PROJECT MANAGEMENT IN HIGHER EDUCATION

by

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ABSTRACT

SHANNON ATKINSON ALPERT. Project management in higher education. (Under the direction of DR. RICHARD HARTSHORNE)

This study identified factors that influenced the use of project management in higher education research projects. Using a qualitative grounded theory approach that included in-depth interviews with assistant professors, the researcher examined how these individuals were using project management processes and tools and factors that enabled, motivated, and/or inhibited the use of project management processes and tools in research projects. A total of 22 participants (12 women, 10 men) from 21 different universities across 13 states took part in the study. Participants were selected based on specific inclusion criteria. All participants were assistant professors working in colleges of education or other education-related areas at doctoral-granting universities. Participants were currently working on funded research projects or had worked on funded research projects in the past two years. Focusing on participants in a single discipline (education) enabled a meaningful grounded theory to be developed from the data and has established a method for study and comparison with other disciplines in the future.

DEDICATION

For Scott and Grant

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CHAPTER 1: INTRODUCTION

The title of the classic career development book, *If You Don't Know Where You're Going*, *You'll Probably End Up Somewhere Else*, emphasizes the importance of having defined goals and plans in place to reach those goals (Campbell, 1974). Although this book deals with the topic of career development, its title has resonance for the field of project management. Defining goals and creating plans to attain those goals are key elements of the project management process. Project management provides a framework for completing a "...sequence of unique, complex, and connected activities [that has] one goal or purpose" (Wysocki, Beck, & Crane 2000, p. 65). The ability to apply appropriate processes and tools to meet the needs of individual projects is a critical success factor for projects and project managers.

Project management is becoming a required leadership and management skill in many businesses (Mengel, 2008; Leybourne, 2007). Defining the timeline and steps needed to complete a project, identifying stakeholders with the ability to help or hinder a project's progress, and uncovering and mitigating project risks are just a few of the benefits of using a project management approach. These benefits are evident in organizations that have embraced project management - engineering, construction, and information technology among others. In higher education, professors could realize these benefits for their research projects. By approaching research projects with a structured process and set of tools, professors may gain time-, resource-, and funding-efficiencies.

For example, universities may be able to save money on project managers who may be hired to manage large research projects. Studies regarding project management in higher education tend to focus on institution-wide efforts related to information technology or academic governance, but studies on the use of project management by professors in any context are scarce. Therefore, the purpose of this research was to investigate the project management practices of professors in order to identify factors that influence their use of project management. This study used a qualitative research design and a grounded theory approach.

The following sections in chapter 1 will address the need for project management research in the field of higher education and clarify the research problem and research questions. In addition, the methodology, limitations, delimitations, benefits, and definitions will be described. Finally, the researcher's subjectivity related to this research study will be discussed.

Overview

Since much of the research on project management involves investigating project practices across diverse businesses (construction, engineering, transportation, etc.), the term *business* will be used to reflect any of the non-education sectors defined by the North American Industry Classification System (Executive Office of the President & Office of Management and Budget, 2007). Following a discussion of the evolution of project management as a profession, brief descriptions of how project management is applied in business and higher education settings will be presented.

Project Management as a Profession

The concept of project management has existed for thousands of years. Consider what it takes to build a house or even an ancient city. Both efforts require careful planning, execution, and monitoring - three of the key processes involved in managing projects. The Project Management Institute defines a *project* as: "a temporary endeavor undertaken to create a unique product, service, or result" (2008, p. 5) and *project management* as: "the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements" (2008, p. 6). *Project managers* establish a vision for a project and lead the project team in realizing that vision. In fact, successful project managers "will complete all facets of their job, and so work themselves out of a job as quickly as possible" (Gaddis, 1991, pp. 30 -31).

Projects differ from the daily operations of most organizations in that they are typically temporary efforts designed to create unique results. Most projects follow a similar lifecycle that includes beginning, planning and organizing, executing, and concluding the work (Project Management Institute, 2008). To be successful, a project should meet its objectives within the constraints of scope, quality, schedule, budget, resources, and risk. Project managers are responsible for orchestrating all aspects of a project and for working within these constraints.

The profession of project management began to take shape in the early 1900s as a result of the work of Henri Fayol and Frederick Taylor - two classic organizational theorists. Fayol was the first to describe a comprehensive theory of management, including planning, organizing, commanding, coordinating, and controlling (Fayol, 1916/2005). Taylor's theory of scientific management stressed the best way to

accomplish a task (Taylor, 1916/2005). Taylor, Fayol, and others set the stage for the emergence of project management as a profession.

To be considered a profession, a field must require "advanced training and education... involving intellectual skills" (Neufeldt, 1988, p. 1074). A profession must also have "a body of knowledge that is replicable" (Ibbs & Kwak, 2000, p. 42). For project managers, this body of knowledge is maintained by the professional organization known as the Project Management Institute (PMI). PMI created the Project Management Body of Knowledge (PMBOK®) as a comprehensive reference guide for project management professionals (Project Management Institute, 2008). This guide forms the basis of the project management methodology and vocabulary that is used in many businesses today. The PMBOK® lists five key project management Process Groups: Initiate, Plan, Monitor and Control, Execute, and Close. These terms are defined in the Definitions section of this proposal. The terms used in higher education may be similar, though perhaps not identical to those used in business and defined by the PMBOK®. Therefore, these terms may serve as a point of comparison between higher education and business settings.

Thanks to the efforts of professional organizations like PMI and the International Project Management Association (IPMA), project management is now recognized worldwide, and project management standards continue to be documented. In addition to creating standards for project management practices, PMI also offers professional certification, accredits project management degree programs, and sponsors research. Project management information is disseminated in journals, articles, and books. Higher

education degree programs as well as professional and continuing education courses are available to support project managers working in a variety of industries.

Project Management in Business

Project management has been studied and found to be successful in a variety of business settings from construction (Clegg, Pitsis, Rura-Polley, & Marosszeky, 2002) to research and development (Engwall & Westling, 2004). Often, project management is studied by looking across business sectors to identify best practices and to measure project management adoption within an organization (Ibbs & Kwak, 2000; Kerzner, 2006; Pennypacker & Grant, 2003). Businesses may tout project results that include reduced cycle times or other productivity gains based on effective planning and risk mitigation (Eve, 2007). Some businesses are moving toward project management as the primary means of conducting internal business rather than as a separate activity performed only by project management professionals (Eve, 2007; Kerzner, 2006). By having a project management methodology, career paths, mentoring programs, formal training, and management support, businesses can attain maximum project management benefits such as increased profits and return on project investment.

Project Management in Higher Education

There is no shortage of project management opportunities for those working in higher education. Higher education administrators responsible for facility improvements and campus technology may use project management to accomplish their objectives. Campus-wide projects are often cited as benefitting from project management processes and tools. Specifically, higher education information technology (Tracey & Riha, 2009), process reengineering (Ahmad, Francis, & Zairi, 2007), and construction projects

(Gainsboro, 2006) have been studied. Although project management consulting firms routinely work with universities on information technology projects, those consultants rarely work with professors on research projects (K. Harmon, personal communication, September 15, 2009).

Increasingly, businesses and higher education institutions are forming partnerships with the intention of creating marketable products and services. This trend toward commercially-sponsored research is, in part, the result of a decline in federal and state funding for universities. This decline in funding has prompted some universities to seek new funding sources through business-higher education research collaboration, also known as *technology transfer*. Universities benefit from the funds provided by businesses and may use those funds to attract and retain the best graduate student researchers and faculty members or to make necessary infrastructure improvements to support these business-higher education collaboration efforts (Audet & Pegna, 2001; Reneault, Cope, Dix, & Hersey, 2008). Businesses may be able to obtain patent rights for products or services that result from the collaboration and could also exert their influence on the direction and/or timing of the research (Press & Washburn, 2000).

Despite the small number of empirical studies, there are plenty of opinions about project management in higher education. One professor suggested that the integration and adoption of project outcomes in higher education is more important to a project's success than the project methodology that is used (McCormick, 2006). This stands in contrast to a survey of over 100 university computing departments where the participants expressed the need for a common project management framework and additional training for project managers and team members (Wierschem & Johnston, 2005). These conflicting findings,

along with the potential benefits of using project management for research projects, and a significant gap in the literature, suggest a need for further study.

Statement of Purpose

For the purpose of this study, project management processes will be defined by the PMBOK®, and project management tools will be defined as any item (document, spreadsheet, calendar, etc...) that enables these project management processes. Professors manage a variety of projects including instructional and curriculum development projects, service projects, and research projects. However, it is not clear if professors use established project management processes or tools like those defined in the PMBOK® in any of these contexts. Although research grants and contracts require some level of project management, the focus is typically on front-end planning and periodic budget reporting (D. Bolick, personal communication, September 29, 2009). In addition, project management is not among the key leadership characteristics for academic department chairs (Bryman, 2007).

A recent survey of project management maturity in higher education revealed that project management could address the demands for greater efficiency, reduce reliance on public funding, and generate income through contract research and consulting (Bryde & Leighton, 2009). In addition, the study distinguished between having a *project-focus* (where work is typically seen as a series of projects) and a *project management-focus* (where the tools and methods of project management are employed). This is an important distinction as professors may have a project-focus, but may not have a project management-focus.

The purpose of this research is to identify factors that influence the use of project management in higher education research projects by investigating the project management practices of professors. Using a grounded theory approach, the researcher examined factors that enable, motivate, and/or inhibit professors' use of standard project management processes and tools in research projects as well as how these individuals are using project management processes and tools in their research projects. The study focused on knowledge and use of standard project management processes and tools as defined by the PMBOK®.

<div align="center">Problem Statement and Research Questions</div>

Published studies regarding project management in higher education focus on information technology, process reengineering, and construction. There are few studies documenting the use of project management by professors for research or other projects (Bryde & Leighton, 2009). Results from a previous pilot of this research suggest that scholarly research should be the focus of this investigation. By limiting the scope of this research to scholarly research projects, the researcher will be able to gather rich data on the topic of research projects that will provide input into a grounded theory. Thus, the following research questions will contribute to closing this gap in the literature.

1. What project management processes and tools, if any, do professors use to manage research projects?

2. How do professors use project management processes and tools in research projects?

3. What factors enable and motivate professors' use of project management processes and tools in research projects?

4. What factors inhibit professors' use of project management processes and tools in research projects?

Methodology

The methodology that was used for this qualitative study is grounded theory. In this approach, the researcher attempts to form a theory that describes the data set, one that is specific to the participants and context (Ezzy, 2002). The culture of higher education was the context in which professors' use of project management was explored. In order to form a grounded theory, the researcher used an inductive process to uncover existing data and meanings. In-depth interviewing is common in grounded theory research because it encourages reflection, discussion, and clarification of the topic under investigation (Glesne, 2006; Ezzy, 2002). In this study, the use of in-depth interviews encouraged participants, as well as the researcher, to reflect, discuss, and clarify views on project management processes and tools.

Limitations and Delimitations

The primary limitation of this study was the sampling strategy (purposive and convenience sampling), which may limit broad generalizability. However, this was not a significant issue given that the research design (qualitative, grounded theory) is less concerned with generalizability to broad audiences than with finding similarities across participants and contexts to form a grounded theory. To ensure that the sampling strategy enabled a grounded theory to emerge from the data, theoretical sampling was used. This strategy is further described in chapter 3.

Exploration of project management in higher education research projects was the key delimitation. Research projects align to the standard definition of a project. Therefore, they were the focus of this investigation.

Benefits

The results of this research will lead to increased awareness of factors that influence project management use and the related benefits to higher education research. By uncovering these factors, this research may contribute to establishing the foundation for a project management model that is sensitive to the needs of professors managing research projects. This research may also have implications for continuing education to address the needs of professors who manage their own research projects and mentor student researchers. Using project management processes and tools results in a greater likelihood of project success through the efficient use of resources and the management of issues and risks (Project Management Institute, 2008). Professors who use project management processes and tools could reduce the time it takes to conduct and publish research thereby increasing their scholarly contributions within or across disciplines and ensuring that project outcomes are shared with researchers and practitioners. Ultimately, successful research projects can lead to the transformation of educational practices.

Definitions

Unless otherwise noted, all definitions will be based on the Project Management Institute (PMI) Project Management Body of Knowledge (PMBOK®) since this document is considered to be the global standard for project management professionals. Definitions from PMBOK® that may be used in this study include the project management Process Groups as defined below.

- Project Management Process Groups: For each project, the following processes are typically completed in the order outlined below. Each process is dependent upon the next and may be repeated for subsequent phases of a project. Examples of a hypothetical project (building a house) are included as well.

  o Initiate: Defining and securing approval for a new project. The initiation process may include developing a project charter and identifying stakeholders.

    ▪ Example: Initiating the project of building a house might include selecting the location, style, and approximate size of the house (project charter) as well as identifying the builder and the type of craftspeople who may be involved (stakeholder identification).

  o Plan: Establishing the scope, objectives, and project plan. For instance, defining project requirements and identifying costs and risks would be part of the planning process.

    ▪ Example: Planning would include the creation of architectural blueprints (scope and objectives) and estimation of the tasks, dependencies, and timeline for completing the house (project plan).

  o Execute: Completing the work as defined in the project plan. This may include securing necessary project resources and ensuring that the work is completed according to project requirements.

    ▪ Example: Hiring craftspeople (resources) and building the house according to the blueprint (project requirements) would be considered part of the *execute* process group.

- o Monitor and Control: Tracking, reviewing, and regulating project progress and changes in scope, objectives, and/or project plan. For example, project scope and risks must be monitored and controlled.
    - ▪ Example: Reviewing the progress of the house through informal or formal physical inspections would be one way to monitor and control the building effort.
- o Close: Finalizing and closing the project. Closing the project may include documenting lessons learned from the project experience.
    - ▪ Example: Conducting a final walk-through of the house and determining if any changes are needed prior to occupancy would be two ways to close the building project.

Subjectivity Statement

All researchers must face their subjectivity. However, qualitative researchers must deal explicitly with their subjectivity based on the interactions and relationships that typically result from qualitative inquiry. It is important to describe my views on the nature of knowledge and research paradigms as it relates to this study.

For 15 years, I worked as a project manager in a variety of learning organizations within two large, global companies. Both companies valued project management and project managers, and I was considered to be a highly successful project manager based on the results of my projects and my ability to effectively lead project teams and influence others. I have been responsible for managing projects with budgets ranging from a few thousand dollars to more than $2 million. The project teams I have led varied in size from 5 to 20 or more people. I have had direct management responsibility for

teams as small as 3 people and as large as 22 people. During my career, I designed, enhanced, and implemented project management process and tools while also working within a number of existing project management processes and tools. In addition, I have been responsible for mentoring other project managers. I have obtained my Project Management Professional (PMP) certification through PMI. I approach many aspects of my personal, professional, and academic life with a project management perspective, and I find project management to be a very natural and effective means of accomplishing goals.

I strongly believe that project management skills are important for professors, particularly in doctoral-granting programs where many future researchers begin their careers. Professors have the ability to influence the project management practices of students. Many of these students will become professors with responsibility for their own research agenda and research projects.

During the pilot study of this research, I found that my participants did use project management processes and tools, though the language they chose to describe those processes and tools differed from what is commonly used in the field of project management as referenced in the PMI PMBOK®. (Some of these language differences are discussed in chapter 3.) After further reflection on the pilot findings, I believe that professors may regard the use of formal project management processes and tools as a barrier to their scholarly research and an impediment to the autonomous nature of most academic work. Still, my opinion is that professors are using project management in some fashion, and my goal is to discover how they use it, what benefits they derive, and whether or not a specific model of project management is necessary for higher education.

Epistemologically, I believe that knowledge is constantly being created, yet it is possible to find objective truth within a given context. I value the scientific method while also believing that some knowledge is situated in a given context and may vary accordingly. I recognize and appreciate the benefits and limitations of both quantitative and qualitative inquiry.

Summary

Project management processes and tools can be used to bring structure and efficiency to academic research efforts from proposal through publication. Outcomes from this study will create an awareness of factors that influence project management use and the corresponding benefits to higher education research and will have implications for future project management courses and continuing education for professors. The following chapters describe the relevant literature, methodology, results, and implications of this study.

