ABSTRACT

ROHRBOUGH, MARK CURTIS. A Case Study on Project Manager Learning in a Large Information Technology Organization. (Under the direction of Dr. Michelle E. Bartlett.)

This thesis is a case study of Information Technology project manager learning in a large financial services organization. The purpose of this study is to understand how project managers learn to manage projects. The reasons for doing this study are that (a) project managers have a significant impact on the success of projects, and projects are the primary means used by many organizations to execute their strategies, (b) the project management literature identifies a need to develop project managers with new ways of thinking about project management, and (c) the project management literature identifies experience as the primary means by which project managers learn to manage projects, yet it gives little insight into how this learning occurs. This study found evidence of project managers learning on the job and creating knowledge that project managers themselves valued. It describes the situations associated with the learning experiences analyzed in this study and develops a concept map of how the project managers thought about the knowledge that was created. It also describes some of the methods project managers employ to learn.

A Case Study on Project Manager Learning in a Large Information Technology Organization

by
Mark Curtis Rohrbough

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APPROVED BY:

Dr. Michelle E. Bartlett
Committee Chair

Dr. James Bartlett

Dr. Dianne D. Chapman

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BIOGRAPHY

Mark Rohrbough is an Information Technology practitioner with three decades of experience in a varied set of management and individual contributor roles that include Industrial Engineer, programmer, trainer, systems analyst, organizational leader, consultant, coach, and advisor. His goal in pursuing a Master's in Human Resource Development is to build on his experience by developing new skills to move into other roles as trainer, advisor, teacher, and consultant to management teams and leaders in the IT community.

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CHAPTER 1: INTRODUCTION

Information Technology (IT) project managers manage projects to bring ideas from concept to reality to achieve business results valued by their project sponsors. Because these project managers (PM) play a key role in determining the success of the project, organizations are interested in developing their project managers' project management knowledge, skills, and abilities to improve project success. Researchers studying projects and project management have pointed out weaknesses in the most common development approach, training, and argue that both the content and the delivery of the training are insufficient to develop project managers that can manage complex projects (Carbone, 2006, p. 354; Crawford & Gaynor, 1999, p. 3; Crawford, Morris, Thomas, & Winter, 2006, pp. 723–724; Egginton, 2012, pp. 520–521; Hans Jurgen Thamhain, 1991, p. 41; Winter, Smith, Morris, & Cicmil, 2006, p. 642). In addition, even though some researchers argue that experience is the primary way that project managers learn to manage projects (Crawford & Gaynor, 1999, p. 5; Hans Jurgen Thamhain, 1991, p. 41), little is said in the literature about how project managers learn from their experience or even what those experiences are. This learning phenomenon of how project managers learn to manage projects from experience is the subject of this paper. The purpose of this chapter is to introduce key concepts needed to understand project management, to explain why project manager learning matters, and to explain how this learning phenomenon can be studied. Following this discussion, Chapter 2 discusses the literature relevant to project manager learning. Chapter 3 will describe the

methods used to study this phenomenon, and Chapter 4 will present the findings. Finally, Chapter 5 will discuss the implications of these findings for practice and the field of HRD.

Background and Context

Long before academics and practitioners spoke of project managers and project management and long before any recognized principles and practices were defined that would today be recognized as project management, people were executing projects to bring ideas to reality. Examples of projects before there was project management include the construction of the Giza Pyramids, Stonehenge, cooking, and hunting (Morris, 2013, pp. 12–13; Packendorff, 1995). In fact, it was not until 1953-1954 that the position of project manager was formally recognized when it was coined by the Martin (Marietta) and McDonnell Aircraft companies. Later that same decade, *The Harvard Business Review* published "The Project Manager" by Paul Gaddis (1959), indicating that the project manager role was now receiving general management attention (Morris, 2013, p. 36).

