Cc: Deborah Anderson

LCSB 28
1400 Washington Ave, Albany, NY 12222
Ph: 518-442-9030  Fx: 518-442-9997
IRB@uamail.albany.edu

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UNIVERSITY AT ALBANY
State University of New York

IRB 00000589
FWA 00001970
Notice of Approval
IRB Protocol Number: 11-249

Approval Date: December 9, 2011
Expiration Date: December 9, 2016
Title: Exploring the Impact of Program Structure on Student and Faculty Scholarly Communities in Interdisciplinary Ph.D. Programs

Principal Investigator: Lenore Horowitz
Review Type: Exempt #2

Approved under Exempt Category:

- 1 – Research conducted in established/commonly accepted educational settings involving normal educational practices.
- 2 – Research involving the use of educational tests, survey procedures, interview procedures or observation of public behavior.
- 4 – Research involving collection or study of existing data, documents, records, pathological specimens or diagnostic specimens.
- 5 – Research and demonstration projects conducted by or subject to approval of federal Department or Agency heads and designed to study, evaluate, examine public benefit or service programs.
- 6 – Taste and food quality and evaluation/consumer acceptance studies.

1. Provisions of Approval: the determination is valid until the expiration date above. If your research is expected to continue beyond this expiration date, you must submit a new protocol. You are required to maintain IRB approval for as long as the study remains active.

2. All recruitment materials and methods must be approved by the IRB (as part of the determination of exempt from IRB review) prior to being used.

3. Informed Consent: An adequate standard of informed consent has been met when required.

4. Principal Investigator Responsibilities: It is the responsibility of the PI to ensure that all investigators and staff associated with this study meet the training requirements for conducting research involving human subjects, promptly report any changes in research activity to ORRC, keep appropriate research records, and comply with all University at Albany Policies, federal, state and local laws. Declaration of Helsinki and the Belmont Report.

5. Research Records: Accurate and detailed research records must be maintained. All research records (including all IRB correspondence) must be kept for a minimum of 3 years after the completion of the research. This research is subject to an audit under the terms of the IRB’s Quality Improvement Program.

6. Modifications: All protocol modifications must be IRB approved prior to implementation. Modifications include (but are not limited to) study personnel, research instruments, protocol procedures, and/or addition of funding source.

7. Funded Research: If your research is funded or otherwise sponsored research, you must submit any changes to the grant to ORRC with the human subjects section(s) highlighted. This is true whether the source of funding is internal or external.

8. Study Closure: A study is considered to be open and active until the protocol has reached its Expiration Date or the investigator has submitted a Closure Form (available at www.albany.edu/research/compliance/Forms.htm). Until a Closure Form is received, IRB oversight of the research will remain active. A closure notice/reminder will be sent to you, but it is your responsibility to ensure that you submit an updated protocol and receive an approval in a timely manner.

9. Unanticipated or adverse events: All unanticipated or adverse events must be reported to the IRB within 5 days.

10. Other:

We wish you success with your research.

Sunita M. Chowdhri
Assistant Director, Office of Regulatory Research Compliance
On behalf of the Institutional Review Board