CHAPTER 2: LITERATURE REVIEW

This study will identify factors that influence the use of project management in

higher education research projects by investigating the reported practices of professors. In

business and higher education contexts, projects can be used to further the vision and

mission of an organization. Projects may be used to implement process improvements,

manage change efforts, and increase productivity and/or revenue. In some cases, projects

may be used to improve the efficiency of the support and operations areas (i.e., human

resources, facilities) necessary for the organization to conduct its business. In higher

education, research projects may be used to study a problem, contribute to the growing

body of knowledge, and create evidence-based practices. While scholarly research

projects may appear to be distinctly different from projects in a business context, all

projects have unique goals and requirements, and all projects, regardless of size, can

benefit from using the body of knowledge that has been gathered, analyzed, and

documented in publications like the PMI PMBOK®.

Overview

This literature review is organized to facilitate an understanding of current project

management research and trends in business and higher education and to demonstrate

possible connections to scholarly research projects. The discipline of project management

and its supporting body of research continue to evolve. Therefore, the literature review

will begin with reflections on the current state of project management research. In a variety of business and higher education contexts, this information provides a foundational understanding of what is known and what is lacking in the literature. In addition, the literature review includes a discussion of the issues where project management research in business and higher education interconnect. In particular, the issues surrounding project management maturity, business-higher education partnerships, and training are discussed.

Project Management Research

From a theoretical perspective, project management evolved from general systems theory where individual components work collectively to produce a result (Kerzner, 2003). In project management terns, the project (system) takes into account how individual tasks (components) contribute to managing and solving problems in order to achieve project goals. The theoretical basis for project management continues to evolve. For instance, some argue that project management research has focused too intently on practitioners (e.g., project managers, sponsors, teams) without enough of a theoretical basis (Leybourne, 2007). The social and behavioral aspects of project management are now being more fully investigated, and this is where the application of existing or new theories may be most appropriate.

An exhaustive meta-analysis of project management research (3,554 sources) reviewed works from 1960 – 1999 and uncovered key trends and future predictions (Kloppenborg & Opfer, 2002). Although project management research in the 1960s made up only 1% of the study's sources, research increased in the 1970s to 7%. Software automation and cost- and schedule-control were among the most researched topics in the

1970s. Research in the 1980s focused on risk management and earned value management. In the 1990s, project management research expanded to include leadership, interpersonal, and team-building studies. Kloppenborg and Opfer offered several predictions as well as recommendations for future research, including increases in standardized processes, tools, terminology, risk management practices, project management training/certification, and stakeholder communications. With the release of the PMBOK® guides in 2000 and again in 2008, many of these predictions are becoming reality. As it relates to project management in higher education, the authors recommended that more universities establish project management degrees and benchmarking methods for degree programs. Since project management is a relatively new discipline and one that continues to evolve, benchmarking has been used to measure organizations' project management maturity as well as individuals' project management performance.

In a study involving 860 project managers, the top 2% of project managers were isolated and labeled as *alpha* project managers based on survey ratings from their managers and stakeholders (Crowe, 2006). Although the participants were chosen through non-random sampling, the 18 alphas that were selected for in-depth interviews provided significant insight into project management in a variety of business contexts. Crowe found that the alphas shared eight key characteristics - attitude and belief, focus and prioritization, communication, approach, relationship and conflict, alignment, issue management, and leadership. These characteristics are described in Table 1.

Table 1: *Alpha Project Manager Characteristics*

Characteristic	Description
Attitude and belief	Alphas found their jobs to be satisfying at twice the rate of non-alphas, and they described the importance of having career paths and decision-making authority for the projects they led. In general, alphas were optimistic and saw themselves as leaders.
Focus and prioritization	Being able to sort through an almost continuous stream of information and determine the most important data while also prioritizing activities were two of the traits that set alphas apart from non-alphas. Despite attending fewer meetings and responding to a smaller number of e-mails, alphas were seen as being responsive in the eyes of project team members and stakeholders.
Communication	Alphas shared several traits that made them effective communicators. They took time to understand the communication needs of stakeholders, and they created and adhered to a communication schedule that included concise messages and open and frequent dialogue.

Table 1: *Alpha Project Manager Characteristics* (continued)

Characteristic	Description
Approach	How alphas approached a project was significantly different from non-alphas in two ways. First, by spending more time in project planning activities than non-alphas, the alpha project managers spent less time in execution activities. Second, alphas also believed that having subject-matter expertise is important to a project's success.
Relationship and conflict	Alphas built relationships using formal and informal networks, and they addressed conflict quickly and effectively by de-personalizing the issue and focusing on resolution.
Alignment	Ensuring alignment among the project team, project manager, and project and organizational goals is a key challenge for project managers. Alphas managed this balance by communicating to various levels of the organization about how the project can support organizational and personal goals.
Issue management	Alphas know how to identify, document, escalate, resolve, and prevent project issues.
Leadership	Being recognized as a leader by project teams and stakeholders alike was a key alpha trait. Adapting leadership styles to address different situations was one of the ways alphas demonstrated their leadership.

Crowe's study focused on professional project managers, those who make their living managing projects; however, the traits described can apply to almost any project situation. Full-time or even occasional project managers who emulate these traits will be more likely to meet project objectives and to do so in a way that respects and involves stakeholders in the process. The extent to which professors possess these alpha traits will determine, in part, how effectively they apply project management processes and tools to research efforts and how likely it is that they will achieve the same results as the alphas cited in Crowe's study. In addition to Crowe's characteristics, the Project Management Institute PMBOK® lists eight interpersonal skills important for project managers: leadership, team-building, motivation, communication, influencing, decision-making, political and cultural awareness, and negotiation (Project Management Institute, 2008).

Project Management in Business Settings

Selecting the right project management tools, involving stakeholders, and being mindful of best practices can make the difference between a project that is successful and one that fails. Rigid adherence to project management processes or tools can hamper the kind of creative and breakthrough thinking that leads to important discoveries in business and in higher education research. Project managers must select the most appropriate processes and tools based on the projects' goals. A four-year study of a research and development project within a telecommunications company revealed that the appropriate application of project management processes and tools was effective in helping the project team to reach their goals (Engwall & Westling, 2004). Using a grounded theory approach, the authors gathered data from interviews, documents, and field observations to describe how the project team evolved to reach a shared understanding of the project

goals. The moment the team reached this understanding signified a critical point in the

project's lifecycle - one that the authors refer to as peripety (a sudden change). By

clarifying the project organization, stakeholders, language, and problem-solving tools, the

project team was able to create a vision for the project and meet the project objectives.

In addition to the appropriate application of project management processes and

tools, the cultural context in which projects occur, particularly how stakeholders are

involved is another factor in determining project success. For instance, an ethnographic

case study involving a large construction project for the 2000 Olympic Games in Sydney,

Australia, uncovered dissatisfaction on the part of community stakeholders who were not

involved in the project until just before its implementation (Clegg, Pitsis, Rura-Polley, &

Marosszeky, 2002). The community raised concerns that caused issues for the entire

project team. Despite the fact that the project team had built a strong project culture and

goal-orientation, stakeholders were not identified or engaged early enough to prevent

issues from impacting the project. In business and higher education alike, stakeholder

involvement can bolster or hinder a project's progress.

Another factor that influences the success of a project is organizational learning -

the organization's ability to capture and disseminate knowledge (Cook & Yanow, 1993).

Organizations that value project management knowledge-sharing encourage project

managers to learn from each other. It takes a concerted effort to ensure that knowledge-

sharing is an accepted and expected part of an organization's culture. Despite

acknowledging the importance of sharing best practices and lessons learned, a case study

of project managers at a small European media company revealed that organizational

factors influenced project management knowledge-sharing efforts (Eskerod & Skriver,

2007). Over a period of six months, the researchers studied project managers and a

project chief (lead project manager) through semi-structured interviews and focus groups.

The project chief implemented several actions designed to increase knowledge transfer,

including a new organizational structure, co-location of project managers in a single

office space, and opportunities to share and hear best practices. As a result of co-location,

communication increased, but actual knowledge transfer did not. Likewise, the other

actions did not result in increased knowledge transfer because project managers felt a

strong sense of ownership over their projects and preferred working autonomously rather

than truly collaborating. In many universities, there is a similar autonomous structure.

Professors are responsible for their own research agendas and may have few incentives to

work together or share best practices related to how they manage research projects.

<div align="center">Project Management in Higher Education Settings</div>

When applied effectively in a business context, project management may result in

improved process cycle times, reduced rework, and increased revenue (Kerzner, 2003).

Although the terms *process cycle times*, *rework*, and *revenue* may be widely-used in

business, it is unlikely that these specific terms would be used to describe the benefits of

project management in higher education. Throughout the course of this study, particular

attention was paid to the language that was used to describe the benefits and other aspects

of project management in higher education. It is possible that differences in the language

used to describe project management in business and higher education may influence

professors' use of project management processes and tools. To begin to understand these

differences, the following section will address project management in higher education

settings.

In a 2009 study, professors and academic administrators were interviewed regarding the concept of distributed leadership in project teams (van Ameijde, Nelson, Billsberry, & van Meurs, 2009). Participants shared insights into successful and unsuccessful projects at a UK university. The resulting model of distributed leadership contained several concepts important for successful projects and project management in higher education. For example, at the project team level, there must be clear roles and responsibilities as well as well-defined, shared goals. These are some of the hallmarks of effective project management. Although this study dealt with project leadership topics, the majority of the literature on higher education projects and project management has focused on information technology, process reengineering, and construction.

Information Technology

Some colleges have found that moving away from the traditional higher education committee structure has allowed them to successfully implement projects with small, empowered teams of key stakeholders. For example, Oklahoma City Community College (OCCC) has been successful in funding and completing key campus information technology projects by using rapid prototyping, involving end-users, and maintaining flexibility in the use of project management methods and tools (Tracey & Riha, 2009). This example demonstrates how information technology projects can be successfully managed and integrated in a higher education setting.

Another example of an information technology project situated in higher education involved a university-wide enterprise resource planning (ERP) project at a UK university. The study allowed researchers to identify several cultural issues related to project management in higher education (Fowler & Gilfillan, 2003). Researchers

observed the project management process and project team dynamics among university

administrators and systems vendors. University administrators were not familiar with the

project management process and often resisted the fast pace of decision-making

necessary to implement the system. One result of the study was a project management

model for implementing systems projects in academic settings. While much can be drawn

from this study in terms of a possible project management model suitable for higher

education, the study does not speak to the project management practices of professors

managing their own research projects.

A 2005 survey of project managers across 101 university information technology

departments in the United States focused on six key areas - project prioritization, project

sponsorship, project managers, formal project management tools, project management

drivers, and project management software (Wierschem and Johnston, 2005). Two key

findings emerged. First, project management was considered a planning tool by most

respondents. There was little to no mention of any project monitoring or control

activities. Second, respondents suggested that there was a need for a common project

management framework and additional training for project managers and team members.

Both of these findings are consistent with pilot research results (discussed in chapter 3),

so these have continued to be areas of inquiry for this study of professors' use of project

management processes and tools.

Process Reengineering

In higher education, process reengineering could include any effort to improve or

implement processes related to academic governance, accreditation (Cann, 2008), or even

degree completion (Pinis, 2007). Project management is an important component of

process reengineering. In a cross-case comparison of three private universities, project management was listed as a success factor in managing the process reengineering projects by insuring stakeholder engagement, and financial-, task-, and resource-management (Ahmad, Francis, & Zairi, 2007). In addition, issues reporting, team building, and critical path modeling were also cited as significant contributions of using a project management approach. These components of project management are also important for professors to be successful in managing their research projects.

Construction

Effective project management often requires additional planning time and the involvement of various stakeholders. Investing this time early in construction projects pays dividends in the form of competitive pricing and a reduced likelihood of expensive changes during construction. According to one source, campus-wide construction projects should follow three main phases of project startup necessary for success in higher education settings (Gainsboro, 2006). Gainsboro's startup methodology phases can be aligned to the PMBOK® Process Groups as follows. (The applicable PMBOK® Process Group is listed in parentheses.)

- Defining the project and the desired results (Initiate, Plan)

- Building the project team (Execute, Monitor and Control)

- Selecting consultants (Execute, Monitor and Control)

Even though professors who manage research efforts are not usually dealing with project management on the same scale as campus-wide construction, it is still important to plan the project in a disciplined way. Thoughtful planning helps to avoid assumptions that may go unchecked. Assumptions related to the roles and responsibilities of project

participants, identification of risks and constraints, and project monitoring can impact the success of a project.

<div align="center">Project Management in Higher Education Research</div>

Graduate research has begun to address project management in higher education. One key finding from exploratory research into the project management practices of academic researchers in Ireland was that the use of project management increased the quantity as well as quality of research (Dowling, 2010). Most studies, however, do not address professors' use of project management in research projects. For instance, topics related to project managers' career development (Carden, 2007) and emotional intelligence (Gasiorowska, 2007) have been studied. In addition, project management best practices have also formed the subject of dissertation research (Gonzalez, 2008; Groman, 2007). Recent studies on the topic of higher education research have focused on issues surrounding the accessibility of internal university resources and external research funding. The tenure process is also closely linked to these issues. Still, the role that project management plays in scholarly research has not been the subject of extensive study.

Resources for Research

A case study approach was used to investigate the concept of resource allocation and performance-based funding in higher education research (Liefner, 2003). Professors and administrators from six different universities, representing four countries participated in the study. A key finding was that performance-based resource allocation (in the form of research project funds) was found to encourage applied rather than basic research. Liefner's findings suggest that this focus on producing applied research could lead to a

higher quantity of research with lower quality depending on how performance measures are defined. Therefore, professors who manage large numbers of research projects for the sake of meeting performance measures may have less time to plan and manage the timelines, resources, and risks inherent in those projects. Professors who are seeking tenure may experience increased pressure to secure external research funds and to publish in peer-reviewed journals. In a 2008 study, new professors reported that they did not have adequate support to meet research and publication expectations, and some felt certain they would soon lose their positions due to lack of publication (Archer, 2008). This study underscores the critical importance of research for professors' long-term success. Using project management processes and tools in scholarly research efforts may result in efficiencies that support professors' research and publication goals.

Funding is often necessary for professors to conduct research. In a study of the factors associated with securing external research funding (outside the university), the author found that professors who were able to obtain external research funding also had basic support funding referred to as enabling or sustaining funding, had diverse funding opportunities (government, industry, etc...), and had a strong track record of success (Laudel, 2006). While factors associated with the quality of the researcher and the proposal play a role in securing funding, there are other factors not associated with quality. These include incentives and time to complete proposals, an understanding of the rules of the funding "game," the selection of a pre-determined topic, and the availability of funds. Professors may experience a vicious circle of academic research and funding where more funding results in a better reputation and increased future funding, and this circle may have the most impact new professors seeking tenure. The opposite may also

be true - little to no funding results in a limited reputation and decreased future funding. Laudel refers to the concept of the same researchers obtaining more and more of the research funding as being like the rich getting richer, also known as the Matthew Effect. Effective project management may influence the quality of proposals and subsequent research as well as the ability of professors to secure necessary funding.

Tenure and Research

New professors in many doctoral-granting universities are expected to create a self-sustaining research agenda, teach courses, and provide service to the university community (Goldsmith, Komlos, & Gold, 2001). While the tenure process includes a review of all three areas, new professors may find the research aspect of their role to be the most challenging and time-consuming (Higgs, Graham, & Mattei, 2006). According to a study of 1,365 science and engineering professors at top research universities, on average, non-tenured professors spent more time on research and proposal-writing activities than tenured professors (Link, 2008). The study found that, on a weekly basis, non-tenured professors spent 4.05 hours more on research and 2.37 hours more on proposal-writing than their tenured counterparts. Non-tenured professors spent almost 30 hours on research and proposal-writing each week. Establishing an effective research agenda takes a great deal of time and includes not only research, writing, and publication, but also networking with funding agencies as well as professors at other universities (Higgs, Graham, & Mattei, 2006; White & Meenderling, 2008). It is not enough to simply submit proposals and papers. New professors are advised that: "Being timely, accurate, and thorough will give you a 'good name' in your research specialty, and establish you as a scholar" (Higgs, Graham, & Mattei, 2006, p. 136). Using a project

management approach can provide the structure necessary to meet the criteria of *timely*, *accurate*, and *thorough* research. In addition, the use of project management processes and tools can enable new professors to successfully manage the research projects that are critical to the research agenda and the tenure process. Project management processes and tools, particularly task identification and prioritization, can also assist new professors in organizing their overall workload of teaching, research, and service responsibilities (White & Meenderling, 2008).