The emergence of project management. As this growing awareness of project management continued in the 1960s, demand for project managers grew, and groups of project managers began meeting to share practices and discuss their experiences. Out of these meetings the Project Management Institute (PMI) was created in 1969 (Project Management Institute, Inc, 2014). In the 1970s, PMI began to discuss the idea of project manager certification as part of their goal to develop the project management profession; however, to certify project managers, a body of project management knowledge was needed as the basis for this certification. Therefore, PMI established a body of knowledge unique to

project management that is now called the Project Management Body of Knowledge (PMBOK). As a result, PMI published a pilot body of knowledge in 1983, and then in 1987 formally published *A Guide to the Project Management Body of Knowledge* (also called the *PMBOK Guide*). Since that time, there have been several updates with the most recent being published in 2013 (Morris, 2013, pp. 52–55; Project Management Institute, 2013). In parallel with this codification of project management practice in PMBOK, many of these practices were studied in the growing body of project management research literature that began to emerge in published peer-reviewed journal articles, conference papers, and books. These publications more than doubled each year since 1960. Moreover, in the decade beginning in 2000, over 5,500 publications were made, a substantial increase from the 24 publications in the decade beginning in 1960.

Though there was rapid adoption of project management in industries such as construction and defense, the move toward project management took longer to develop in IT. One of the challenges of managing projects in technology settings is eliciting and managing requirements that define the system being developed. As a result of these challenges, waterfall methods were applied to software development in the late 1980s and early 1990s, to manage large projects. Waterfall methods are built around a project lifecycle where work moves from idea, to business case that justifies the idea, to chartering a team to develop and implement the idea, to gathering requirements to explicitly state what the system ought to do, to designing a solution to meet the requirements, to building the solution, to testing the solution to make sure it meets the requirements, and finally to implementing the solution. A

typical waterfall development method is the instructional design framework ADDIE (analysis, design, development, implementation, evaluation) which is a model frequently used in training and development organizations for developing courses (Allen, 2006). The steps in the waterfall software development cycle are similar to ADDIE, and the term waterfall comes from the stair-step appearance of waterfall plans when they are represented by a Gantt chart. This approach makes is possible for different teams in different locations and working at different points in time to work on each phase of the project because most information sharing takes place at the start and stop of each phase in the lifecycle. (This information sharing is often referred to as a handoff or "throwing it over the wall" in practice because often communication is limited to these transition points.) Therefore, it was not until the 1990s with these methods in place that software project management began to develop effective capabilities because with the emergence of these methods IT project managers in the 1990s could now draw on PMI's Body of Knowledge and recognized development methods to inform their project management practices.

Even with these improvements, challenges in managing changing requirements remained because, with waterfall methods, the system users were often not shown a working system until late in the project when changes would trigger extensive rework. Therefore, new practices and ways of thinking about software development began to emerge. These new ways of thinking and working were called Agile practices in 2000-2001 because of how they help teams respond to changes in requirements by giving system users a chance to view and provide feedback on the working system as it is developed. The publication of the Agile

Manifesto in 2001 (“Manifesto for Agile Software Development,” 2015) is a statement of these Agile beliefs by a group of prominent leaders in software development and marks a turning point in codifying agile practices. Agile is a way of thinking about change such as delivering software and has much in common with action research (Baskerville, 1997; David A Kolb, 1984). Agile operates as a series of learning cycles where a single cycle is referred to as an iteration or sprint and consists of planning the work, doing the work, evaluating the work, and finding ways to improve how to work before the next cycle begins. The project team captures the work to be done in a list called a backlog, and much of the planning work involves prioritizing and structuring the backlog to determine the next most important thing to be done. One advantage of this approach over traditional waterfall planning is that the project team can change direction at the start of each sprint (Sutherland, 2014). Despite helping teams to be more adaptable, Agile does have some challenges that teams must learn to overcome. For instance, the team’s focus on short-term tasks during the sprints can limit the team’s ability to see the larger project needs. Also, Agile practices for coordinating work across multiple development teams can be a challenge for teams to learn. Given that Agile teams typically have ten or fewer members, medium to large efforts involving multiple Agile teams will need to solve the problem of coordinating work across these teams. Before agile, the coordination of this work across teams had become known as program management, and this paper includes program management when referring to project management. And while the focus that Agile practices place on task and work stream management may not be considered project management by some scholars (Morris, 2013, p. 91), Agile practices

include activities that are considered part of project management such as structuring teams, structuring work, planning work, capacity planning, and tracking work completed. But the way in which Agile teams do these things is different than how waterfall teams carry out these activities.