cc: Andersen, Deborah L
## Appendix J: A Summary Review of the Literature

<table>
<thead>
<tr>
<th>Study</th>
<th>Focus</th>
<th>Methods</th>
<th>Theory</th>
<th>Key Findings</th>
<th>Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ali &amp; Kohun (2009)</td>
<td>Doctoral attrition</td>
<td>Qualitative – ethnographic study</td>
<td>US institution</td>
<td>Students with culturally similar backgrounds tend to congregate together thus increasing feelings of isolation &amp; attrition rates</td>
<td>No quantitative measurements</td>
</tr>
<tr>
<td>Anthony, Palius, Maher (2007)</td>
<td>Interdisciplinary programs</td>
<td>Mixed – participant observations</td>
<td>Discourse analysis</td>
<td>Students benefit in being a member of a cross-disciplinary learning environment/community</td>
<td>No quantitative measurements</td>
</tr>
<tr>
<td>Austin (2002)</td>
<td>Preparation process of doctoral</td>
<td>Qualitative – longitudinal; US</td>
<td></td>
<td>Students did not receive systematic opportunities to develop necessary abilities &amp; skills</td>
<td>No quantitative measurements</td>
</tr>
<tr>
<td>Beauchamp, Jazvac-Martek, McAlpine (2000)</td>
<td>Doctoral attrition rates</td>
<td>Mixed: document analysis &amp; interviews; Canadian institutions</td>
<td>Activity theory</td>
<td>Students reported that community sharing with students benefitted their development as academics</td>
<td>No quantitative measurements</td>
</tr>
<tr>
<td>Berelson (1960)</td>
<td>Program structure, student preparation, attrition</td>
<td>Meta-analysis &amp; Mixed study interviews, surveys, content analysis; US institutions</td>
<td></td>
<td>Time to degree completion is a concern; attrition not as big a problem as feared; ABD numbers are too large</td>
<td>Many demographic and student characteristics variables</td>
</tr>
<tr>
<td>Borrego &amp; Newswander (2010)</td>
<td>Interdisciplinary Graduate programs</td>
<td>Qualitative – content analysis; US institutions</td>
<td></td>
<td>Need for interdisciplinary researchers; calls for integration, teamwork, &amp; communication; community building</td>
<td>No quantitative measurements</td>
</tr>
<tr>
<td>Bowen &amp; Rudenstine (1992)</td>
<td>Completion rates &amp; Time-to-degree (Attrition)</td>
<td>Mixed Method – Content analysis of databases; survey; US institutions</td>
<td></td>
<td>There are opportunities to achieve significant improvements in the organization and functioning of graduate programs especially with respect to completion rates &amp; time-to-degree</td>
<td>Independent Variables: completion rates &amp; time-to-degree Dependent Variables: discipline, university type, financial aid, department structure, dept. requirements, dept. expectations, culture, gender, race</td>
</tr>
<tr>
<td>Chandramohan &amp; Fallows (2008)</td>
<td>Interdisciplinary college programs</td>
<td>A collection of studies and essays; International data</td>
<td></td>
<td>Interdisciplinary programs are the future of Higher Education globally; will require the greater use of Communities of Practice</td>
<td>No quantitative measurements</td>
</tr>
<tr>
<td>Di Pierro (2007)</td>
<td>Attrition, persistence</td>
<td>Quantitative – document analysis; US institution</td>
<td></td>
<td>Benefits seen through faculty advisor training, faculty communication workshops, annual review of the program structure</td>
<td>No quantitative measurements</td>
</tr>
<tr>
<td>Study</td>
<td>Focus</td>
<td>Methods</td>
<td>Theory</td>
<td>Key Findings</td>
<td>Variables</td>
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</tr>
<tr>
<td>Ehrenberg, Jakubson, Groen, So, Price (2007)</td>
<td>Attrition, graduation probabilities</td>
<td>Quantitative – survey (used data from the Graduate Education Initiative (GEI)) Data from US institutions.</td>
<td>The GEI reduced attrition rates and improved graduation rates primarily through the routes of improving clarity of expectations and encouraging students to finish their dissertations as quickly as possible</td>
<td>Independent Variable: attrition rate &amp; graduation probability Dependent Variables: program characteristics (financial support, seminar requirement, summer study requirement, exam requirement, department culture, quality of advising, clear program expectations)</td>
<td></td>
</tr>
<tr>
<td>Ehrenberg, Zuckerman, Groen, Brucker - Ehrenberg &amp; Kuh, Eds., (2009)</td>
<td>Attrition, time-to-degree;</td>
<td>US institution</td>
<td>Graduate Education Initiative (GEI) project</td>
<td>Attrition rates, time-to-degree, # of publications, field of study, conflicting expectations, specialized courses, supervision, funding</td>
<td></td>
</tr>
<tr>
<td>Golde, Bueschel, Jones, Walker - Ehrenberg &amp; Kuh, Eds., (2009)</td>
<td>Attrition, program structure;</td>