<div align="center">Research Mentoring</div>

According to one scholar, there was a time when faculty members were divided into two groups - those who conducted research and those who did not (Malachowski, 2006). However, there are now two different groups emerging - faculty who involve students in research and those who do not. In Malachowski's experience, professors who involve students in research tend to be more collaborative and more concerned with the impact of research on student learning. Professors play a leadership role in shaping future researchers (Whiteside et al., 2007). Some of the benefits of involving students in research projects include increased retention, pursuit of graduate school, cognitive gains, and enhanced research skills (Prince, Felder, & Brent, 2007). Many studies have measured the impact of student research experiences, and the role of the research mentor (often a professor or graduate student) is significant in shaping these experiences (Falconer & Holcomb, 2008; Tan, 2007; Kardash, 2000; Nagda, Gregerman, Jonides, von Hippel, & Lerner, 1998). How professors use project management processes and tools to manage research projects will influence the way future research is conducted.

Intersections Between Business and Higher Education Project Management

There are three points where the project management literature demonstrated that business and higher education intersect – project management maturity, technology transfer, and project management training. Project management maturity refers to the sophistication with which an organization applies project management processes and tools. Technology transfer involves universities and businesses working together to create commercially-relevant products and services. Project management training may also include business-higher education partnerships that build project managers' skills.

Project Management Maturity

Reaching a certain level of project management maturity is a goal for some organizations. To be considered *mature*, an organization must demonstrate its support for the discipline of project management through processes, tools, training, and other behaviors (Kerzner, 2006). Studies of project management maturity have taken place in business and higher education settings alike. Typically, an organization will rate its level of maturity based on a standard model like the PMI Project Management Maturity Model (OPM3®) or other benchmark data.

Faculty and staff involved in project work at a UK university were surveyed regarding project management maturity (Bryde & Leighton, 2009). The authors were able to draw conclusions about the influence of project management on new teaching methods and scholarly research by comparing the results with those from existing literature on project management maturity in other industries. The results of the survey indicated that the university needed to increase project management maturity in a systematic way. Two issues appeared to be driving the low project management maturity rating: lack of support

from educational leaders and lack of project infrastructure (organization structure, continuing education, etc). As it relates to the topic of professors' project management practices, the authors commented that some funding agencies require robust project management, and this can be problematic for professors who may be unfamiliar with project management tools and methods. The authors recommended future research to determine if certain academic disciplines like engineering and construction are more mature in their project management practices since project management is prevalent in these business sectors.

Researchers have also studied project management maturity by asking participants to gauge their organization's maturity level. In one study, participants from 38 large, multi-national companies representing industries such as engineering and construction, telecommunications, information systems, and manufacturing scored their organization's project management maturity an average of 3.26 on a scale of 1 - 5, with 5 being most mature (Ibbs & Kwak, 2000). Yet, another study indicated that 67% of participants from a variety of business sectors scored their organization's project management maturity at a level 1 on a scale of 1 - 5, with 5 being most mature (Pennypacker & Grant, 2003). These different results may indicate that measuring the maturity level of an ever-evolving discipline like project management could be problematic. Nonetheless, project management maturity continues to be a topic of inquiry in project management literature (Jugdev, Mathur, & Fung, 2007).

Businesses that are more mature in their project management processes and tools tend to have established a means of training project managers, project teams, and other stakeholders. The implementation of training programs may signify that the business sees

project management as an important function that is to be cultivated and sustained (Kerzner, 2006).

Technology Transfer and Commercialization

The traditional culture in higher education values the autonomous nature of professors who are encouraged to establish a unique research agenda. While professors manage projects as part of their research, teaching, and service responsibilities, higher education is generally not viewed as being project-driven. A significant exception to this is in the area of technology transfer. Technology transfer is the term used to describe how business-higher education partnerships are managed. Technology transfer often results in research that may receive a license and/or patent leading to a commercially-viable product. In order to increase efficiencies associated with the commercialization of scholarly research, a project management approach should be used (Kerzner, 2006).

Business-higher education collaboration (also called university-industry partnerships) plays a role in how research projects are managed and how project management is taught. As universities establish guidelines for managing technology transfer ("University Fosters," 2010), professors are voicing concerns about traditional academic values and possible conflicts of interest (Press & Washburn, 2000). As globalization impacts universities and research funds become more competitive, professors may seek funds from businesses that could influence the nature of academic research (Stilwell, 2003). Business-higher education partnerships are challenging the traditional role (and even the tax-exempt status) of universities. As a result, commercially-oriented research may become the focus of the research agenda, and other

less commercially-oriented areas may suffer as funding is diverted to more lucrative areas

of research (Press & Washburn, 2000).

Having a similar organizational culture (or one that acknowledges cultural

differences), creating a shared understanding of the project timeframe and goals, and

sharing a common working style are three of the factors that influence the success of

business-higher education partnerships (Thune, 2009; Thompson & Homer, 2005). In this

context, using similar project processes and tools would likely create harmony and

strengthen the partnership. The use of dissimilar processes and tools could cause friction.

Some scholars have recommended changes in the way business-higher education

collaboration is measured. Consider the following recommendations from Reneault,

Cope, Dix, and Hersey (2008).

- Broaden tenure considerations to include entrepreneurial activities.

- Create standard business-higher education contracts.

- Revise royalty structures.

- Implement new measures of success in collaboration with business sectors,

   particularly in support of regional economic development.

In addition to technology transfer between professors/administrators and

businesses, technology transfer can also occur between student groups and businesses.

For instance, mechanical engineering and commerce students at Concordia University in

Montreal, Canada, collaborated with a high tech business with the goal of creating a new

product (Audet & Pegna, 2001). Students kept a field journal, completed questionnaires,

and took part in informal discussions about the project. While the students reported

generally positive experiences, communication and collaboration among the student

groups were identified as the main concerns for this type of technology transfer partnership.

Project Management Training

Another intersection of business and higher education involves project management training. Project management training is offered by colleges and other organizations in order to prepare future project managers for roles in a variety of organizations. In some cases, courses in project management are designed as part of a business-higher education partnership. For instance, the University of Manchester collaborated with four businesses to develop a successful project management course and to measure its return on investment (Alam, Gale, Brown, & Kidd, 2008). Empirical studies on the topic of teaching project management deal mainly with the content of courses designed for business in the form of professional development or pre-employment preparation. Absent from these studies is any mention of how professors become equipped to teach project management or how professors apply project management to manage research projects.

<div align="center">Summary</div>

Project management research has steadily increased since the 1960s as the discipline has continued to evolve. The emergence of standard processes and tools is evident in the literature and predicted to continue. Since project management research and application is focused mainly in business settings, the literature reviewed provides a foundation for investigating professors' project management practices. Connections between project management research in business and higher education can be seen in the research on project management maturity, technology transfer, and training.

This review of literature supports the use of a standard body of project management knowledge (PMBOK®) as context for studying professors' use of project management. In addition, the literature reveals key characteristics of the most successful project managers (Crowe, 2006). These characteristics were reflected upon during data analysis. A summary of the four studies that are the most relevant to this research is included in Table 2.

Table 2: *Key Studies*

Authors	Methods	Outcomes
Fowler & Gilfillan (2003)	Qualitative (case study)	Model for implementing information technology projects in higher education
Crowe (2006)	Mixed (survey, interviews)	Eight characteristics of successful project managers (*alphas*)
Thune (2009)	Qualitative (interviews)	Key success factors for business-higher education partnerships
van Ameijde, Nelson, Billsberry, & van Meurs (2009)	Qualitative (interviews)	Model of distributed leadership in higher education projects

Although there are no studies that directly address the project management practices of professors, this review of literature provides a framework for understanding project management and its place in higher education today. Chapter 3 describes the

methodology of this study, including pilot study findings, research design, participants

and setting, data collection and analysis, and risks associated with this research.

CHAPTER 3: METHOD

The purpose of this study is to identify factors that influence professors' use of

project management in research projects. Based on a review of the literature, there are no

published studies on this specific topic. The following sections will describe the pilot

study findings, research design, participants and setting, data collection and analysis, and

risks associated with this research.

Pilot Study

A small-scale pilot study of this research was conducted in spring 2009 with two

participants. Pilot data was collected through semi-structured interviews. In addition, the

researcher maintained a field journal and conducted peer review and member-checking

activities. As a result of this pilot, modifications were made to the research questions, and

several aspects of the methodology have been improved. Although this study differs from

the pilot, the pilot results provided insight into this research. For example, both pilot

participants reported gaining new insights into their own experiences through the

research process. The pilot findings demonstrated that, while project management is used

in higher education research projects, professors may use different terminology from the

PMBOK® standards to describe their project management experiences. For instance, a

project manager may be referred to as a *project director*. Other differences can be seen in

the PMBOK® Process Groups and have been summarized below.

- Initiate: Participants commented that this may be done formally as a professor decides to move forward with his or her research agenda - whether funded or not. If a project is funded, approval or receipt of funding would initiate the project. The tenure process may provide some structure for new faculty in that they may seek approval/input from the department chair or a mentor.

- Plan: Participants reported using a timeline, but this did not always include a list of tasks and interdependencies. Project objectives were framed as research questions. Stakeholders were rarely thoroughly reviewed or engaged, and participants preferred to work autonomously.

- Execute: According to participants, the *execute* process consisted of data collection and analysis activities. Consistent with the PMBOK®, participants reported that these activities were unique to each project.

- Monitor and Control: Participants shared that risks were not always identified or prioritized in advance in order to mitigate them. If there were mitigation plans, they were not usually documented. There were many un-checked assumptions, and this slowed progress when unanticipated issues arose.

- Close: Participants did not mention documenting or sharing lessons learned. *Closing* a project meant publishing the research findings.

Research Design

A grounded theory research design was used in this study. Grounded theory is one of the major qualitative research designs and involves an inductive approach where data is gathered, analyzed, and constantly compared in order to generate a theory that describes the data set (Creswell, 2009). Using a grounded theory approach, researchers

allow relationships to emerge from the data as they are collected and often conduct data collection and analysis activities in parallel. In this study, data on project management in the context of higher education was simultaneously collected and analyzed.

The recursive nature of grounded theory allowed the researcher to make modifications to the design as more information was available. As revisions were made to this study, they were documented, and participants were contacted for follow-up as needed. For example, the use of semi-structured interviews to study professors' project management practices enabled the researcher to fully investigate the topic by modifying interview questions during the course of the interview and in subsequent interviews. This level of flexibility is not possible with other types of data collection (i.e., survey instruments).

Although the project management practices of professors have not been studied in-depth, there are studies related to this topic that have employed a variety of qualitative research techniques including semi-structured interviews, case studies, journaling, focus groups, and surveys (Ahmad, Francis, & Zairi, 2007; Fowler & Gifillian, 2003; Audet & Pegna, 2001). In addition to the qualitative techniques described, a grounded theory approach has been used to investigate issues related to the topic of project management and scholarly research (Helm & Remington, 2005; Younglove-Webb, Gray, Abdalla, & Thurow, 1999). Unlike other research designs, grounded theory was an appropriate approach for this topic because allowed the researcher to uncover the process (inputs, outputs, activities, responsibilities) professors use to manage research projects without making specific assumptions that could have limited the description of the process. Through skillful listening and questioning techniques, the researcher was able to identify

the language professors employed when discussing project management processes and tools.

The research design herein will address the following questions:

1. What project management processes and tools, if any, do professors use to manage research projects?

2. How do professors use project management processes and tools in research projects?

3. What factors enable and motivate professors' use of project management processes and tools in research projects?

4. What factors inhibit professors' use of project management processes and tools in research projects?

Participants

A total of 22 participants (12 women, 10 men) from 21 different universities across 13 states took part in the study. More than 100 professors were contacted to participate, and any professor who met the study criteria and returned the informed consent document was interviewed and included in the study. (Recruitment scripts are included in Appendix A, and the informed consent document is available in Appendix B.) Participants were selected based on specific inclusion criteria. All participants were assistant professors working in colleges of education or other education-related areas at doctoral-granting universities who were currently working on funded research projects or had worked on funded research projects in the past two years. Since tenure requirements at doctoral-granting universities are linked to high levels of research activity and publication (Archer, 2008; Goldsmith, Komlos, & Gold 2001), it was assumed that assistant professors would be heavily involved in research activity and would provide a

rich source of data about how those research projects are managed. This assumption was found to be true for the participants in the study. Focusing on participants in a single discipline (education) enabled a meaningful grounded theory to be developed from the data and has established a method for study and comparison with other disciplines in the future. The researcher identified participants working on funded research projects by accessing lists of principal investigators from public databases (e.g., US Department of Education, 2010; American Educational Research Association, 2010), searching university Web sites, and networking with professors and others who knew of potential participants. A list of participant demographics is included in Appendix C.

UNC Charlotte faculty in the Department of Educational Leadership were not considered for inclusion to avoid the possible conflicts of conducting backyard research (Glesne, 2006); however, faculty from other UNC Charlotte education departments were considered for inclusion. Staff members, students, adjunct professors, retired professors, and instructors who are not professors were not considered for inclusion.

Setting

Participants were chosen from US doctoral-granting universities (very high research activity, high research activity, and doctoral/research) classified by the Carnegie Foundation for the Advancement of Teaching (2010). Limiting participants to doctoral-granting universities ensured that research projects were a significant aspect of professors' responsibilities.

Initial and Theoretical Sampling

Participants were chosen through purposive and convenience sampling. The initial sample of 5 participants enabled the researcher to identify preliminary categories and

gaps that needed to be addressed with modifications to the interview protocol.

Theoretical sampling was used to ensure that selected categories reached a point of

theoretical saturation – when no new insights were evident as new data was obtained

(Charmaz, 2006). Typically, theoretical sampling involves the selection of participants

based on the data revealed. However, in this study, theoretical sampling was used to

obtain additional data from participants. In order to achieve a level of theoretical

sampling, three categories were identified in the initial sample of 5 participants, and the

following theoretical sampling strategies were applied to the remaining 17 participants as

follows:

- Using the proposal to structure the project
  - If the proposal is not mentioned in Question 8 (How do you plan your research projects?), then ask: "How do you use proposals to plan and manage your research projects?"
  - Rationale: Each of the initial participants mentioned using the proposal as a guideline for planning, and in some cases, managing research projects. Including a specific question about the proposal ensured that enough data was captured about how the proposal document was used.
  - Related research question: 1. What project management processes and tools, if any, do professors use to manage research projects?
- Receiving research support
  - After Question 8 (How do you plan your research projects?), say: "Describe the support that you receive from your university with

regard to your research. This may include support from an office of

research services or a business office."

- o Rationale: The "business office" (also referred to as "research office")

  was listed as a key stakeholder by all initial participants. It was viewed

  as a source of support as well as a source of frustration related to the

  type and amount of support provided during the grant process (pre-

  award, post-award, grant management). Including a new question

  about the "business office" ensured that participants provided data

  about the influence of this important stakeholder.

- o Related research question: 2. How do professors use project

  management processes and tools in research projects?

- Being mentored in project management during graduate school

  - o If mentoring is not mentioned in Question 6 (Tell me about any formal

    or informal training you have had in project management), then ask:

    "Did you have any mentors in graduate school who gave you insight

    into managing research projects? If so, please tell me about that

    experience."

  - o Rationale: Each of the initial participants described mentoring, or a

    lack of mentoring, related to the project/grant management process

    during graduate school. This was a significant influence on how

    participants reported using project management today. Including a

    specific question about the role of mentors in shaping project

management skills in graduate school ensured that participants

provided data on the influence of mentors.

o Related research questions: 3. What factors enable and motivate

professors' use of project management processes and tools in research

projects? 4. What factors inhibit professors' use of project

management processes and tools in research projects?

The semi-structured interview guide was revised to reflect these changes, and it is

available in Appendix D.

<center>Data Collection</center>

Data was gathered from multiple sources. Once an individual agreed to participate

in the study, the required informed consent document was secured. Each participant took

part in an in-depth, semi-structured interview with the researcher. Participants' total time

commitment was no more than two hours. This included time to participate in the

interview and review the interview transcript (if desired). In addition to the interview

data, the researcher maintained a reflective field journal, noting observations about all

aspects of the research process as a means of facilitating reflexivity.