Though project management in IT has matured and projects have become ubiquitous, there are divergent viewpoints on how projects and project management are defined; therefore, more should be said about the nature of projects and project management. In addition to being "undertakings to realize an idea", projects can be viewed as organizational entities(Morris, 2013, p. 13). They are also viewed as "a temporary endeavor undertaken to create a unique product, service, or result" (Project Management Institute, 2013, p. 3). Consistent with these views Packendorff (1995) suggested that projects are temporary organizations with

> an organized (collective) course of action aimed at evoking a non-routine process and/or completing a non-routine product...a predetermined point in time or time-related conditional state when the organization and/or its mission is collectively expected to cease to exist…has some kind of performance evaluation criteria…is so complex in terms of roles and number of roles that it requires conscious organizing efforts (i.e. not spontaneous self-organizing). (p. 327)

Based on these ideas this paper will view projects as temporary organizations created for a specific purpose that a firm cannot realize through existing routine organizational structures and processes.

Though there seems to be wide agreement that projects need project managers to manage and lead the project team, there is disagreement about how project managers should perform this role. According to PMI (2013), "project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements" (p 5). According to Morris (2013), PMI's view of project management emphasizes monitoring and control with a focus on outputs and contrasts this with a view Morris calls the management of projects that considers both the setup and structuring of the project, the execution of the project, and is focused on outcomes (Morris, 2013, Chapter 7). Based on these ideas, this paper will view project management as the application of knowledge, skills, tools, and techniques to realize the purpose of the project. In short, projects are undertakings to realize some purpose, and project managers apply their knowledge and skills to ensure that the undertaking is successful. But understanding whether a project has been successful is not as simple as it might appear, and so it is discussed next.

Project success. Because projects exist to realize some purpose, and project managers exist to assist the project in realizing its purpose, understanding whether or not a project realizes its purpose and is successful is important to project stakeholders. However, this can be a challenge because project success means different things to different project stakeholders. For instance, some stakeholders consider efficiency measures such as budget,

scope, and schedule performance to be determinants of success. Other stakeholders would consider the benefit to the customer, the benefit to the organization, or preparing for the future to be the key success measures. Still other stakeholders would take an approach similar to the Balanced Scorecard (a reporting approach that uses a combination of business measures such as customer satisfaction, employee engagement, operating effectiveness, and financial performance to describe the health of the organization (Kaplan, 1996)) and consider the combination of these four factors to be the success measure. The Balanced Scorecard approach conceptualizes success as a multi-dimensional concept, and which measures are most applicable depends on the stakeholder's role, the level of technology risk in the project, and the point in time when stakeholders evaluate success (Shenhar, Dvir, Levy, & Maltz, 2001).

Nevertheless, even though project success is a multi-dimensional concept, many research articles assert that IT projects fail at an unacceptable rate, usually around 30%, based solely on the efficiency measures of schedule, cost, and scope (The Standish Group, 2001). Researchers and organizations use this approach to measuring success because they can calculate efficiency measures in near real time as projects progress, but other measures such as customer benefit are not available until after project launch (Shenhar et al., 2001). Another reason researchers use this approach is that project managers typically see themselves as directly accountable for schedule, cost, and scope, and they are often the source of data used in research when assessing project success. In a sense, efficiency measures are leading indicators of project success; therefore, they are prominent in research articles discussing

project success, though other measures are often acknowledged. With this description of project success, it is important to consider how the project manager influences project success because the relationship between the project manager and project success is what gives this study much of its significance.

The project manager. In discussing the role of the project manager when project management was just beginning, Goodman (1967, p. 396) argues,"When the nature of the task is one of complex interdependency, there must be a person designated who can supervise the trade-off between each of the work units involved in the task accomplishment" (p.396). Later, Thamhain and Wileman (1977) elaborate on the role of the project manager, stating that

> …the project manager must be able to integrate various supporting disciplines in a continuously changing work environment. In his search for multidisciplinary problem resolution, he must often cross functional lines to deal with personnel over whom he has limited direct formal authority. Moreover, he has to build teams at various levels of the project organization. This requires an understanding of interpersonal dynamics to make sure that various specialists contribute to the end objective of the project. Thus, the challenge is for the project manager to provide an environment conducive to the motivational needs of his team members. Equally important to successful project performance is the project manager's ability to deal effectively with the inevitable conflict situations. Taken together, the role of the project