<td>US institution</td>
<td>Student apprenticeships are important as is a healthy, vibrant community; together they create outstanding programs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nerad - Ehrenberg &amp; Kuh, Eds., (2009)</td>
<td>Effectiveness of programs;</td>
<td>US institution</td>
<td>Three national studies – focus on creating opportunities for students to become global citizens</td>
<td>Career goals, first job, last job, tenure status,</td>
<td></td>
</tr>
<tr>
<td>Ferrer de Valero (2001)</td>
<td>Time-to-degree, completion rates</td>
<td>Mixed – document analysis &amp; interviews; US institution</td>
<td>Shorter time-to-degree &amp; higher completion rates when there is more advising, mentor relationships, students treated as junior colleagues</td>
<td>Median time to degree Completion rate Department, numerous graduate study characteristics/factors (advisor change, financial support, peer support, student participation….)</td>
<td></td>
</tr>
<tr>
<td>Gardner (2009)</td>
<td>Attrition</td>
<td>Qualitative – interviews; US institution</td>
<td>Attribution theory</td>
<td>Students leave the program due to poor fit, personal and departmental issues No quantitative measurements</td>
<td></td>
</tr>
<tr>
<td>Golde (2005)</td>
<td>Attrition</td>
<td>Qualitative – content analysis, participant observation, student interviews; US institution</td>
<td>Students leave their program due to a mismatch between student &amp; discipline &amp; between student &amp; department; also isolation from department</td>
<td>Different disciplines; department structures</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Focus</td>
<td>Methods</td>
<td>Theory</td>
<td>Key Findings</td>
<td>Variables</td>
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<tr>
<td>Golde (2007)</td>
<td>Program structure</td>
<td>Qualitative: observation &amp; interviews; US institution</td>
<td></td>
<td>Students benefit by the inclusion of student seminars and clubs</td>
<td>No quantitative measurements</td>
</tr>
<tr>
<td>Herzig (2004)</td>
<td>Attrition</td>
<td>Meta-analysis; US institution</td>
<td></td>
<td>Students need a strong sense of belonging, previous grades &amp; standardized test scores do not predict persistence; confidence is important; moral support; mentors &amp; advising are important; isolation &amp; lack of social interaction is a deterrent; departmental structure &amp; supervision should be strong; financial support is important; support for part-time study &amp; flexible deadlines;</td>
<td>No quantitative measurements</td>
</tr>
<tr>
<td>Holley (2009A)</td>
<td>Interdisciplinary doctoral</td>
<td>Qualitative – interviews; US institution</td>
<td></td>
<td>Programs require collaboration among faculty and deliberate process to foster interdisciplinary integration and student learning; form a culture specific to a community</td>
<td>No quantitative measurements</td>
</tr>
<tr>
<td>Hoyle &amp; Torres (2008)</td>
<td>Preparation</td>
<td>Mixed - structured interviews</td>
<td></td>
<td>Faculty guidance, rich interactions with other students (for advice &amp; emotional support) are important</td>
<td>Independent Variable: school leadership preparation</td>
</tr>
<tr>
<td>Janson, Howard, Schoenberger-Orgad (2004)</td>
<td>Contribution to theory</td>
<td>Qualitative – content analysis &amp; informal conversations; New Zealand university</td>
<td>Communit y of Practice</td>
<td>Students should take ownership of the process of forming a community</td>
<td>No quantitative measurements</td>
</tr>
<tr>
<td>Kiley (2009)</td>
<td>Preparation</td>
<td>Mixed-surveys &amp; interviews; Australian institutions</td>
<td>Communit y of Practice</td>
<td>Faculty advisors felt that students should be encouraged to engage in the academic community</td>
<td>No quantitative measurements</td>
</tr>
<tr>
<td>Lechem (2007)</td>
<td>Preparation</td>
<td>Qualitative – ethnographic; Israeli university</td>
<td>Communit y of Practice</td>
<td>Formation of student Communities of Practice assists students’ to improve their conceptual capabilities</td>
<td>No quantitative measurements</td>
</tr>
<tr>
<td>Lott, Gardner &amp; Powers (2009)</td>
<td>Attrition</td>
<td>Quantitative – content analysis</td>
<td></td>
<td>Odds of attrition highest in the first year and also for females &amp; Asians; lower attrition for married students and those with higher GRE scores</td>
<td>Independent Variable; attrition rate</td>
</tr>
<tr>
<td>Lovitts (2001)</td>
<td>Attrition</td>
<td>Mixed – surveys &amp; interviews</td>
<td></td>
<td>Four primary reasons that students fail to integrate and thus leave the program: the lack of information regarding the nature of doctoral study &amp; how to navigate the system (“cognitive maps”), the absence of community, disappointment with the learning experience, and an unsatisfactory advisor relationship</td>