In-Depth Interviews

Interviews were conducted by phone between June 25, 2010, and December 17,

2010. Each interview was recorded and transcribed. The researcher opened each

interview by confirming pertinent demographic information (e.g., length of time in higher

education, institution, professional title, gender). Participants were allowed as much time

as needed to respond to each question. To ensure that rich, descriptive data were

obtained, interviews lasted an average of 56 minutes. Follow up communication via e-

mail took place as needed. (Refer to Appendix D for the semi-structured interview guide.)

Data Analysis

Data analysis included three key data analysis techniques: line-by-line coding, memo-writing, and axial coding (Charmaz, 2006). The analysis process was iterative and involved a constant comparison of the data its emerging meanings. Throughout the process, the researcher sought to reduce, organize, and explain the data. The researcher used qualitative analysis software (ATLAS.ti) to support the analysis process as follows:

- Coding transcripts

- Tracking, modifying, and reporting codes

- Identifying relationships between codes and relationships between codes and emerging concepts captured in memos

- Creating categories from codes

- Storing and organizing transcripts and memos

In addition, the researcher used non-electronic methods (note cards, flipcharts, etc.) to sort hard copy ATLAS.ti outputs, interview summaries, memos, and other notes. To insure the quality of data analysis, data was triangulated (Charmaz, 2006) using the following strategies:

- Analyzing interview and field journal data

- Conducting peer reviews and member-checking

- Recruiting a large sample of participants (22)

At the conclusion of each interview, the researcher wrote a summary of the interview, including reflections on the positive aspects of the interview (*went well*), key

points (*takeaways*), and ideas for future improvement (*next time*). In addition, at the

conclusion of each transcription, the researcher wrote additional reflections on the

interview. The researcher also wrote memos on emerging concepts and themes that

became evident during the interview, transcription, and coding processes. Transcripts

were sent to each participant, though participants were not required to review the

transcript. An overview of the data analysis process is included below, and a visual

overview of this process is included in Appendix E.

Transcribed interview data was analyzed using a line-by-line coding technique.

This process enabled the researcher to identify meanings (codes) related to the research

questions. Codes were combined into categories to represent commonalities across

participants. Table 3 lists the 11 key categories and the main codes that were used to

devise the categories.

Table 3: *Main Codes Mapped to Categories*

Category	Codes
Processes	Planning a project, following a project management process, defining and managing project scope
	Subcodes (related to the Execute Process): Managing project issues, delegating tasks, negotiating for resources, protecting resources
Tools	Using project management tools, creating a task list, creating a timeline

Table 3: *Main Codes Mapped to Categories* (continued)

Category	Codes
Using proposals as tools	Creating a proposal, using a proposal to structure a project
Collaborating	Collaborating with colleagues, leading a research group, involving students in research Subcodes (related to Involving Stakeholders): Analyzing stakeholder needs, balancing the needs of all stakeholders, building and managing relationships with stakeholders
Receiving research support	Being supported by university infrastructure, working through academic bureaucracy
Mentoring	Mentoring or being mentored, project management training, learning from other's mistakes/what not to do
Accountability	Accountability
Efficiency	Managing a differentiated workload, creating efficiency, using what is familiar
Restrictive and complex	Being flexible, having a preference for doing things alone
Projects not large enough	Being disinclined to use project management

Table 3: *Main Codes Mapped to Categories* (continued)

Category	Codes
Awareness and time	Feeling burdened by project management, lack of interest

Theoretical sampling was used to reach a point of data saturation for key categories. Each category was further analyzed through the process of memo-writing, and axial coding was used to trace connections between categories. The field journal also captured insights into the research process. Throughout the data analysis process, the researcher reflected on the demographic factors to determine if commonalities exist based on these factors.

The interview questions aligned to the research questions, PMBOK® Process Groups defined in chapter 1, and/or the alpha characteristics described in chapter 2. Aligning questions in this way provided a basis for comparison of professors' project management practices with the standard PMBOK® Process Groups as well as the alpha characteristics. The alignment of interview questions is described in Appendix F. In addition, a description of the key data sources that were used to answer each research question is included in Appendix G.

<div align="center">Risks and Mitigation Plans</div>

The main risk inherent in this study involved the role of the researcher throughout the research process. Having a critical awareness of the research process and the researcher's role in that process is referred to as reflexivity (Charmaz, 2006). As a means of encouraging reflexivity, the researcher examined her perspective, prior experiences,

and current position as a student researcher and prospective future professor. These reflections were captured in the field journal. In addition, peer review and debriefing as well as member-checking was used.

The researcher adhered to the University of North Carolina at Charlotte Institutional Review Board (IRB) guidelines while also being mindful of the qualitative research guidelines set forth by the American Anthropological Association (Glesne, 2006). Only those involved with the research project had access to the data, and pseudonyms were assigned to participants and universities to maintain confidentiality. Electronic data, including transcripts, communications, and audio files, was stored and backed-up on a personal, non-networked computer. Audio files were destroyed at the conclusion of the study. Hard copies of data were stored in a locked filing cabinet, and hard copies of draft data collection and analysis reports, including transcripts, were shredded.

<div align="center">Summary</div>

Using a grounded theory approach that included a semi-structured interview, the researcher uncovered rich data that addressed the research questions. The resulting analysis of this data is included in chapter 4, and a further discussion of these findings appears in chapter 5. The researcher applied lessons learned from the previous pilot to enhance the methodology. In particular, the inclusion of a theoretical sampling strategy allowed categories of data to reach a point of saturation not possible in the pilot. The data from this research is limited in its ability to be generalized across different populations. However, the goal of this study, as in most qualitative research, was to produce evidence, to inform, and to create relevance for the researcher and the audience. Investigating the

project management practices of professors has provided new insight into the scholarly

research process and may lead to a project management model appropriate for professors

managing research projects.

CHAPTER 4: RESULTS

As described in chapter 1, this study sought to identify factors that influence professors' use of project management processes and tools in research projects through the use of a qualitative grounded theory design. Based on the detailed analysis process described in chapter 3, the researcher defined 11 major categories from nearly 200 codes and developed a grounded theory appropriate for participants of this study. (The 20 most-used codes are included in Appendix H.) Theoretical sampling was used to saturate three categories: using the proposal as a key project management tool, receiving research support, and being mentored in project management during graduate school. This chapter describes the study findings related to each of the four research questions (listed below) and concludes with a statement of the grounded theory.

1. What project management processes and tools, if any, do professors use to manage research projects?

2. How do professors use project management processes and tools in research projects?

3. What factors enable and motivate professors' use of project management processes and tools in research projects?

4. What factors inhibit professors' use of project management processes and tools in research projects?

Research Question 1: What Project Management Processes and Tools, if any, Do

Professors Use to Manage Research Projects?

The purpose of research question 1 was to elicit data on the specific processes and

tools that participants used to manage their research projects and to determine how those

processes and tools aligned to standard project management practices. As described in

chapter 1, project management processes were defined by the Project Management Body

of Knowledge (PMBOK®), and include the PMBOK® Process Groups of Initiate, Plan,

Execute, Monitor and Control, and Close. Project management tools were defined as any

items that enable the project management process (e.g., documents, calendars,

spreadsheets). Participant responses were summarized with regard to how they applied

the PMBOK® Process Groups. In addition, participants provided insight into the specific

tools they use to manage their projects. The proposal document was cited as a critical tool

that helped to define the project's scope, timing, and resource needs.

Processes

In response to interview question 23 – "Do you think it is important to follow a

similar process and use similar tools to manage your research projects? If so, why? If not,

why not?" - many participants commented on the importance of following a consistent

project management process. For instance, Corey voiced some of the benefits of

following a repeatable process in managing his research projects: ". . . anybody that's

been on any of my projects, they could probably step into another project and be up to

speed in very little amount of time" (September 22, 2010). Hailey provided a similar

perspective about how she manages her research projects: "It's helpful for me because if I

use the same system, I don't forget pieces along the way" (October 12, 2010). Following

a similar project management process can reduce the amount of time it takes to plan

project activities and could, therefore, reduce the overall project timeline.

With regard to following the standard PMBOK® Process Groups, participants

described following processes that loosely-aligned to the PMBOK®, without stating any

direct connection to or awareness of the PMBOK®. These findings are similar to those

from the pilot study described in chapter 3.

Initiate. The PMBOK® Initiate Process Group includes defining the project as

well as securing approval for the project. Participants described the proposal as being the

blueprint for funded projects. In most cases, securing approval for the project meant

getting funding, university approval, and/or research site approval. While Arnold

answered a call for a National Science Foundation (NSF) grant, Mark described having a

close relationship with a key funder that gave him an edge when it came to awarding

money. So, even though their points of entry in the Initiate Process Group were quite

different, Arnold and Mark were both successful in securing grants. Corey likened the

grant process to the "tail wagging the dog" in that the amount of money often defines the

research scope (September 22, 2010). In fact, Corey and Corrine described choosing not

to apply for certain grants. In Corey's case, funding was not sufficient to support the

research objectives. He stated: "I've seen a lot of grant competitions that would be a

really good fit for what I'm doing, but the amount of money is just insufficient to be able

to do what you want to do" (September 22, 2010). Likewise, Corrine commented:

"Another change that I made with my grant-writing was that just because something's out

there doesn't mean I need to go after it" (October 19, 2010). By carefully considering the

resources needed to complete the project, these participants chose not to apply for funding that would initiate a project.

    Plan. Activities in the PMBOK® Plan Process Group involve creating the scope, objectives, and timeline for the project. Participants reported using task lists, goals and timelines documents, and most often, meetings where the scope, objectives, and timelines were discussed and documented. Participants described planning as a progressive and iterative activity. Hailey's response below was echoed by several others:

> I guess it's sort of whatever needs to happen – what are the next steps, what do we have to do to be able to get done. Right now, my group just met on Friday for this new project that we're trying to launch. And, we're in the process – we have a few grant proposals in, and we're trying to think about if we do a pilot, so what steps... So, we met on Friday, planning out if we're going to do pilot in the spring, here are the things that we have to get done this semester. So, contact with the schools, getting the surveys together and approved for IRB, and all those pieces – so being able to put all those things together. (October 12, 2010).

Hailey's description of the planning process demonstrates the concept of progressive elaboration where details are added to the project plan as more information becomes available (Project Management Institute, 2008). Using progressive elaboration, the project team can continually improve the plans for completing the project. Hailey had an overall plan, and she worked with her research group to build out more detail as the project progressed. This approach is necessary for any project and works particularly well for projects that are ambiguous – like research.

Execute. The PMBOK® Execute Process Group focuses on completing work to support the project's objectives while also securing the necessary resources to do so. The *work* associated with completing a research project centered on data collection activities like observations, interviews, focus groups, surveys, and professional development workshops in school or community settings. Following data collection, data analysis activities, including organizing, synthesizing, and writing were completed. Throughout the Execute activities, participants delegated project tasks and resolved project issues. Lynne described how she delegated project tasks: "We meet weekly and assign tasks. And then the next week, we'll update and create the next task" (November 3, 2010). Peyton shared how the resolution of a project issue had slowed the analysis process: "We're better now. We're analyzing faster now. But, getting that framework set up took a long time" (November 9, 2010).

In addition to delegating tasks and resolving issues, identifying and securing project resources is an important activity in the Execute Process Group. Participants most often described securing human resources, though resources like equipment, software, and survey instruments were also mentioned. Participants reported that human resources were typically assigned or recruited. For larger research projects, resources were usually assigned: "So, a typical grant, a four-year grant is $1 ½ - 2 million, typically they [the university] would assign a 25% support staff person to it" (Corey, September 22, 2010). Resources were also recruited. For instance, Peyton described how he typically found students to work on his research projects: "I'll work with students from my classes, from colleagues' classes. I'll take recommendations, send out a call for these types of students, then I'll ask for their recommendations on the students." Several participants also shared

their frustration with securing resources in terms of lengthy hiring processes and under-qualified or disinterested candidates.

Monitor and control. Activities in the PMBOK® Monitor and Control Process Group include tracking, reviewing, and regulating the project's progress. Participants stated that this was usually a collaborative activity that took place during meetings with colleagues or the research group. Some participants also described using computer-based pop-up reminders for significant project milestones. However, Morris described a more reactive approach to monitoring his projects: "In terms of individual projects, it is very haphazard. In some cases, something jogs my memory that I haven't done anything with this [project]" (October 5, 2010).

Close. Disseminating research project results and documenting lessons learned are two of the key activities in the PMBOK® Close Process Group. Participants reported that their projects typically concluded when funding ended. One participant summarized this as: ". . . the timeline will be dictated, in part, by how much funding is available" (Eileen, December 17, 2010). The deadlines associated with sharing research results through presentations or publications also play a role in project closure. The conclusion of funding and the need to disseminate results may or may not correspond to meeting the objectives of the project.

Eileen was the only participant who specifically mentioned applying lessons learned from one project to the next: "So, things that I have learned with them during that first project helped me be more thoughtful when I was writing the next one" (December 17, 2010). However, many participants referenced learning from both positive and

negative examples. (These learning experiences are further described in the section

dedicated to research question 3.)

Tools

Many participants responded that they used a variety of project management tools

including timelines (e.g., paper, whiteboard, or electronic), task lists (e.g., documents,

spreadsheets), and collaborative document modification and storage systems (e.g.,

Google Documents, Drop Box). (A list of the most frequently-mentioned project

management tools is included in Appendix I.) Arnold's response summarized the tools

many participants mentioned: "What we do tools-wise, is we have meetings, we plan, we

write things down digitally, on paper . . . The timeline normally is on my whiteboard, and

it is also electronically produced as well on an Excel sheet" (June 25, 2010).

Types of tools. Most participants reported using tools that were Web-based and

ubiquitous like many of the Google applications. Edward went so far as to say:

> I sold my entire soul to Google. I do everything with Google that I can – their e-
>
> mail, their calendar. I use Google Documents. I have my task list, and I set up
>
> automatic reminders for things. If they [students] want me to remember
>
> something, they have to send me an e-mail with a reminder because that's how I
>
> do it. (November 17, 2010).

Participants selected tools that would be accessible to project team members and other

stakeholders regardless of location. For instance, using Drop Box for storing project

documents allowed participants to modify documents without having access to the

Internet and to synchronize files once an Internet connection was established. Using tools

like Google Documents reduced the time it took to revise project documents because multiple project team members could edit simultaneously.

Benefits of tools. Corey described the benefits of project management tools in managing multiple research projects: "I think the advantage of using them [project management tools] is becoming more and more apparent to me with more projects that I am bringing in because it's just so difficult to stay on top of all these different projects otherwise" (September 22, 2010). While Corey saw the benefits of using project management tools, many participants reported that they were not aware of project management tools.

Awareness of tools. Hailey, Corrine, Marisol, and Derek described their project management approach as organized and structured, but they did not seem to consciously or deliberately use project management tools. Julie described a lack of awareness of project management tools: ". . . I just haven't had the chance to be exposed [to project management tools], so you just fall back on things that will probably work for you" (October 28, 2010). In addition, some participants struggled to identify the tools that they used; with some even stating that they used no tools at all. After prompting, participants were able to describe the tools that they used. Marisol summarized this phenomenon as:

> I had never really thought about how I managed things. I've learned a lot just by answering your questions because I didn't realize that some of these visual aids – there's a lot of them, probably more that I'm not even thinking about, like keeping a notebook in the car, by the side of the bed - I didn't think of those as management tools, but it's more of managing ideas than managing people. (October 21, 2010).

These responses indicate a need for professional development in the area of project management, and this topic will be discussed in chapter 5.

Using Proposals as Tools

As a result of theoretical sampling, if the proposal was not mentioned in interview question 8 (How do you plan your research projects?), then the participant was asked: "How do you use proposals to plan and manage your research projects?" Most participants mentioned the importance of the proposal as a tool to structure project tasks and timelines because the proposal document typically requires a complete outline of the project including project scope, timing, milestones, stakeholders, and other critical project data. For example, Derek commented: "The planning on the funded projects happens with the proposal really" (September 3, 2010). Arnold further described the function of the proposal:

> Well, the planning of the research project for us primarily occurs with the initial grant proposal. Our projects are, of course, funded grants. So, the preliminary planning happens even before the project is funded. . . . we start out with the blueprint, the proposal itself, but the research project involves a lot of collaboration among researchers as to how we want to go ahead with the project. (June 25, 2010).