> manager is a difficult one. His project success often depends significantly on his ability to deal effectively with human behavior in a multidisciplinary environment. (p. 102)

Thirty-four years after Goodman's comments, Schmidt, Lyytinen, Keil, and Cule (2001) studied project risks and reported that "lack of project management skills" is cited as a key risk to project success by many project managers in Finland and the United States but is not cited by project managers in China. (They do not elaborate on the reasons for this difference.) Examples of the management tasks discussed by Schmidt et al. include:

- Managing end user expectations about what the project can accomplish,
- Identifying and including those with an interest in the project (stakeholder management),
- Establishing and following project management procedures such as communicating the impact of changes to the project team and stakeholders (change management),
- Identifying and managing project risks (risk management),
- Determining the cost and time required for the project (estimating),
- Planning and scheduling the work, and
- Managing dependencies that exist at the technical and organizational boundaries (boundary management).

Therefore, according to project managers themselves, a project manager's management skills influence project success. In addition to using their management skills to influence project success, project managers' leadership skills also play a part. Thamhain and Wilemon (1977) provide evidence from a survey of 68 project managers and 33 of their supervisors that the work climate and project manager's leadership style together influence the success of the project manager. Examples of leadership tasks discussed include:

- Crossing functional lines to influence others over whom the project manager has little or no formal authority,
- Creating an environment that is motivating to project team members,
- Managing and resolving conflict, and
- Adapting leadership style to fit the situational needs of the project.

Presumably, project manager success is linked to project success, but this connection is not made explicit in the article. Thirteen years later, Thite (2000) makes this connection and argues that the leadership style of the project manager has an impact on project outcomes according to both project managers and their followers. One example of leadership tasks reported by Thite is that IT followers expect their leaders to act as an organizational catalyst that can encourage creativity by providing challenging stretch assignments and autonomy to explore new ideas. Verner and Evanco (2005) also report that software developers view the role of the project manager as having an impact on project success. For instance, one example cited by software developers is that changes in project managers during a project

can be disruptive to a project team to a point that the change impacts project success. Moreover, Kappelman, McKeeman, and Zhang (2006) report that the project manager's inability to "lead the team and communicate with clients" (p. 33) is the third most important early warning sign reported by project managers. Sumner, Bock, and Giamartino (2006) present evidence from those who observe project leaders that there is a relationship between the project leader's characteristics and project success. Therefore, in addition to influencing project success by their management skills, project managers' leadership of the project also has an impact.

This idea that both a project manager's management and leadership skills influence project success is supported by Fortune and White (2006) who used a Formal Systems Model to integrate critical success factors from 63 studies to create a model of projects that could be used to compare the results of different projects to identify what caused the differences. By comparing the projects in their study, they found that project manager competence (the ability to apply project management practices) and project manager leadership both emerge as necessary to a successful project. In addition, Kaulio (2008) looked at the impact of project managers on project success, but through the Critical Incident Technique lens, and identified the need for both project manager management and leadership skills to resolve unexpected incidents that would otherwise impact project success. In Kaulio's discussion, the distinction between management and leadership hinges on whether or not the project manager is responding to a routine or new situation. If the situation is routine, then it is something that project managers could plan, monitor, and control and is considered a

management task, but if the situation is unexpected, the project manager would need to adapt to respond to the unexpected situation, and it would be called a leadership task. In short, multiple researchers argue that there is evidence that project manager leadership and project manager management skills influence the success of projects; therefore, one way that firms can improve their project outcomes is to develop their project managers' management and leadership skills.

Statement of Problem and Purpose

As previously discussed, a project manager's management and leadership skills influence the success of their projects; therefore, many IT organizations and project managers alike seek ways to develop the project manager's management and leadership skills, hoping to improve project success rates. How they go about developing these skills and what skills they emphasize often depends on how they see project management knowledge and how they think about the role of the project manager. This section discusses these ideas and suggests how these ideas relate to what project managers need to learn to be more effective.