<td>Dependent variables: student individual characteristics (race, gender, marital status, citizenship, discipline, years in the program, GRE scores, age)</td>
</tr>
<tr>
<td>Study</td>
<td>Focus</td>
<td>Methods</td>
<td>Theory</td>
<td>Key Findings</td>
<td>Variables</td>
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</table>
| Most (2008) | Retention; degree completion | Quantitative - survey | | Average 30% completion rates over the 9 years; 10% higher for men; 11% higher for foreign students; Asian American students lagged behind all other groups (domestic students in general were 20% more likely to complete); students starting a program with a Master’s degree had higher completion rates | Independent Variable: Completion rate  
Dependent Variables: Field, gender, race, Master Degree before entry |
| Nettles & Millett (2006) | Preparation, degree completion, rate of completion | Quantitative – survey; US institutions | Engagement theory | Confirm much of what is already in the literature; reports on challenges of African American graduate students; advisers distinct from mentors | More than 800 variables: Field of study, race, gender; GRE scores; students’ elapsed time in their programs in relation to eight stages of progress; research productivity; stop-out rates, rate of progress |
| Newswander & Borrego (2009) | Interdisciplinary graduate programs | Qualitative-participant observation, interviews, focus groups; US institution | Engagement theory | Positive student experiences when program facilitate engagement | No quantitative measurements |
| Rovai (2002b) | Sense of community | Quantitative – online survey | | A significant relationship exists between classroom community and perceived cognitive learning | Independent Variable: Sense of community  
Dependent variable: cognitive learning in an online educational environment  
Gender, race |
| Shacham, Od-Cohen (2009) | Program structure | Mixed – surveys & interviews | Community of Practice | Students acknowledged the benefits of Communities of Practice including support beyond gaining their PhD; students agreed that learning in a group was superior to that of learning alone | No quantitative measurements |
| Spelt, Biemans, Tobi, Luning, Mulder (2009) | Interdisciplinary higher education | Meta-analysis | Biggs Teaching & Learning Theory | Scientific research into teaching & learning in interdisciplinary higher education has remained limited & explorative. | No quantitative measurements |
| Terrell, Snyder, Dringus (2009) | Attrition & program structure | Quantitative – online survey | Community of Practice | Connectedness was found to be an integral part of the dissertation experience | Student-student connectedness, Student-faculty connectedness |
| Trafford, Leshem (2009) | Preparation | Mixed-survey, discussions, content analysis | Threshold concept theories | Students who do not understand what is expected of them may have not had the specifics of the doctoral program effectively explained to them | No quantitative measurements |
| Ugrin, Odom, Pearson (2008) | Preparation | Mixed – survey & interviews | Social exchange theory | Strong social exchange between students and their advisors relate to positive outcomes for students in terms of productivity in their early years of employment | Independent Variable: LMX (quality of mentoring)  
Dependent variables: # of months to PhD completion, # of publication, Student gender, Student race |
Dependent variable: dissertation progress (subscales: cohort, mentoring, dissertation preparation) |
<table>
<thead>
<tr>
<th>Study</th>
<th>Focus</th>
<th>Methods</th>
<th>Theory</th>
<th>Key Findings</th>
<th>Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washburn (2002)</td>
<td>Attrition</td>
<td>Mixed – discussions &amp; surveys</td>
<td>A supportive community is paramount to completing doctoral degrees</td>
<td>No quantitative measurements</td>
<td></td>
</tr>
<tr>
<td>Wisker, Robinson, Shacham (2007)</td>
<td>Program structure</td>
<td>Qualitative – focus groups &amp; interviews</td>
<td>Communit y of Practice</td>
<td>Effective support for students and advisors through the incorporation of: student/advisor research projects, program workshops, compulsory research development workshops</td>
<td>No quantitative measurements</td>
</tr>
<tr>
<td>Zimitat (2007)</td>
<td>Student Learning</td>
<td>Qualitative – semi-structured interviews</td>
<td>Communit y of Practice</td>
<td>The WebCaseStudy software was effective in that it enhanced the simulation of a CoP</td>
<td>No quantitative measurements</td>
</tr>
</tbody>
</table>
Appendix K: Email to Student Survey Participants