In addition to being a valuable planning tool, the proposal was also used throughout the project to ensure that project objectives were being met. Derek described modifying the proposal document as the project progressed: ". . . I have the original grant proposal. And, I have a Word document that has modifications in terms of dates and timelines" (September 3, 2010). Joe also mentioned the importance of referring back to

the proposal: "I constantly go back to the timeline that we initially proposed because we want to make sure that we do what we proposed to do" (December 10, 2010).

Some participants described their research as being proposal-driven. That is, proposals, and subsequent funding, were the driving force behind their research projects. Still, other participants discussed an idea-driven approach that takes the opposite approach by searching for funding after an idea has been generated. Participants also described combinations of the two approaches.

Conclusion

Participants described a variety of project management processes and tools they used to manage research projects. Although participants did not mention having specific knowledge of the PMBOK® Process Groups (Initiate, Plan, Execute, Monitor and Control, and Close), the project management processes they outlined closely resembled these Process Groups. Participants reported the types and benefits of project management tools and expressed varying degrees of familiarity with those tools. The proposal document was often cited as a tool used in project planning and throughout the project lifecycle. The next section describes the results associated with research question 2.

Research Question 2: How Do Professors Use Project Management Processes and Tools in Research Projects?

The purpose of research question 2 was to determine how participants utilized project management processes and tools and how these practices may align to standard project management practices. Two key categories emerged from this inquiry: the importance of collaboration and the amount and type of research support that was provided to participants. Participants described the methods they used to collaborate with

others in planning and managing research projects, including how they involved

stakeholders and students. In addition, participants listed several examples of successfully

and unsuccessfully working through the department, college, and university infrastructure

to manage issues and obtain support for their research. This section concludes with a

brief discussion of how participants emulated the interpersonal characteristics of project

managers as defined by Crowe (2006).

Collaborating

In project management, collaboration involves seeking and incorporating various

perspectives that can result in consensus and support for project activities and decisions

(Project Management Institute, 2008). Collaboration was a key strategy that participants

used to accomplish their research objectives. For instance, Corey commented on the

importance of collaborating by saying: "The first question I ask myself is, 'Is there a

colleague here at the institution or at another institution that would be a good collaborator

on this?'" (September 22, 2010). Participants described different methods of

collaborating and shared ways in which they involved stakeholders and students in their

research.

Methods of collaborating. Participants shared three ways that they typically

collaborate as they are managing their research projects.

- Individual: Participants worked alone or with students, but not with other

  colleagues. Students may or may not have been involved in all aspects of the

  research from concept through dissemination. In one case, a participant

  demonstrated a clear preference for working alone, saying: "And, I just don't

like people. So, the less I can interact with them the better" (Morris, October 5, 2010).

- Partnership: Participants worked with one or more colleagues on an ongoing basis. Kendra and her research partner shared authoring credit, split conference presentations between them, and met weekly in person. She described an example of this partnership approach: "Every Friday, we meet, and we work literally all day long. And, then we have assignments that are due the next week. So, it really holds you accountable, more so than if you're just on your own" (October 26, 2010).

- Research Group: Participants formed research groups by identifying interested colleagues and students. The group was often funded by a large grant, and it may have also been required as part of a graduate program. Students or colleagues led aspects of the work and may have received first-author credit in an article or presentation. Joe described being part of several different types of research groups as a graduate student and now as an assistant professor. He commented on the importance of having a vision that guides the research group's activities: "A vision, how to manage a group to make this group really collaborative and all the members contribute equally is always in the back of my mind" (December 10, 2010).

In addition to the methods of collaboration described above, some participants also reported that research networks have provided invaluable support and feedback for their research projects. For example, Eileen described a research network that consisted of the recipients of a particular grant. The network meets in-person three times a year and

by phone every other month. Eileen commented: "I think of them as being peripheral advisors on the projects I have. . . . I don't know what I would have done without it [the research network]" (December 17, 2010). These kinds of networks can facilitate the sharing of project management best practices, which can improve the likelihood of project success.

   Involving stakeholders. Stakeholders are typically defined as people who are "actively involved in the project or whose interests may be positively or negatively affected by the performance or completion of the project" (Project Management Institute, 2008, p. 23). While students would normally fit this definition, participants made a distinction between stakeholders and students by referring only to co-Principal Investigators (co-PIs), funders, and their own research participants as stakeholders. Participants described the importance of involving stakeholders in research projects by acknowledging the different needs of stakeholders. There are also risks inherent in managing stakeholder expectations. Mark shared how he involved political stakeholders: "We don't know the politics of the state very well, so we essentially just invite everybody. . . . the state superintendent, the chair, and the governor. We keep all of them in the loop with everything we do" (August 26, 2010). Stakeholder involvement can influence the direction as well as the success of a project.

   In addition to keeping stakeholders informed, participants listed two other methods for managing stakeholder expectations. First, participants described seeking input from stakeholders. Darla asked stakeholders to provide their perspective early in the project to ensure that stakeholders' needs would be met. She commented:

I also asked what they [research site contacts] would want so that I could include

that on the proposal. . . . I believe it's important to include what they want out of

it as well so that they can gain something from it, too. (September 24, 2010).

Second, participants shared how they involved their own participants as stakeholders.

Lauren described how she follows up with her participants:

I think that an important aspect of my project management has been getting back

to my participants and my respondents and letting them know how things came

out. So, following up with all of my participants, sending the transcript of the

interview if they want it . . . (October 7, 2010).

Involving students. Students played a key role in how participants managed their

projects. The roles that students played and the extent of their involvement varied greatly

across participants, with roles ranging from limited involvement in clerical and

administrative tasks to full collaboration and co-authorship. Mark reflected that, although

he fully involves his graduate students in his research projects, he does not always find

students who are willing to be involved: "I've co-published with my graduate assistants

and co-presented with them. It's not easy to find folks that can do that. We've given

opportunities to a lot of people to do that, but not a lot have taken full advantage of that"

(August 26, 2010). There is a great deal of research published on how students benefit

from being involved in research projects. (See, for example, Falconer & Holcomb, 2008;

Kardash, 2000.) In this study, participants reported that students benefit from receiving

course credit, being paid as contractors or student employees, or most significantly,

gaining the skills needed to manage projects of their own.

Receiving Research Support

As a result of theoretical sampling, participants were asked to: "Describe the support that you receive from your university with regard to your research." The addition of interview question 9 to the interview guide elicited rich data from the 17 participants who were interviewed after the initial 5 participants. This support was seen as critical to the success of research projects. Proposal review and editing, budgeting, and submission services were listed as important support mechanisms during the pre-award phase (before the proposal has been submitted for consideration). In addition, financial management was a key support service offered during the post-award phase (after the proposal has been funded). Internal funding opportunities, interest groups, and communication about upcoming grant opportunities were also described by many participants as a means of support. These kinds of support systems are examples of Organizational Process Assets as defined by the PMBOK®. Organizational Process Assets may include the processes, procedures, and collective knowledge that contributes to a project's success (Project Management Institute, 2008).

Participants described the support they received as alternating between being helpful, frustrating, and overwhelming. For instance, Corey said that the support he received during the post-award phase was helpful: "And, when it comes to the grant management, once you receive it, again, the business office is there to do your financial reports, to provide any type of any information or support that they can help you to run your grant" (September 22, 2010). However, Mark described a great deal of support during the pre-award phase with little to no support once the grant had been obtained (post-award):

But, our college is really invested in pre-award folks. So, when you call

downstairs and say, "I want to write a grant." They're awesome. They come and

say here's the RFP, and all you have to do is write. They will load it in the

system, do the budget for you. It's really slick. But, we don't have the same kind

of operation going after you get an award. Instead, what we have is more

compliance-like officers. (August 26, 2010).

Like Corey and Mark, most participants described support systems that were more

effective during either the pre-award or post-award phase, but not both. Still, Kendra

described having access to only limited support throughout her projects: "The grant

writing that I've done has been on my own volition. If I specifically ask, then I'll get

specific support for one item, but not ongoing" (October 26, 2010). Amy suggested that

well-intentioned administrators may provide too much support to the point of being

invasive and distracting: "The associate dean for research here also gets to know you and

starts sending you personalized things about people who might be interested in doing

projects with you. So, it's a constant bombardment. It's a nice feature, but it's also

overwhelming" (October 5, 2010).

Interpersonal Characteristics

As discussed in chapter 2, key interpersonal characteristics of successful project

managers have been documented (See, for example, Crowe, 2006; Project Management

Institute, 2008.) In general, participants did emulate some of these characteristics, though

they described an approach that was not as formal or deliberate as the project managers in

the *alpha* study (Crowe, 2006). Each of the *alpha* interpersonal characteristics is listed

below along with a description of how participants displayed these project manager characteristics.

Attitude and belief. Participants reported that informal training through mentoring and observation of other project managers gave them insight into managing research projects. Participants described learning as much about effective practices as they did about ineffective practices. Only 4 participants reported formal training experiences related to managing projects.

Focus and prioritization. When asked about the time they spent in meetings (interview question 5), participants responded with a wide range of hours. Most participants (12) reported spending no more than 3 hours a week in meetings with 3 or more people. A large number of participants (7) reported spending 8 or more hours a week in meetings with 3 or more people. Several participants indicated a preference for limiting time spent in meetings and otherwise prioritizing their time.

Communication. When asked about providing project updates (interview question 7), participants listed colleagues, students, funders, site contacts, and research groups as the groups that they update. Three participants reported that they only update themselves and perhaps one student. In most cases, updates were periodic and occurred during meetings, via e-mail, or through required reporting mechanisms for funding agencies.

Approach. All of the participants reported that their project planning activities started in one the following ways: having an idea, creating a proposal, collaborating with colleagues, or funneling a broad concept to a tangible, researchable idea.

Relationship and conflict. All of the participants described formal or informal networks where they collaborated with funders, colleagues, students, research groups, and/or research site and participants.

Alignment. All of the participants described the support they received from their university most often in the form of grant-writing, budgeting, and submission services (pre-award), financial management (post-award), internal funding, and interest groups.

Issue management. Fourteen participants described frustrating issues involving academic bureaucracy, particularly the disbursement of funds from grants. Some participants openly showed their frustration and admitted that they did not handle the issues effectively.

Leadership. There were some divergent findings related to how participants viewed their leadership roles. Julie and Corrine both shared that they were not taking a leadership role when it came to issues related to funding. In Julie's words: "I feel like I'm still pretty early career, and I'm not really taking the lead so much on trying to seek out funding opportunities" (October 28, 2010). However, Trent described the importance of taking a leadership role as a means of demonstrating the kind of results that can lead to tenure. Trent commented: ". . . I have to be thinking about my CV and how I can get myself tenured. So, I need something where I have a clear leading role on a project" (November 11, 2010).

Conclusion

In addressing how professors used project management processes and tools in research projects, participants described the importance of collaborating with colleagues, stakeholders, and students. The degree and type of collaboration varied among

participants, with some preferring to work alone or perhaps with a few students. However, most participants reported a preference for collaborating with a research partner or research group. Securing support for research from the university was a critical success factor for many participants and their research projects. Participants reported that their universities provided better support at some points in the project lifecycle (e.g., pre-award, post-award) than others (e.g., budgeting, reimbursements). Participants' interpersonal characteristics appeared to contribute to how well they were able to use project management processes and tools to manage their research efforts.

To this point, the research questions have focused on *what* processes and tools participants used and *how* those processes and tools were used. The remaining two research questions will address *why* those processes and tools are used or not used. The following section deals with factors that enable and motivate professors to use project management in their research efforts.

Research Question 3: What Factors Enable and Motivate Professors' Use of Project Management Processes and Tools in Research Projects?

The purpose of research question 3 was to uncover attitudes and values that promote project management use among participants. This information will contribute to the development of a future model of project management that is tailored to meet the needs of professors managing research projects. Participants described being motivated to use project management processes and tools based on mentoring experiences, particularly mentoring that took place during graduate school. Both positive and negative mentoring experiences played a role in participants' project management approaches. Participants described a sense of accountability – to research partners, research groups, or to

themselves – as a motivating factor in their use of project management processes and tools. Using project management processes and tools enabled participants to find efficient ways of managing their complex and competing responsibilities.

Mentoring

Few participants reported having any formal training in project management. Instead, they cited mentoring as a means of informal training that was the primary source of their project management knowledge. As a result of theoretical sampling, participants were asked: "Did you have any mentors in graduate school who gave you insight into managing research projects? If so, please tell me about that experience." All participants demonstrated a commitment to mentoring their students and also expressed the value of being mentored. While a few participants did not recall receiving any mentoring in graduate school specifically related to project management, those participants reported that this lack of mentoring motivated them to mentor their own students.

Peyton described the mentoring continuum in one of his proposed projects: "The grant that I wrote last week is actually one that is supposed to mix both undergraduate and graduate students in mentored experiences where the graduates mentor the undergraduates. The professors mentor the graduates" (November 9, 2010). Participants shared experiences of being mentoring in project management during graduate school, and these experiences had a significant influence on how participants reported using project management. Derek described the experience of having multiple mentors in his graduate program: ". . . I was one of the few that was really blessed to have multiple mentors. . . . Both of them sort of gave me glimpses in terms of how to manage projects

and how to go about it" (September 3, 2010). Mark listed specific skills that he learned

from his mentor:

> If not for her, I would not be half the grant-writer and facilitator that I am. . . . I
>
> learned about paying attention to details . . . keeping people in the loop, getting
>
> them involved in decision-making, making sure that requests are followed up with
>
> in a timely fashion. (August 26, 2010).

Lauren also shared her positive mentoring experience:

> I did have a mentor who did really bring me into projects and showed me what he
>
> was doing and spoke with me about our plans for going out and collecting data
>
> and how we would delegate certain tasks to certain people. (October 7, 2010).
>
> Learning how <u>not</u> to manage a project was as important to participants as learning

how to manage a project. Shortly after Derek described his positive mentoring

experiences, he also reflected on learning what not to do.

> . . . we had some faculty that are no longer at the University . . . that completely
>
> mismanaged and did a horrible job with project management - nothing completely
>
> illegal, but there was some shady business going on. And, as a result of that, a lot
>
> of us would jokingly say to each other, when we were hanging out at the bars or
>
> just catching up, "I guess we're learning how not to manage projects" based on
>
> what was going on. (September 3, 2010).

Edward also commented on learning what not to do based on observing his graduate

advisor: "So, I try to keep in mind the inconsistencies and instabilities that he brought

about and to make sure people understand what is happening, trying to be the opposite of

him." These mentoring experiences shaped how participants managed their research

projects in terms of project communication, delegation, and consistency.

Accountability

Feeling accountable to others or even to the research process itself motivated

many participants to take advantage of project management processes (e.g., setting up

regular meeting routines to track project progress) and tools (e.g., timelines and task

lists). Peyton described how he established project management processes to hold others

accountable for their project responsibilities: "I think a really important thing is regular

meetings as you can see by the meeting times that we spend. . . .It's the accountability

factor" (November 9, 2010). Candace described an instance of mutual accountability by

stating: "So, we keep ourselves on a regular timeline, and we hold each other accountable

for what we've agreed to do" (November 18, 2010). Unlike Peyton and Candace, Lauren

described an intrinsic sense of accountability that was also echoed by other participants

when they described the project management tools that they used. As a new faculty

member, Lauren established several methods of accountability for herself:

> So, I have this semester-by-semester playbook and my visual organizer. I have my
>
> Microsoft Office. And, I have this little pink notebook that I take with me
>
> absolutely everywhere, and I write stuff down, and I keep track of the stuff that I
>
> need to do to for my research projects. So, I have various forms of accountability
>
> for myself, and that's pretty much it. (October 7, 2010).

Project managers are ultimately responsible for the success of their projects. Establishing

methods of accountability, as demonstrated by participants, will increase the chances of

project success.

Efficiency

Since project management increases the likelihood of project success through the efficient application of processes and tools (Project Management Institute, 2008), it is possible that professors may be able to meet their project objectives in a more efficient manner, leading to increased opportunities for publication and, ultimately, tenure. Research and publication were cited as being critical to the tenure and promotion process. In Lynne's words: ". . . publications are the currency by which you are measured" (November 3, 2010). Likewise, Morris commented: "That is the nature of the academic beast. If I want to keep my job, I need to publish. In order to publish, I need to do research" (December 5, 2010). Some participants described a desire to become more efficient by using project management processes and tools. For instance, Kendra shared: "My background is not project management, so maybe there are some ways I could be more effective and efficient" (October 26, 2010). This sentiment supports the need for professional development in the area of project management that was identified previously. This topic will be discussed in chapter 5.