The need for adaptive project managers. Project managers need adaptive skills because projects are more complex than can be managed solely through planning and monitoring ("Manifesto for Agile Software Development," 2015; Morris, 2013; Sutherland, 2014). For instance, project managers will experience unexpected events during the life of the project that were not anticipated in the plans, even when the project manager refines the plans during the life of the project through a process of progressive elaboration (Project Management Institute, 2008). Moreover, even when project managers practice risk

management, their plans still contain risks because risk management itself is limited to using the past to predict the future, making it impossible to de-risk a project fully. So no matter how thorough the planning effort is, unexpected events will happen during most projects, and responding to these unexpected events is a core part of project management (Geraldi, Lee-Kelley, & Kutsch, 2010). However, often when facing the unexpected, project managers struggle to adapt because they are limited to a set of prescribed models and practices that are insufficient when facing unexpected situations. Therefore, in addition to having prescribed models, they need the ability to operate as a "creative facilitator of change" that can create new practices or adapt existing practices, and this is a critical skill that is needed when working in complex environments that present unexpected situations (J. Thomas & Mengel, 2008, p. 312). This need to adapt is so significant that some project managers consider the ability to take this kind of innovative action to be the most important characteristic of a successful project manager (Söderholm, 2008).

Though unexpected events are a trigger for taking innovative action, another factor creating this need to innovate is the idea that the same leadership job can be accomplished in different ways by people with different skills because there are many paths that can be taken to achieve the same objective (Hollenbeck & McCall, 2003). Therefore, not only must project managers innovate to find an approach that fits the unexpected event, project managers must innovate to find an approach that fits their abilities and style. Another consideration is that project managers will need to adapt their approach to fit the project setting because they may need different combinations of skills in different situations (Müller

& Turner, 2007; Napier, Keil, & Tan, 2009; H.J. Thamhain & Wilemon, 1977). A final consideration is that the objectives of the project can change or emerge during the life of the project, triggering a need to adapt to changes in direction that are central to the success of the project (Winter et al., 2006, p. 644). In short, to manage complex projects, project managers need the ability to adapt to respond when unexpected events emerge, to find ways to use their skills effectively, to adjust their approach to fit the project setting, and to respond to changing objectives.

Limitations of "know what" knowledge. Thomas and Mengel (2008) suggest that new ways of developing these adaptive project managers are needed because most project management training is PMBOK based and transfers "know what" information which does not prepare project managers to deal with complex environments. This view that a new development approach is needed is consistent with Crawford's (2005) findings that there is no relationship between project manager effectiveness as seen by senior management and project management certifications such as PMI's Project Management Professional (PMP). Because the PMP is based on knowledge of PMBOK, these findings bring into question whether PMBOK based training and education is insufficient to develop these adaptive skills. Moreover, because more than 90% of all project management education and training is PMBOK based (J. Thomas & Mengel, 2008), options for training and education to develop adaptive skills are limited.

In addition to off-the-shelf development approaches, another way managers seek to transfer "know what" knowledge to their project managers is through the use of project

reviews to transfer knowledge from one project team to another. Yet this approach has challenges that hinder project-to-project learning. For instance, project teams often lack a shared mental model for how projects behave, and this lack of a shared model limits their ability to share what they learn from project to project (Cooper, Lyneis, & Bryant, 2002). Another factor is that the social setting and politics of the project can hinder the kind of information sharing that leads to learning within and across project teams (DeRue, Ashford, & Myers, 2012; Sense, 2008). These findings indicate that transferring "know what" knowledge has limited effectiveness to improve project manager performance and, therefore, something more is needed (Crawford, 2005, p. 15; Crawford et al., 2006, p. 727; Turner, Keegan, & Crawford, 2000, p. 13,20).

Developing "know how" and "know why" knowledge. Even with the limited capacity of formal course offerings and project reviews to develop project managers, high performing project managers exist and lead successful projects in complex environments. Turner, Keegan, and Crawford (2000) comment on how these high performing project managers learn and argue that "experiential learning is the only source of competence development of the majority of project management personnel" (2000, p. 5). Building on this idea that experience is the key to project manager development, some organizations create project management development programs (Carbone, 2006, p. 355), and the most effective of these programs seem to rely heavily on the project manager learning from his or her experiences on the job (Iverson, Lau, & Dietz, 2002; Turner et al., 2000). Even in firms that accept this idea that experience is the primary teacher of project managers, there can be disagreement