Dear <Participant name>,

We are conducting a survey of doctoral students in our Information Science Ph.D. program at UA as part of a research project concerning building effective doctoral cohorts. The title of our study is “Building Effective Doctoral Cohorts in Information Science PhD Programs: Practical Techniques for Enhancing Third Year Retention in Program and Shortening Time to Degree”. We are interested in identifying practical techniques for enhancing 3rd year retention rates and shortening time to degree completion.

Your participation is completely voluntary and you can opt to end the survey at any time. You do not have to answer any question you'd rather not answer. We do not expect it to take more than 15-20 minutes to complete the questionnaire. By filling out the survey and submitting you are consenting to participate. Your responses will be kept confidential. No individual answer will be identified.

If you have any questions concerning your rights as a research participant that have not been answered by the investigators or if you wish to report any concerns about the study, you may contact the University at Albany Office of Regulatory Research Compliance at 518-442-9050 (toll free 800-365-9139) or orrc@uamail.albany.edu.

Your individual link to the survey is <link> You will have the ability to return to your survey at a later time should you desire, but please use this URL as it is uniquely tied to you. We recommend that you use Internet Explorer to complete the survey. There are known issues (e.g. the “Close Survey” button does not work) with Firefox.

Thank you so much.

Sincerely yours,

Lenore Horowitz, Jennifer Goodall, David Andersen, and Deborah Andersen
Appendix L: Email to Faculty Participants

Dear <Participant name>,

I am conducting a survey of faculty members in the Information Science Ph.D. program at UA between 2004 and 2008, as part of a dissertation research project concerning program experiences. The title of my study is “Exploring the Impact of Program Structure on Student and Faculty Scholarly Communities in Interdisciplinary Ph.D. Programs”. I am interested in exploring faculty sense of community and levels of connectedness.

Your participation is completely voluntary and you can opt to end the survey at any time. You do not have to answer any question you'd rather not answer. I do not expect it to take more than 15-20 minutes to complete the questionnaire. By filling out the survey and submitting you are consenting to participate. Your responses will be kept confidential. No individual answer will be identified.

If you have any questions concerning your rights as a research participant that have not been answered by myself or if you wish to report any concerns about the study, you may contact the University at Albany Office of Regulatory Research Compliance at 518-442-9050 (toll free 800-365-9139) or orrc@uamail.albany.edu.

Your individual link to the survey is <link>. For PC users I recommend that you do not use the Firefox browser to complete the survey as there are known issues (e.g. the “Close Survey” button does not work).

Thank you so much.

Sincerely yours,
Lenore Horowitz, Information Science Ph.D. Candidate
Appendix M: Student Survey Online Consent Form

Thank you for volunteering to participate in our research! Your responses are very important to us.

Your participation is completely voluntary and you can opt to end the survey at any time. You do not have to answer any question you'd rather not answer. By filling out the survey and submitting you are consenting to participate. Your responses will be kept confidential. No individual answer will be identified. You will have the ability to return to your survey at a later time should you desire, but please use this URL as it is uniquely tied to you.

The survey data will be matched with the data extracted from the student file using a unique code for each student. Only Jennifer Goodall will have access to the code sheet--kept separate from the student data. She will be the one to attach the surveys (removing student names after matching the data sources) to the data extracted from the student files. The analysis will be done using only the codes and not names of students. All unique information (that might identify students individually) will be removed from the data extraction sheets (e.g., if a unique country of origin might identify a student).