Participants also described the importance of efficient planning to ensure that funding was available to gather pilot data for future studies. Marisol said: "As your money is drying up, and you're finishing it, you need to use some of those resources to help you gather some pilot data so that you can write the next proposal" (October 21, 2010). The idea that efficient planning can lay the foundation for future research funding was mentioned by several participants. Since project management processes and tools provide a framework for planning, using project management may increase the likelihood of securing funding for new research projects.

Conclusion

Participants reported that their mentoring experiences, whether positive or negative, were instrumental in motivating and enabling them to use project management processes and tools. In addition, having a sense of accountability – as all effective project managers do – motivated participants to adopt project management processes and tools. A desire for efficiency also motivated participants to use project management processes and tools. In addition to considering factors that motivated and enabled participants to use project management processes and tools, participants were asked to describe reasons for not using project management processes and tools. The following section addresses factors responsible for inhibiting the use of project management processes and tools.

Research Question 4: What Factors Inhibit Professors' Use of Project Management

Processes and Tools in Research Projects?

This section summarizes the findings related to research question 4. The purpose of this question was to uncover attitudes, values, and misconceptions that hinder project management use across participants. Understanding factors that inhibit project management use will be a critical component of a future model of project management that is specific to the needs of professors managing research projects. Participants described several reasons for choosing not to use project management processes and tools in their research projects. Among these reasons, there were two misconceptions regarding standard project management practices. First, participants thought that project management would be restrictive and complex. Second, participants believed that many of their projects were too small to warrant the use of project management processes or

tools. In addition to these misconceptions, participants cited a lack of awareness or time

as reasons for not using new project management processes and tools.

Restrictive and Complex

Project managers must determine which project management processes and tools

are appropriate for each project and the rigor with which those processes and tools should

be applied (Project Management Institute, 2008). Although project managers have a great

deal of flexibility in managing projects, participants did not view project management as

flexible. Instead, many perceived it as restrictive and complex. For instance, Corrine

expressed a desire for flexibility that has kept her from using project management

processes and tools. Although she was aware of project management processes and tools

from her experience in event planning, she stated: "I just don't need that level of

organization. For me to take that time would distract from what I really need to do which

is write" (Corrine, October 19, 2010). With regard to the complexity of project

management processes and tools, Arnold stated: "And, what keeps me away is also the

perceived complexity of various tools out there. I have no formal training on any of these

things, so that may keep me away and others away as well" (June 25, 2010). Derek

shared a similar sentiment. However, he seemed to negate the benefits of using project

management for his own research projects. Derek commented: "In the corporate world, in

instructional design, they use different multi-colored charts and things like matrices and

tables. And, I just don't feel it's beneficial spending all that time putting that together if

it's not needed" (September 3, 2010).

Although some participants described project management processes and tools as

inflexible or even unnecessary, the PMBOK® reinforces the flexible nature of project

management processes and tools and encourages project managers to apply the most

appropriate "knowledge, skills, tools, and techniques to project activities to meet the

project requirements" (Project Management Institute, 2008, p. 6). It is true that some

project management tools are complex and require specific expertise to execute.

However, it is a misconception to characterize all project management processes and

tools as restrictive and complex. Nonetheless, this is the very perception that participants

described. This perception can only be modified through increased awareness and

application of project management processes and tools.

Project Size

The size and number of research projects that participants described reflected the

diverse roles and responsibilities of assistant professors. Some participants reported

managing multi-million dollar projects, while others indicated that they received only a

few thousand dollars in research funding. While projects of all sizes benefit from using

project management processes and tools, it takes experience in managing projects to

identify and apply the most appropriate processes and tools. Arnold and Peyton believed

that their projects were not large enough to justify the use of project management

processes and tools beyond the ones that they are already using. Arnold stated: "I've seen

people using project management software, and I see the investment and the benefit of

using that for large-scale projects. I'm not too sure about using it for smaller projects. . ."

(June 25, 2010). Likewise, Peyton described his perspective as follows:

> With project management tools especially, the larger the project gets, the more
>
> essential it becomes. That said, I haven't really used them. I think the role is there.
>
> The opportunity to work with them is there. I wouldn't take a large project on

without doing it, but I haven't taken any really large projects on. (November 9, 2010).

Arnold and Peyton seemed confident that project management would benefit larger projects, and Julie concurred: "If I were to be managing a big, huge grant, like hundreds of thousands of dollars, or something like that, I probably would start to feel the need to use something bigger and better, or more high-powered" (October 28, 2010). These participants felt that could "get by" without additional project management processes and tools on smaller projects. This is similar to the misconception regarding project management as restrictive and complex. Many participants believed that only large projects would benefit from project management processes and tools. Without any experience to the contrary, this misconception will likely persist.

Awareness and Time

All participants reported using some type of standard project management process and tools to manage their projects, but when asked if they knew of other processes or tools that they chose not to use, they cited a lack of awareness and limited time as two reasons for not using new project management processes and tools. Some participants seemed willing to use new project management processes and tools if they were made aware of them. Others were content to use only what was familiar to them and did not want to invest time in learning about new processes or tools.

Several participants acknowledged their lack of awareness of new project management processes and tools and expressed interest in learning more about project management in general. For instance, Kendra, Joe, Marisol, and Eileen specifically asked to see the results of this study. In addition, *not knowing what is available* was a common

response when participants were asked to consider this topic. Darla's comments were similar to those of several participants: ". . . if I'm not using something - a new software package or a new tool - it's because I probably don't know about it. And, I'm just doing things the only way I know how to do it. So, that's why - because I don't know what's out there" (September 24, 2010). A project management model designed for professors managing research projects could increase the awareness and appropriate application of project management processes and tools.

Some participants cited a lack of time as a reason for not using new project management processes and tools. Expressing a similar sentiment, Carl stated: "If my little calendar and e-mail and Post-It™ notes are working for me, I don't need to worry about something else" (November 4, 2010). Morris stated: "Why do I need something to make me more productive?" (October 5, 2010).

Conclusion

Participants described two misconceptions regarding project management – that it is too restrictive and complex, and that it is only appropriate for larger projects. Although these are misconceptions regarding standard project management practices like those cited in the PMBOK®, they represent the perspective, and thus, the reality of participants. Participants also reported that a lack of awareness or time inhibited their use of new project management processes and tools. Exposure to and experience with project management processes and tools may counteract these inhibiting factors and increase the likelihood of project success. The section that follows provides a summary of the findings and a statement of the grounded theory.

Summary of Findings

The results presented here indicate what processes and tools participants used to manage their research projects along with how those processes and tools were used. In addition, participants shared what factors motivated and inhibited their use of project management processes and tools. The research projects described by participants fit into the standard definition of a project discussed in chapter 1. In general, participants described using project management processes and tools. That is, they applied their knowledge, skills, tools, and techniques to their research projects. However, the extent to which participants did this varied greatly. Participants did not always describe themselves as project managers. Instead, they used terms like principal investigator (PI), co-PI, or project director. However, the role of a project manager in establishing a vision and leading a team to fulfill that vision was a role that participants embraced.

A visual representation (axial coding map) of the findings can be found in Appendix J. The axial coding map depicts how the major categories of findings relate to the research questions and to one another. For each of the four research questions (displayed as boxes), major categories (displayed as circles) are connected by arrows that demonstrate relationships between the categories.

Based on the data gathered and analyzed in this study, a grounded theory has emerged in which participants:

- Used some standard project management processes and tools as defined by the PMBOK®. (This statement addresses research question 1.)

- Leveraged the proposal document as the blueprint for the project, much like the standard project management plan defined by the PMBOK®. (This statement addresses research question 1.)

- Demonstrated a preference for collaborating with colleagues, stakeholders, and/or students in managing research projects. (This statement addresses research question 2.)

- Found support as well as frustration in dealing with infrastructure designed to facilitate the research process. (This statement addresses research question 2.)

- Learned how to manage and how not to manage projects based on prior experiences, particularly mentoring in graduate school. (This statement addresses research question 3.)

- Perceived project management processes and tools as somewhat restrictive and complex. (This statement addresses research question 4.)

Figure 1 provides a visual depiction of the factors that influence professors' use of project management processes and tools in higher education research projects.
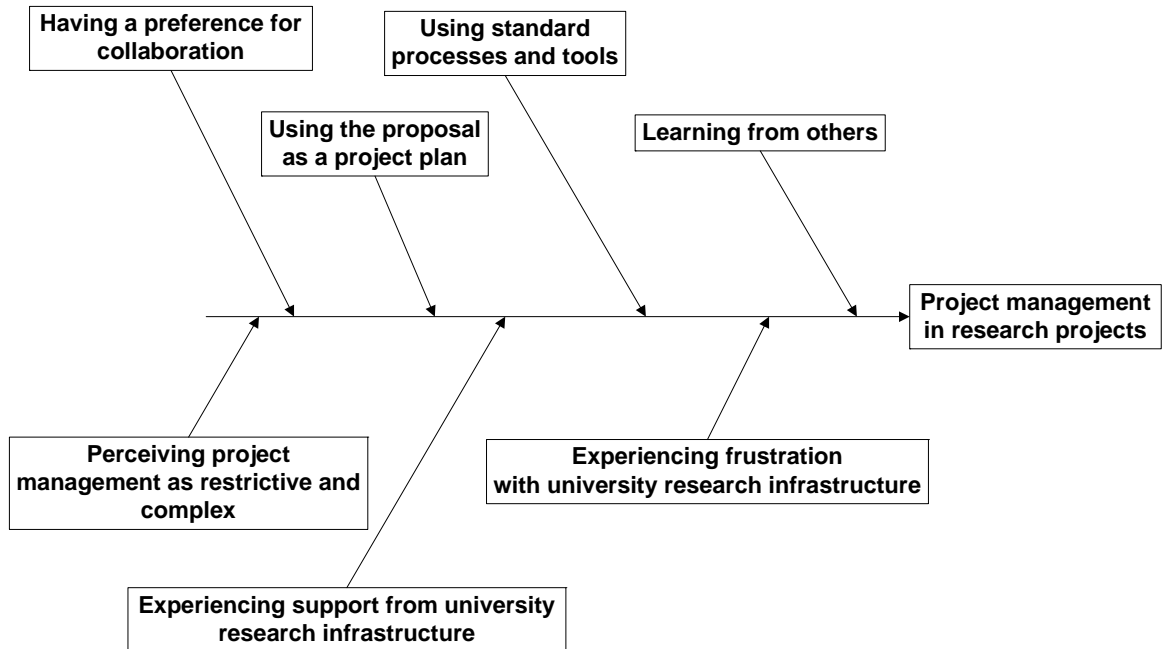
Figure 1. Factors that influence professors' use of project management in research

projects.

A further discussion of these findings appears in chapter 5. This discussion

includes the researcher's insights, limitations, unanticipated findings, implications for

improving practice, and recommendations for future research.

CHAPTER 5: DISCUSSION

The purpose of this research was to identify factors that influence the use of project management processes and tools in higher education research projects by investigating the project management practices of professors. Using a qualitative grounded theory approach that included in-depth interviews with 22 assistant professors, the researcher examined how these individuals used project management processes and tools in their research projects and factors that enabled, motivated, and/or inhibited the use of project management processes and tools in research projects. This chapter will discuss the major theories and relationships that emerged based on the following research questions.

1. What project management processes and tools, if any, do professors use to manage research projects?

2. How do professors use project management processes and tools in research projects?

3. What factors enable and motivate professors' use of project management processes and tools in research projects?

4. What factors inhibit professors' use of project management processes and tools in research projects?

Based on the results presented in chapter 4, the researcher developed a grounded theory in which participants:

- Used some standard project management processes and tools as defined by the PMBOK®. (This statement addresses research question 1.)

- Leveraged the proposal document as the blueprint for the project, much like the standard project management plan defined by the PMBOK®. (This statement addresses research question 1.)

- Demonstrated a preference for collaborating with colleagues, stakeholders, and/or students in managing research projects. (This statement addresses research question 2.)

- Found support as well as frustration in dealing with infrastructure designed to facilitate the research process. (This statement addresses research question 2.)

- Learned how to manage and how not to manage projects based on prior experiences, particularly mentoring in graduate school. (This statement addresses research question 3.)

- Perceived project management processes and tools as somewhat restrictive and complex. (This statement addresses research question 4.)

The following discussion reviews the major results of the study and explores the researcher's insights, limitations, unanticipated findings, implications for improving practice, and recommendations for future research.

<div align="center">Researcher's Insights</div>

Although no studies were indentified that directly addressed the project management practices of professors managing research projects, the researcher's insights

will provide examples of how this study supports or extends previous literature. In addition, this section will describe the meaning of key findings.

Project-Focus

Throughout the study, participants provided candid and thoughtful responses to the interview questions while also expressing enthusiasm for the topic and a desire to learn more about how they could apply project management to further their research efforts. Many said that the interview helped them to see what they were doing to manage projects that they had not considered before. This was particularly true when participants were asked about the tools they used. Some participants were not aware of using project management processes and tools. Yet, those same participants were able to name several tools after the researcher probed further. Some participants reported spending a great deal of time thinking about their research topic, methods, and participants, without giving much consideration to the processes and tools they needed to manage that research. As suggested in chapter 1, participants described a *project-focus* as opposed to a *project management-focus* (Bryde & Leighton, 2009), since they did not always recognize how and when to use project management processes and tools.

A key principal of adult learning states that learners must have a compelling reason to learn a new concept or to extend an existing skill (Knowles, Holton, & Swanson, 2005). Since some participants described a lack of awareness of project management processes and tools, it is unlikely that they would feel a compelling need to learn more about project management. In addition, professors who have been successful in research and publication in the past may not feel compelled to find more efficient or effective means of managing their research projects.

Organizational Learning

As discussed in chapter 2, organizational learning refers to the organization's ability to capture and share knowledge including best practices and lessons learned (Cook & Yanow, 1993). Participants described ways in which they encouraged organizational learning where the organization was defined as those involved in the project (e.g., research group, project team). In many cases, participants described leading a research group – either a temporary group formed to address the needs of a particular research project or an ongoing group that existed to manage projects. Eileen recognized the need to organize and maintain project information so that: ". . . there's some cumulative knowledge that can get passed down in writing without me telling people" (December 17, 2010). By leveraging project management best practices from others, learning from other's mistakes, and documenting and sharing project norms, many participants created an environment for organizational learning to flourish.

Cycle of Mentoring

An additional significant finding was related to participants' experiences with project management as graduate students. These experiences, both positive and negative, had a profound effect on how participants managed their projects. Participants also recognized that they had both an opportunity and a responsibility to model project management processes and tools for their own students. Given these findings, and the interest that many participants expressed in learning more about project management, it appears that participants would benefit from a project management model specific to the needs and perspectives they shared. The researcher will consider developing this model as part of a future research project.

Journey to the Professoriate

Participants shared many reasons for choosing the professoriate as a career. In several cases, participants described career progressions that led them from positions as classroom teachers to roles in educational administration, and ultimately to the professoriate. The four participants who described career paths or volunteer opportunities that included experience outside of education also indicated the greatest awareness of project management processes and tools. For instance, Peyton described how he became aware of project management through his religious affiliations:

> One of the things that has become really clear to me was how useful the training I got as a missionary and in a lot of my church roles have played in project management. I've had some actual formal training in terms of project management from leadership roles in the church as a lay-clergy. (November 9, 2010).

Research Contributions

Participants described the factors that influenced their use of project management processes and tools, and this information will contribute to the future development of a project management model for professors managing research projects. Several participants expressed a desire to learn more about project management, and this research will therefore have implications for professional development for professors who manage their own research projects and mentor student researchers. As discussed in chapter 1, using project management processes and tools results in an increased likelihood of project success through the efficient use of resources and the management of issues and risks (Project Management Institute, 2008). The use of project management processes

and tools in research projects may reduce the time it takes to conduct and disseminate research project outcomes to researchers and practitioners alike. In the end, successful research projects in the field of education can lead to the transformation of educational practices.