about what those experiences should be. For instance, Clark and Colling (2005) describe the organizational tension between project managers and Human Resources when the two groups have different views of which project management experiences are needed to develop project managers. However, even when the right experiences are made available to project managers, learning from experience is not always effective, and in some cases, it can even lead to learning the wrong lessons. Fortunately, learning from experience can be influenced by practices such as coaching, training, action learning, action research, and communities of practice (Buganza, Kalchschmidt, Bartezzaghi, & Amabile, 2013; Day, 2000; McCall, 2010; R. J. Thomas, 2008; Turesky & Gallagher, 2011). This research suggests that for managers to develop project managers, managers need insight into which experiences can be effective for developing their project managers and how to influence those experiences so that project managers are learning the right lessons. Therefore, while both practitioners and scholars seem to agree that project management experience is the key to developing project managers, how project managers learn from their experiences and which experiences lead to what kind of learning has not received much attention in the project management literature.

The purpose of this case study is to understand how IT project managers learn from their project management experiences to manage projects. Project manager learning will generally be defined as the processes that project managers use to transform their project management experiences into knowledge about managing projects. This definition of learning is based on Kolb's (1984) definition that "Learning is the process whereby knowledge is created through the transformation of experience" (1984, p. 38). This is not an intervention or experimental

study, and though some project managers may learn about project management by participating in the present study, improving participants' project management knowledge is not the purpose of this study.

Study Context

To inquire into how project managers learn from their project management experiences, I conducted a case study set in a large multi-site IT organization. The IT organization in this study is a part of a large (over 40,000 employees) well-established financial services organization with headquarters in the Eastern United States. In this study, the firm will be referred to as Financial Services Firm (FSF). FSF serves a wide range of customers through its many operating divisions, and it is possible that a single customer interacts with more than one division. In general, each division has a president who is responsible for the division's profit and loss, and most divisions have a dedicated IT organization managed by a CIO who reports directly to the division president. In addition to the division level IT organizations, a corporate IT organization provides support for the entire firm and manages the firm's wide area network, data centers, video conferencing, software and hardware procurement services, and other aspects of the IT infrastructure shared across the enterprise. In this particular firm (as in most if not all financial services firms), IT plays a key role in enabling and supporting business processes and is often visible to customers through internet sites, account statements, reports, and telephone interfaces, making technology a part of how customers experience interactions with the company. This visibility to customers makes IT critical for

realizing business strategy, and the significance of IT is apparent in the presence of CIOs reporting directly to the business line presidents.

FSF has campuses in numerous cities in the United States and abroad that support business operations. FSC provides services to customers through call centers, branch offices around the United States, and web sites on the internet. Because customers may conduct business by phone, in person, or on the web with multiple divisions, integration of services and systems to create an integrated experience for the customers is needed. This need for integration of customer services creates a need for the IT organizations to integrate their services and systems; however, integrating across these divisional and technological boundaries is a complex undertaking because diverse agendas must be aligned and managed to create the level of integration needed. This need for integration has a profound impact on the demands placed on senior managers who must find ways to manage the complexity of integrating so many business lines, and these demands placed on senior managers cascade to the project management community when projects are commissioned to implement senior management initiatives.

In addition to operating within a complex organization, project managers at FSF face a complex technology infrastructure that has developed organically for more than 20 years. Typically, this means that for large and mid-size projects, multiple IT providers must be involved, and frequently these providers come from different IT organizations within FSF or externally from FSF's technology suppliers. The technology infrastructure also includes a

wide range of technologies that include 20 year-old mainframe COBOL/VSAM/DB2[1] implementations, a wide range of desktop technologies (.NET and Java are prominent[2]), customer facing technologies for web development, workflow technologies, mobile device technologies used for smart phones and tablets, distributed databases such as Oracle relational databases and more recently NOSQL databases, and big data technologies such as Hadoop. Not only is there a broad range of technologies in use at FSF, but new technologies are also frequently introduced.

Still another dimension of complexity faced by the FSF project manager is the multiple development methods in use at FSF consisting of waterfall methods, Agile methods, and hybrid methods. Typically, Agile methods are the most recent and the stated direction for many of the IT organizations. However, because Agile is focused primarily on how small teams of about ten people operate, there is a need to define a method for managing work that spans multiple Agile teams. Historically, this has been the role of program management, but this challenge is large enough that approaches such as the Scaled Agile Framework("Scaled Agile Framework," 2015) have been created to codify methods for managing dependencies across multiple Agile teams.