If you have any questions concerning your rights as a research participant that have not been answered by the investigators or if you wish to report any concerns about the study, you may contact the University at Albany Office of Regulatory Research Compliance at 518-442-9050 (toll free 800-365-9139) or orrc@uamail.albany.edu.

Once we have published our results we will be sure to notify you.

We do not expect it to take more than 15-20 minutes to complete the questionnaire. It is three pages in length (sections A, B, C) and a total of 48 questions. Section A is based on the Classroom Community Scale which attempts to measure a sense of community in a learning environment. Section B, based on the Doctoral Student Connectedness Scale, focuses on student-to-faculty connectedness in a learning environment. The final section is intended to gather experiences of students in this program.

Thank you in advance for your time!
David Andersen, Faculty Advisor (david.andersen@albany.edu)
Jennifer Goodall, Co-investigator (jgoodal@uamail.albany.edu)
Lenore Horowitz, Principal Investigator (ln266266@albany.edu)
Appendix N: Faculty Survey Online Consent Form

Thank you for volunteering to participate in my research! Your responses are very important to me.

I am conducting a survey of faculty members in our Information Science Ph.D. program at UA as part of a dissertation research project concerning program experiences. The title of my dissertation research study is “Exploring the Impact of Program Structure on Student and Faculty Scholarly Communities in Interdisciplinary Ph.D. Programs”. The purpose of this survey is to explore and measure faculty sense of community and levels of connectedness. Although you may not receive direct benefit from your participation, others may ultimately benefit from the knowledge obtained from this research.

Your participation is completely voluntary and you can opt to end the survey at any time. You do not have to answer any question you’d rather not answer. By filling out the survey and submitting you are consenting to participate. Your responses will be kept confidential. No individual answer will be identified. You will have the ability to return to your survey at a later time should you desire, but please use this URL as it is uniquely tied to you.

The survey data will be matched with the data extracted from Informatics Department documents. Only I will have access to the code sheet survey data. I will not identify you by name in any reports using information obtained from this survey, and your confidentiality as a participant in this study will remain secure. Subsequent uses of data will be subject to standard data use policies which protect the anonymity of individuals and institutions. Faculty, students and administrators from UAlbany will not have access to survey data. This precaution will prevent your individual responses from having any negative repercussions.

This project has been approved by the University at Albany Institutional Review Board. Approval of this project only signifies that the procedures adequately protect the rights and welfare of the participants. Please note that absolute confidentiality cannot be guaranteed due to the limited protections of Internet access. Please be sure to close your browser when finished so no one will be able to see what you have been doing.

If you have any questions concerning your rights as a research participant that have not been answered by myself or if you wish to report any concerns about the study, you may contact the University at Albany Office of Regulatory Research Compliance at 518-442-9050 (toll free 800-365-9139) or orrc@uamail.albany.edu.

I do not expect it to take more than 15-20 minutes to complete the questionnaire. It is three pages in length (sections A, B, C) and a total of 43 questions. Section A is based on the Classroom Community Scale which attempts to measure a sense of community in a learning environment. Section B, based on the Doctoral Student Connectedness Scale, focuses on faculty-to-student and faculty-faculty connectedness in a learning environment. The final section is intended to gather experiences of faculty members in this program.

Thank you in advance for your time!

Lenore Horowitz, INF Ph.D. Candidate & Principal Investigator
(email: lh266266@albany.edu; phone: 518-368-7506)

Deborah L. Andersen, Faculty Advisor (email: dla@albany.edu; phone: 518-442-5122)
Appendix O: Email to Student Interview Participants

Dear student name,

I am conducting interviews of past and present students in the Information Science Ph.D. program at UA who began the program between the years 2003 and 2007 as part of a dissertation research project concerning program experiences. The title of my study is “Exploring the Impact of Program Structure on Student and Faculty Scholarly Communities in Interdisciplinary Ph.D. Programs”. I am interested in exploring student sense of community and levels of connectedness.