Limitations

The main limitation of this study is the sampling strategy, which included identifying potential participants from an available population of assistant professors who had recently conducted (or were currently conducting) funded research in the field of education at a doctoral-granting institution. This type of purposive and convenience sampling may limit broad generalizability. However, the research design (qualitative, grounded theory) was less concerned with generalizability to broad audiences than with finding similarities across participants and contexts to form a grounded theory. Therefore, this limitation is acknowledged, but not considered a significant issue. A theoretical sampling strategy (as described in chapter 2) was used to ensure that selected categories reached a point of saturation and enabled a meaningful grounded theory to emerge.

Two additional limitations exist. First, the size of projects that participants described varied widely – from those that required little to no funding to those that required several million dollars in funding. Participants were chosen based on having managed funded projects (in any dollar amount) in the past two years. Even though project management processes and tools can be used effectively regardless of project size, the variation in project size may limit the comparisons that can be made across participants. Second, the culture of autonomy and academic freedom that exists in many doctoral-granting universities may inhibit professors' use of project management

processes and tools. While project management flourishes in business settings that emphasize teamwork and continuous process improvement, university culture does not typically provide incentives for professors to use project management processes and tools. Therefore, results are limited to interpretation within the context of the university culture.

<div align="center">Unanticipated Findings</div>

There were two surprising findings associated with this study. First, as discussed in chapter 1, the researcher suggested that terminology used to describe project management processes and tools in higher education settings might differ significantly from the terminology that is used in business settings and reflected in the PMBOK®. However, the terminology participants used to describe their project management processes and tools did not significantly differ from the standard terminology used in the PMBOK®. In fact, many participants referred to the same basic terms (e.g., task list, schedule, and stakeholder). Notably, though not surprisingly, absent from participants responses were terms dealing with more complex project management concepts such as risk management and quality management. Second, participants responded to interview question 22 (In your opinion, what is the purpose of conducting scholarly research?) in a variety of ways, many of which were surprising to the researcher. Responses included: the need to publish in order to secure tenure, a desire to inform practice, and a passion for asking questions and seeking answers. However, most participants also mentioned the need to make a contribution to society. Eileen's response summarized the sentiments of many participants:

I do not have a luxurious lifestyle at all. I don't get paid that much money, and I

work crazy hours, and I have a ridiculous amount of stress in my life. So, I

wouldn't do it if there wasn't some greater societal purpose. (December 17,

2010).

Although these two findings were not anticipated, they do not indicate any issues

with the study itself. Instead, they provide greater insight into the experiences of

participants and may lead to future study of these topics.

Implications for Improving Practice

While a single study of this topic cannot provide a universal basis for explaining

how project management is used in higher education, this study suggests that there are

several ways that professors and universities can increase the likelihood of research

project success. The following suggestions for improving project management practices

in higher education were drawn from participants' responses.

Preparation

The majority of participants indicated that they had not received any formal

training on project management although many expressed an interest in learning more.

Professors should take advantage of opportunities to learn about project management,

particularly as it relates to their research projects. Learning about project management

would enable professors to select and apply a variety of project management processes

and tools that support the objectives of their research projects and to effectively mentor

their graduate students. Many universities offer professional development courses related

to the grant-writing process. Ideally, universities could enhance their professional

development offerings with course(s) on project management or include project

management as a topic within existing courses. In addition, professors who mentor

assistant professors should be encouraged to learn more about project management and to

share their project management best practices with assistant professors.

Support

   Participants described how important *support* was for their research projects in

terms of finding grants, writing and submitting proposals, and creating and managing

budgets. Professors should be resourceful in locating, understanding, and utilizing all the

research support services available at the department, college, and/or university level.

Universities should continue to publicize their research support services to professors. At

the same time, universities should establish a method that insures continuous process

improvement for the research support services they provide. Where necessary,

universities should broaden and/or deepen research support services to include a

complete support system for funded as well as unfunded research. In addition,

universities should consider developing a systematic process to engage assistant

professors in research support services. This could take place through orientation

programs for new faculty or distribution of information through established

communication channels (e.g., Web sites, e-mail, faculty meetings, faculty mentors).

Relationships

   The projects that participants described did not exist in a vacuum. Participants

relied on relationships with key personnel to conduct their research. Professors should

identify key stakeholders who are important to the success of their individual research

projects as well as their overall research agenda. These stakeholders may include

university research services, deans of research, funding agencies, and research site

contacts. After identifying stakeholders, professors should build and maintain

relationships with them while keeping in mind stakeholders' communication preferences

and their relative influence on projects and the research agenda. In addition, professors

should consider joining or establishing professional networks that provide support for

research. Universities can facilitate these relationships by organizing research special

interest groups and otherwise bringing researchers with common interests together.

<div align="center">Recommendations for Future Research</div>

Additional research is needed to describe the experiences of professors in other

disciplines. For example, it would be interesting to examine how engineering professors

use project management processes and tools in their research since project management

practices are more mature in the field of engineering (Bryde & Leighton, 2009).

Additional research may lead to a model of project management appropriate for

professors regardless of discipline. This model would present best practices for managing

research projects and also dispel project management misconceptions.

To compliment the study of professors' experiences with project management, the

researcher suggests that additional study would include others who are directly involved

in the research projects. For instance, members of the research group should be studied as

a means of understanding the way project management is used at various levels – from

the project manager (typically the professor) to the project team member (typically a

graduate student or post-doc). Additionally, the perspectives of research participants

should be considered. Funding agencies should be queried to determine what they expect

from and what they can provide to principal investigators.

In this study, professors' project management practices were compared to project management practices that are common in business contexts. While participants described using many business-oriented project management processes and tools, future research should consider the role that university culture may play in research projects. For instance, the degree to which a university may encourage or discourage organizational learning, particularly the sharing of best practices – a common expectation in business culture - may impact the project management practices of professors. In addition, the organizational structure and function of research groups, which may parallel that of project teams in a business context, may influence the project management processes and tools used by professors.

Conclusion

Project management is a systematic approach to meeting project goals, and using project management processes and tools increases the likelihood that a project will meet its goals within the parameters of scope, time, cost, and quality. The findings of this research led to a grounded theory that described the project management practices and motivations of participants. The implications of this grounded theory include recommendations that may apply to individuals as well as universities. Enhancing the project management preparation that professors receive, broadening the research support systems available to professors, and providing opportunities for professors to develop relationships that are critical to their research will lead to better project outcomes. Future research is needed to define a project management model appropriate for higher education. This model would include the perspectives of various academic disciplines as well as project team members and other stakeholders. The results of this study will

contribute to the broader context of informing and ultimately transforming professors'

project management practices.

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APPENDIX A: RECRUITMENT SCRIPTS

E-mail Recruitment Script

Dr. _____,

I am a doctoral candidate in Educational Leadership at the University of North Carolina at Charlotte. My dissertation research is focused on examining the project management practices of professors, particularly assistant professors who have managed funded research projects in the past two years.

I would very much appreciate the opportunity to conduct a brief (45 - 60 minute) phone interview with you at your convenience.

I have attached the informed consent document that provides additional information about my study and your potential participation. If you are interested in being interviewed, please sign and return the informed consent document to me at saalpert@uncc.edu or (home address).

Thank you very much!

Shannon Alpert
UNC Charlotte
Doctoral Candidate
Educational Leadership
saalpert@uncc.edu

Recruitment E-mail Follow-Up Phone Call Script
(Phone call/message follow-up typically 3 – 5 days after the e-mail as needed.)

Hello, Dr. _____! This is Shannon Alpert from the University of North Carolina at Charlotte. I sent you an e-mail on (*insert date*) asking if you would be willing to talk with me about your experience managing research projects. This is part of my dissertation research, and I would really appreciate the opportunity to interview you. I promise to take only take 45 – 60 minutes of your time. And, of course, we can schedule this at your convenience. If you are willing to be interviewed, please e-mail me at saalpert@uncc.edu. Thank you! I hope to hear from you soon!

APPENDIX B: INFORMED CONSENT DOCUMENT

**Informed Consent for
Project Management in Higher Education**

Purpose

You are invited to participate in a dissertation research study entitled "Project Management in Higher Education." The purpose of this study is to identify the factors that influence the use of project management in higher education by examining the project management practices of professors.

Investigator

Primary Investigator: Shannon A. Alpert, Doctoral Candidate, Educational Leadership, UNC Charlotte
Faculty Contact: Dr. Richard Hartshorne, Associate Professor, Educational Leadership, UNC Charlotte

Eligibility

This investigation will focus exclusively on assistant professors working in colleges of education or other education-related areas at doctoral-granting universities who are currently working on funded research projects or have worked on funded research projects in the past two years. UNC Charlotte faculty in the Department of Educational Leadership will not be considered for inclusion; however, faculty from other UNC Charlotte education departments may be considered for inclusion. Staff members, students, adjunct professors, retired professors, and instructors who are not professors will not be considered for inclusion.

Overall Description of Participation

Each participant will participate in an in-depth, semi-structured interview with the researcher.

Length of Participation

Participation will last approximately 1 ½ hours. This time includes participating in an interview (60 minutes) and follow-up conversation (15 - 30 minutes). Interview transcripts will be available upon request.

Risks and Benefits of Participation

There are no anticipated risks to participation. However, the project may involve risks that are not currently known. This study will create an awareness of the factors that influence project management use and benefits in higher education. It may also have implications for future project management courses and for continuing education for professors. In addition, this research may establish the foundation for a project management model that is sensitive to the needs of professors managing research projects. In turn, this could result in cost, time, and resource savings. Participants may benefit from being involved in this research by having the opportunity to reflect upon their understanding of project management processes and tools.

Volunteer Statement

You are a volunteer. The decision to participate in this study is completely up to you. If you decide to be in the study, you may stop at any time. You will not be treated any differently if you decide not to participate in the study or if you stop once you have started.

Confidentiality Statement

Any information about your participation, including your identity, is completely confidential. The following steps will be taken to ensure this confidentiality:
- Data will be stored on the researcher's computer. Electronic data, including transcripts, communications, and audio files, will be stored and backed-up on a personal, non-networked computer.

- Audio files will be erased from the recorder once the files have been uploaded to the non-networked computer. Audio files will be erased from the non-networked computer at the conclusion of the study.

- Hard copies of data will be stored in a locked filing cabinet. Hard copies of draft data collection and analysis reports, including transcripts, will be shredded.

- Only those involved with the research project will have access to the data.

Statement of Fair Treatment and Respect

UNC Charlotte wants to make sure that you are treated in a fair and respectful manner. Contact the university's Research Compliance Office (704-687-3309) if you have questions about how you are treated as a study participant. If you have any questions about the actual project or study, please contact Shannon Alpert (704-849-9236, saalpert@uncc.edu) or Dr. Richard Hartshorne (704-687-8711, rhartsho@uncc.edu).

Approval Date

This form was approved for use on June 21, 2010 (#10-06-19), for use for one year.
This form was amended and approved for use on September 21, 2010 (#10-06-19).

Participant Consent

I have read the information in this consent form. I have had the chance to ask questions
about this study, and those questions have been answered to my satisfaction. I am at least
18 years of age, and I agree to participate in this research project. I understand that I will
receive a copy of this form after it has been signed by me and the principal investigator of
this research study.

_____

Participant Name (PRINT)   DATE

_____

Participant Signature   DATE

_____

Investigator Signature   DATE

APPENDIX C: PARTICIPANT DEMOGRAPHICS

Participant Number	Gender	Years as Assistant Professor	Region of US
1	Male	3	Southeast
2	Male	6	Southeast
3	Male	4	Southeast
4	Male	6	Midwest
5	Female	3	Southeast
6	Female	3	Midwest
7	Male	3	Midwest
8	Female	Less than 1	Southeast
9	Female	4	Northeast
10	Female	7	Southeast
11	Female	3	Midwest
12	Female	5	Midwest
13	Female	5	Southeast
14	Female	2	Midwest
15	Male	1	Southeast
16	Male	3	West
17	Male	4	Southeast
18	Female	4	Midwest
19	Male	8	Southeast
20	Female	4	West
21	Male	2	Southeast
22	Female	2	Midwest

APPENDIX D: SEMI-STRUCTURED INTERVIEW GUIDE

Warming-Up (used to establish rapport and gather/verify demographic information)

1. According to my records, you are currently on the faculty at (*insert institution*) in the college of (*insert college*) and department of (*insert department*), and you are an assistant professor. Do I have that correct?

2. When did you begin working as a professor?

3. What made you decide to become a professor?

Managing Research Projects in General

4. What percent of your time is devoted to teaching, research, and service?

5. On average, how many hours do you spend in meetings with three or more people on a weekly basis?

6. Please tell me about any formal or informal training you have had in project management. Formal training could include taking a course on project management, and informal training could include observing others managing projects. [If mentoring is not mentioned, ask: Did you have any mentors in graduate school who gave you insight into managing research projects? If so, please tell me about that experience.]

7. When managing a research project, who do you update on your progress, and how do you update them? (reworded)

8. How do you plan your research projects? Planning may include creating a timeline, listing necessary tasks, or conducting other planning-related activities. [If proposal is not mentioned, ask: How do you use proposals to plan and manage your research projects?]

9. Describe the support that you receive from your university with regard to your research. This may include support from an office of research services or a business office.

10. When you manage a research project, who else is typically involved in the project?

11. Tell me about an issue you have had during one of your research projects. How did you handle the issue?

12. Do you involve your graduate or undergraduate students in your research projects? If so, how?

13. Do you follow similar steps in completing most of your research projects? If so, please briefly describe those steps.

Managing a Specific Research Project

14. In your role as a professor, please describe one of the funded research projects you are managing or have managed in the past two years. [Depending on the nature of the response, questions 15-20 may be asked.]

15. How did you get started with this project?

16. Who was involved in the project?

17. How did you determine what needed to be researched?

18. What happened along the way?

19. Did you encounter anything unexpected (e.g., something that could change the project's focus or timeline)? If so, please describe how you dealt with that situation.

20. How did you complete this project?

21. What tools did you use to complete this project? (Tools may include a project plan/schedule, list of issues to be resolved, list of risks to consider, specific software programs, etc...)

Purpose of Research Projects

22. In your opinion, what is the purpose of conducting scholarly research?

23. Do you think it is important to follow a similar process and use similar tools to manage your research projects? If so, why? If not, why not?