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[1] COBOL is a programming language that prominent in mainframe applications. VSAM is a mainframe file system and DB2 is relational database that is common in mainframe applications.

[2] .NET and Java are distributed development tools that dominate much of the application development marketplace.

This combination of organizational, technological, and development methods complexity places demands on project managers operating in this setting because they must navigate each dimension of complexity to integrate action along these dimensions to deliver a project. This challenge is so pervasive in this environment that senior and middle managers frequently talk about finding project managers "that know how to get things done."

Research Questions

This study investigated the following questions:

1. How do project managers in a large financial services IT organization learn from experience to manage projects?
2. How do different kinds of project management experiences lead to different kinds of learning?
3. Why do some project management experiences have more impact on project manager learning than other experiences?

One of the major tasks in conducting a case study is to determine which aspects of the phenomenon being investigated to observe and study. Yin (2014, Chapter 2) recommends developing research propositions to narrow the focus of the study. Lee (1989) provides a second reason to state propositions, explaining that it is often impossible to directly test a theory; therefore, researchers deduce testable propositions from the theory. In this study, the following propositions about project manager learning have been deduced from Kolb's Experiential Learning Theory (KELT) and were tested.

1. Project Managers use the grasping and transforming processes described in KELT to learn to manage projects from their experiences as project managers.
2. Unexpected events during the life of a project are the primary source of experiences that lead to project manager learning.
3. Expected events are not a source of learning because they do not create the kind of dialectic conflict that KELT predicts is necessary for learning to occur.
4. What the project manager learns from unexpected events will be shaped by how they see project management. Those who see the purpose of project management as planning and controlling project events will often see unexpected events as failures of planning and control; therefore, they will learn that better planning and control is needed when unexpected events occur. Those who see project management as responsible for facilitating change will often learn new ways of adapting and facilitating change when unexpected events occur.
5. The project manager's ability to learn from unexpected events will be shaped by their learning style as defined by Kolb. Those with accommodating and divergent styles will report more learning from unexpected events than those with convergent or assimilating learning styles. Project managers with more integrated learning abilities will report more learning from unexpected events than those with less integrated learning abilities. In other words, those who

operate in multiple learning styles will learn more from unexpected events than those who do not.

6. The project manager's ability to learn from unexpected events will be shaped by their awareness of the ways in which they can influence project outcomes. Those with a greater awareness of their ability to influence project outcomes will report more learning from unexpected events than those with less awareness.
7. The project manager's learning will be influenced by the project environment.

Significance

This study is significant to the field of Human Resource Development (HRD) because it investigates workplace learning to find ways to improve individual capabilities that can improve organizational performance. This goal aligns well with the description of HRD that Harrison and Kessels give (2003):

> HRD as an organizational process comprises the skillful planning and facilitation of a variety of formal and informal *learning and knowledge processes* [emphasis added] and experiences, primarily but not exclusively *in the workplace* [emphasis added], in order that organizational progress and individual potential can be enhanced through the competence, adaptability, commitment and knowledge-creating activity of all who work for the organization. (p.89)

This study is also of interest to IT practitioners. As has already been argued, IT practitioners have an interest in understanding how project managers learn to manage projects because they see project manager development as a way to improve project delivery. This study is relevant to helping these practitioners because it has the potential to improve our understanding of which experiences contribute to a project manager's learning to manage projects and provides insight into ways practitioners can support these experiences. Like IT practitioners, IT and project management scholars have an interest in both experiential learning and project manager learning, and this study could contribute to existing research by identifying the types of experiences that are helpful to project managers' learning and by describing how project managers learn from these experiences. Investigating how project managers learn from experience will contribute to the existing research on project manager learning and development by suggesting how specific experiences are related to project management lessons learned.