Would you be interested and willing to participate in a phone interview? Your participation is completely voluntary and you can opt to end the interview at any time. You do not have to answer any question you’d rather not answer. I do not expect it to take more than 20 minutes to complete the interview. Your responses will be kept confidential. By responding yes to this email you are consenting to participate.

Should you agree to be interviewed, I will be in touch with you soon to arrange a convenient time to conduct the interview.

If you have any questions concerning your rights as a research participant that have not been answered by myself or if you wish to report any concerns about the study, you may contact the University at Albany Office of Regulatory Research Compliance at 518-442-9050 (toll free 800-365-9139) or orrc@uamail.albany.edu.

Thank you so much.

Sincerely yours,
Lenore Horowitz, Information Science Ph.D. Candidate
Appendix P: Email to Faculty Interview Participants

Dear faculty member name,

I am conducting interviews of past and present faculty members in the Information Science Ph.D. program at UA between the years 2004 and 2008 as part of a dissertation research project concerning program experiences. The title of my study is “Exploring the Impact of Program Structure on Student and Faculty Scholarly Communities in Interdisciplinary Ph.D. Programs”. I am interested in exploring faculty sense of community and levels of connectedness.

Would you be interested and willing to participate in a phone interview? Your participation is completely voluntary and you can opt to end the interview at any time. You do not have to answer any question you’d rather not answer. I do not expect it to take more than 20 minutes to complete the interview. Your responses will be kept confidential. By responding yes to this email you are consenting to participate.

Should you agree to be interviewed, I will be in touch with you soon to arrange a convenient time to conduct the interview.

If you have any questions concerning your rights as a research participant that have not been answered by myself or if you wish to report any concerns about the study, you may contact the University at Albany Office of Regulatory Research Compliance at 518-442-9050 (toll free 800-365-9139) or orrc@uamail.albany.edu.

Thank you so much.

Sincerely yours,

Lenore Horowitz, Information Science Ph.D. Candidate
Appendix Q: Consent for Participation in Interview Research

I volunteer to participate in a doctoral research project conducted by Lenore Horowitz. I understand that the project is designed to gather information about the Information science Ph.D. program at UAlbany. I will be one of approximately 10 people being interviewed for this research.

1. My participation in this project is voluntary. I understand that I will not be paid for my participation. I may withdraw and discontinue participation at any time without penalty. If I decline to participate or withdraw from the study, no one at UAlbany will be told.

2. I understand that most interviewees will find the discussion interesting and thought-provoking. If, however, I feel uncomfortable in any way during the interview session, I have the right to decline to answer any question or to end the interview.

3. Participation involves being interviewed by Lenore Horowitz, a doctoral candidate in the Informatics department. The interview will last approximately 20 minutes. Notes will be written during the interview. An audio tape of the interview and subsequent dialogue will be made. If I don’t want to be taped, I will not be able to participate in the study.

4. I understand that the researcher will not identify me by name in any reports using information obtained from this interview, and that my confidentiality as a participant in this study will remain secure. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions.

5. Faculty, students and administrators from UAlbany will neither be present at the interview nor have access to raw notes or transcripts. This precaution will prevent my individual comments from having any negative repercussions.

6. I understand that this research study has been reviewed and approved by the Institutional Review Board (IRB) for Studies Involving Human Subjects at the University at Albany. For research problems or questions regarding subjects, the Institutional Review Board may be contacted through University at Albany Office of Regulatory Research Compliance at 518-442-9050 (toll free 800-365-9139) or orrc@uamail.albany.edu.

7. I have read and understand the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study.

8. I have been given a copy of this consent form.

   My Signature Date ______________________________________________
   My Printed Name ________________________________________________
   Signature of the Investigator _____________________________________

For further information, please contact:
Lenore Horowitz, INF Ph.D. Candidate & Principal Investigator
(email: lh266266@albany.edu; phone: 518-368-7506)
Deborah L. Andersen, Faculty Advisor (email: dla@albany.edu; phone: 518-442-5122)