Use of Project Management

24. What motivates you to use project management processes and/or tools?

25. If there are project management processes or tools that you choose not to use, what keeps you from using them?

Closing

26. Is there anything else you would like to share?

27. Do you have any questions for me?

APPENDIX E: VISUAL DEPICTION OF DATA ANALYSIS PROCESS

```
┌──────────────────┐        ┌──────────────────┐
│  Conduct semi-   │───────▶│   Summarize      │
│   structured     │        │  interviews (pre-│
│   interviews     │        │   transcription) │
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         │
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┌──────────────────┐        ┌──────────────────┐
│                  │        │    Summarize     │
│    Transcribe    │───────▶│ interviews (post-│
│    interviews    │        │   transcription) │
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│                  │◀──────▶│    Identify      │
│  Code transcripts│        │  categories from │
│                  │        │      codes       │
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         │                           │
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┌──────────────────┐        ┌──────────────────┐
│  Create memos to │◀──────▶│  Create visual(s)│
│ verbally describe│        │   to describe    │
│    categories    │        │    categories    │
└──────────────────┘        └──────────────────┘
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Reflexive field journal, Peer review,
Member-checking, Memo-writing
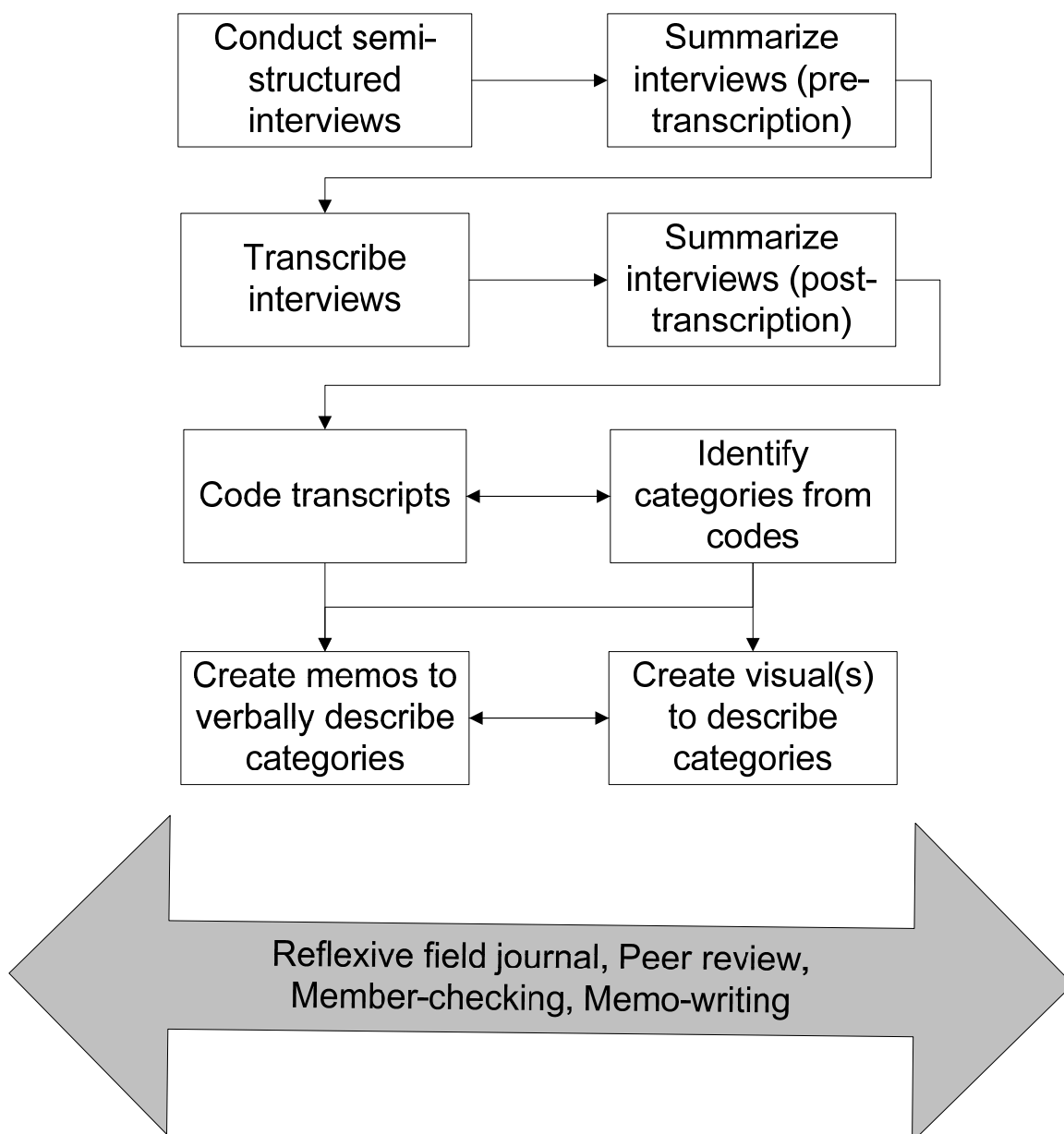
APPENDIX F: ALIGNMENT OF INTERVIEW QUESTIONS

Interview Questions	Related Research Questions, PMBOK® Process Groups, and Alpha Characteristics
1. According to my records, you are currently on the faculty at (*insert institution*) in the college of (*insert college*) and department of (*insert department*), and you are a/an assistant professor. Do I have that correct?	N/A
2. When did you begin working as a professor?	N/A
3. What made you decide to become a professor?	N/A
4. What percent of your time is devoted to teaching, research, and service?	3. What factors enable and motivate professors' use of project management processes and tools in research projects? 4. What factors inhibit professors' use of project management processes and tools in research projects?
5. On average, how many hours do you spend in meetings with three or more people on a weekly basis?	N/A Alpha characteristic: Focus and prioritization
6. Please tell me about any formal or informal training you have had in project management.	3. What factors enable and motivate professors' use of project management processes and tools in research projects? 4. What factors inhibit professors' use of project management processes and tools in research projects? Alpha characteristic: Attitude and belief

Interview Questions	Related Research Questions, PMBOK® Process Groups, and Alpha Characteristics
7. When managing a research project, who do you update on your progress, and how do you update them?	1. What project management processes and tools, if any, do professors use to manage research projects? 2. How do professors use project management processes and tools in research projects? Alpha characteristic: Communication, Alignment PMBOK® Process Group: Monitor and Control
8. How do you plan your research projects?	1. What project management processes and tools, if any, do professors use to manage research projects? 2. How do professors use project management processes and tools in research projects? Alpha characteristic: Approach PMBOK® Process Group: Plan
9. Describe the support that you receive from your university with regard to your research.	1. What project management processes and tools, if any, do professors use to manage research projects? 2. How do professors use project management processes and tools in research projects? Alpha characteristic: Alignment PMBOK® Process Group: All
10. When you manage a research project, who else is typically involved in the project?	1. What project management processes and tools, if any, do professors use to manage research projects? 2. How do professors use project management processes and tools in research projects? Alpha characteristic: Relationship and conflict

Interview Questions	Related Research Questions, PMBOK® Process Groups, and Alpha Characteristics
11. Tell me about an issue you have had during one of your research projects. How did you handle the issue?	1. What project management processes and tools, if any, do professors use to manage research projects? 2. How do professors use project management processes and tools in research projects? Alpha characteristic: Issue management
12. Do you involve your graduate or undergraduate students in your research projects? If so, how?	1. What project management processes and tools, if any, do professors use to manage research projects? 2. How do professors use project management processes and tools in research projects? Alpha characteristic: Leadership
13. Do you follow similar steps in completing most of your research projects? If so, please briefly describe those steps.	1. What project management processes and tools, if any, do professors use to manage research projects? 2. How do professors use project management processes and tools in research projects? PMBOK® Process Group: All
14. In your role as a professor, please describe one of the funded research projects you are managing or have managed in the past two years. (Depending on the nature of the response, questions 15-20 may be asked.)	1. What project management processes and tools, if any, do professors use to manage research projects? 2. How do professors use project management processes and tools in research projects?
15. How did you get started with this project?	1. What project management processes and tools, if any, do professors use to manage research projects? 2. How do professors use project management processes and tools in research projects? PMBOK® Process Group: Initiate

Interview Questions	Related Research Questions, PMBOK® Process Groups, and Alpha Characteristics
16. Who was involved in the project?	1. What project management processes and tools, if any, do professors use to manage research projects? 2. How do professors use project management processes and tools in research projects? PMBOK® Process Group: Initiate
17. How did you determine what needed to be researched?	1. What project management processes and tools, if any, do professors use to manage research projects? 2. How do professors use project management processes and tools in research projects? PMBOK® Process Group: Plan
18. What happened along the way?	1. What project management processes and tools, if any, do professors use to manage research projects? 2. How do professors use project management processes and tools in research projects? PMBOK® Process Group: Execute
19. Did you encounter anything unexpected (e.g., something that could change the project's focus or timeline)? If so, please describe how you dealt with that situation.	1. What project management processes and tools, if any, do professors use to manage research projects? 2. How do professors use project management processes and tools in research projects? PMBOK® Process Group: Monitor and Control

Interview Questions	Related Research Questions, PMBOK® Process Groups, and Alpha Characteristics
20. How did you complete this project?	1. What project management processes and tools, if any, do professors use to manage research projects? 2. How do professors use project management processes and tools in research projects? PMBOK® Process Group: Close
21. What tools did you use to complete this project? (Tools may include a project plan/schedule, list of issues to be resolved, list of risks to consider, or others.)	1. What project management processes and tools, if any, do professors use to manage research projects? 2. How do professors use project management processes and tools in research projects?
22. In your opinion, what is the purpose of conducting scholarly research?	3. What factors enable and motivate professors' use of project management processes and tools in research projects? 4. What factors inhibit professors' use of project management processes and tools in research projects?
23. Do you think it is important to follow a similar process and use similar tools to manage your research projects? If so, why? If not, why not?	3. What factors enable and motivate professors' use of project management processes and tools in research projects? 4. What factors inhibit professors' use of project management processes and tools in research projects?
24. What motivates you to use project management processes and/or tools?	3. What factors enable and motivate professors' use of project management processes and tools in research projects? 4. What factors inhibit professors' use of project management processes and tools in research projects?

Interview Questions	Related Research Questions, PMBOK® Process Groups, and Alpha Characteristics
25. If there are project management processes or tools that you choose not to use, what keeps you from using them?	3. What factors enable and motivate professors' use of project management processes and tools in research projects? 4. What factors inhibit professors' use of project management processes and tools in research projects?
26. Is there anything else you would like to share?	N/A
27. Do you have any questions for me?	N/A

APPENDIX G: DATA ANALYSIS PROCESS BY RESEARCH QUESTION

Research Questions	Primary Data Sources
1. What project management processes and tools, if any, do professors use to manage research projects?	Interview questions 7-21
2. How do professors use project management processes and tools in research projects?	Interview questions 7-21
3. What factors enable and motivate professors' use of project management processes and tools in research projects?	Interview questions 4, 6, 22 - 25
4. What factors inhibit professors' use of project management processes and tools in research projects?	Interview questions 4, 6, 22 - 25

APPENDIX H: 20 MOST-USED CODES BY WORD COUNT

CODES-PRIMARY-DOCUMENTS-TABLE (CELL=WORDCOUNT)						
Report created by Super - 03/28/2011 02:48:44 PM						
HU: [C:\Users\ShannonandScott\Documents\Scientific Softwa...\EdD Dissertation_Janu						
Code-Filter: All [193]						
PD-Filter: All [22]						
Quotation-Filter: All [2378]						
	Description of project	Being supported by university infrastructure (business office, etc.)	Involving students in research	Using project management tools	Planning a project	Working through academic bureaucracy
1	524	114	181	241	459	99
2	951	357	177	34	212	368
3	1801	259	735	45	348	228
4	1458	416	378	113	275	351
5	0	1747	766	305	463	949
6	871	294	312	684	182	33
7	1038	1018	401	795	781	306
8	578	84	179	124	365	88
9	322	423	698	190	85	432
10	298	212	14	19	0	0
11	266	837	153	811	345	182
12	87	480	181	201	317	875
13	0	252	175	703	180	0
14	0	477	489	48	449	589
15	669	291	268	567	596	58
16	437	149	305	235	490	0
17	313	262	59	312	110	0
18	0	293	145	386	15	0
19	0	544	199	473	459	241
20	63	167	153	222	0	0
21	0	758	1304	84	69	274
22	1081	435	267	160	269	0
TOTALS:	10757	9869	7539	6752	6469	5073

	Managing project issues	Collaborating with colleagues	Mentoring or being mentored	Managing a differentiated workload	Career development/ advancement
1	178	233	17	155	35
2	81	105	156	33	0
3	488	411	268	211	136
4	779	0	404	90	112
5	0	98	505	204	61
6	458	24	215	40	35
7	409	122	70	66	429
8	215	73	105	71	40
9	26	13	260	395	337
10	220	898	25	146	87
11	0	499	252	246	904
12	0	42	88	182	39
13	466	363	289	82	244
14	431	181	49	220	103
15	199	316	97	187	313
16	203	39	140	325	43
17	420	0	130	32	66
18	197	35	256	133	107
19	163	77	201	319	75
20	0	219	50	130	0
21	77	258	134	70	21
22	0	0	197	213	261
TOTALS:	5010	4006	3908	3550	3448

	Creating a proposal	Leading a research group	Choosing a career	Project management training	Defining the purpose of research
1	34	0	0	0	123
2	137	0	0	23	250
3	94	0	0	15	396
4	243	0	0	76	0
5	214	0	117	34	0
6	41	716	0	28	0
7	194	0	41	140	0
8	152	0	75	0	70
9	94	0	179	7	88
10	91	0	176	142	71
11	122	0	251	6	15
12	68	0	193	178	28
13	23	67	157	281	85
14	674	0	203	173	214
15	61	0	348	380	57
16	173	0	358	160	222
17	167	0	155	48	174
18	22	739	65	353	59
19	177	0	122	369	149
20	206	399	44	183	0
21	170	1138	262	0	295
22	75	0	200	277	0
TOTALS:	3232	3059	2946	2873	2296

	Organizational climate/culture	Description of graduate program/student body	Meeting with others	Following a project management process
1	0	0	87	0
2	0	36	31	0
3	0	532	197	0
4	0	12	117	431
5	0	191	171	120
6	0	119	9	0
7	0	285	0	0
8	0	0	2	161
9	0	347	7	162
10	0	58	9	111
11	304	43	23	0
12	0	228	9	285
13	219	0	215	20
14	423	10	59	122
15	168	156	101	12
16	24	0	8	0
17	84	0	43	61
18	678	149	653	25
19	158	0	88	0
20	46	0	111	53
21	23	0	127	100
22	145	83	19	300
TOTALS:	2272	2249	2086	1963

APPENDIX I: MOST FREQUENTLY-MENTIONED PROJECT MANAGEMENT

TOOLS

Most Frequently-Mentioned Project Management Tools

Number of participants

(Bar chart: Timeline/calendar 20, Spreadsheets/tables 9, Google Documents 9, Task list 8, Proposal 8, Shared file storage 7, Other Google tools 6, Skype 3, Meeting notes 3)
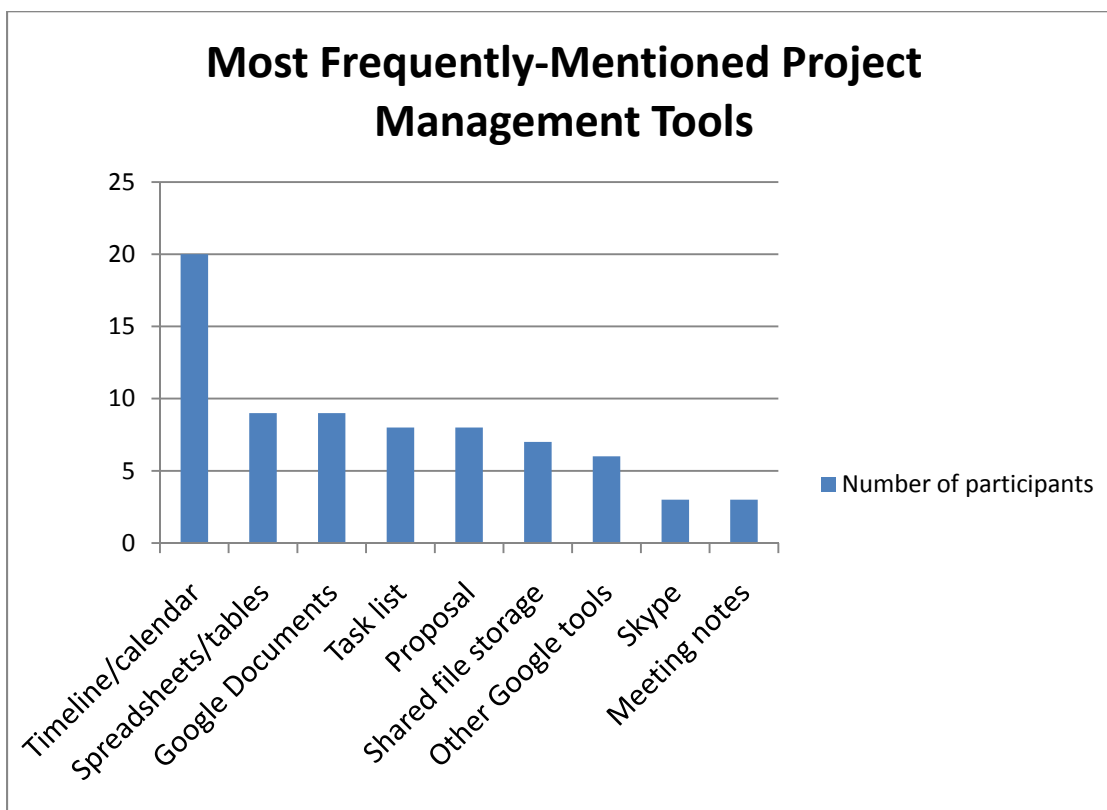
APPENDIX J: AXIAL CODING MAP

Processes

Collaboration

1. What

Tools

2. How

Interpersonal characteristics

Proposals as tools

Support

Mentoring

Restrictive and complex

3. Motivate

Accountability

4. Inhibit

Awareness and time

Efficiency

Project size