Several scholars mention this need for further research. To start, the experiential learning literature discusses the need to learn more about experiential learning. Fenwick (2001) suggests that we need to know more about experiential learning viewpoints, practices, and the role of educators in experiential learning. Moreover, the project management literature calls for more research into project manager learning and development. Crawford (2006) suggests that research showing what practitioners can get from training compared to other development practices is long overdue because there is no empirical evidence showing that training increases project management capacity. She also suggests that researchers learn

more about how tacit project management knowledge is best developed and how that knowledge can be transferred. Similar to Crawford, Taylor and Woelfer (2009) argue for more research on the relationship between training and learning. Winter et al. (2006, p. 641) report on the Rethinking Project Management initiative and state, "In essence, the principal finding of the Network is the need for new thinking in the areas of project complexity, social process, value creation, project conceptualization and *practitioner development*. [emphasis added]" (p. 641). Sauer and Reich (2009) recommend research into project management knowledge and learning processes including which experiences create the new project management mindset they describe. Yet even while there is a need to learn more about project manager learning and development, much is known about learning and development that can support this study; therefore, this study will draw on what is known about experiential learning to guide the study design.

Theoretical Framework

I use Kolb's Experiential Learning Theory (KELT) in this case study because it provides a holistic, integrative perspective on learning that combines experience, perception, cognition, and behavior into the learning process (Kayes, 2002). It is called Experiential Learning Theory because of its roots in the work of Dewey, Lewin, and Piaget, and because of the central role that experience plays in learning. Further, KELT is helpful because it describes the relationship between experience, learning, development, consciousness, and knowledge (David A Kolb, 1984). Based on the ideas from KELT, I expected to see a

relationship between a project manager's experiences, learning, development, consciousness, and what they know about project management.

Conceptual Framework

The seven research propositions previously discussed suggest an IT project manager learning process that is taking place in FSF. To test these research propositions, observations about the learning process will be made. To identify the observations needed, Yin (2014) suggests illustrating the relationship between the concepts in the propositions with a logic model that makes the learning process suggested by the research propositions explicit. Figure 1 illustrates the logic model used in this study and three major concepts: (1) The project manager's characteristics mentioned in propositions four and five may influence the project manager's learning, (2) The project management environment at FSF mentioned in proposition seven may also influence project manager learning, and (3) The learning process itself mentioned in propositions one, two, three, and six may determine what, if anything, is learned.

The project manager's characteristics. The logic model illustrates the following characteristics of the project manager that can influence the project manager's learning:

- Demographic Characteristics: Both what the project manager learns and how the project manager learns may vary based on the demographic characteristics of the project manager.

- Socialization and Self Selection: The combination of socialization processes and the project manager's choices (self-selection) have created experiences that have shaped the project manager's learning skills and knowledge. Two prominent examples of socialization and self-selection are the project manager's education and career experiences and their choice of education and career. These experiences shape the project manager's approach to learning, including (a) how they learn, (b) what they know about project management, and (c) how they conceptualize project management, e.g., monitoring and controlling or facilitating and adapting.
- Prior Project Management Knowledge: The project manager's prior knowledge about project management will instill in them beliefs and mental models that shape what they attend to in a project setting and the type of action they take in a given situation that will influence their learning.

The project management environment. In large IT organizations, the project management environment typically consists of (a) a Project Management Office that oversees the portfolio of projects and standardizes project management practices, (b) the organizational and reporting structure(s) project managers work within, (c) the methods used to manage projects, (d) the project portfolio, (e) the existing technology infrastructure, and (f) the IT labor force, including the disciplines represented, their locations, their demographics, and their marketability. The project management environment is significant because it is a

source of unexpected project management events and is a force in shaping what is considered valid project management knowledge that, in turn, will influence project manager learning.

The learning process. Both the research propositions and logic model suggest that experience is the primary way that project managers learn to manage projects, and unexpected events are the experience that leads to the majority of learning. The logic model uses the grasping and transforming processes described in KELT to predict how this learning takes place. Therefore, when the project manager encounters an unexpected event, it will likely create tension because the event is inconsistent with what the project manager knows about managing projects. In resolving this conflict, the project manager may transform the conflict through reflection on what the event means or taking action to try and resolve the unexpected event (or both), and this can lead to new knowledge about project management. This knowledge could manifest in several ways. For instance, the project manager may develop improved perceptual skills to watch for the type of leading indicators that can predict unexpected events. Alternatively, the project manager may develop an improved mental model of project management, making it easier to prevent this type of unexpected event. Alternatively, the project manager may develop improved behavioral skills to take new kinds of action that were previously untried by the project manager. Another possibility is that the project manager will develop improved skills at managing their emotions as well as greater awareness of the emotions of others.

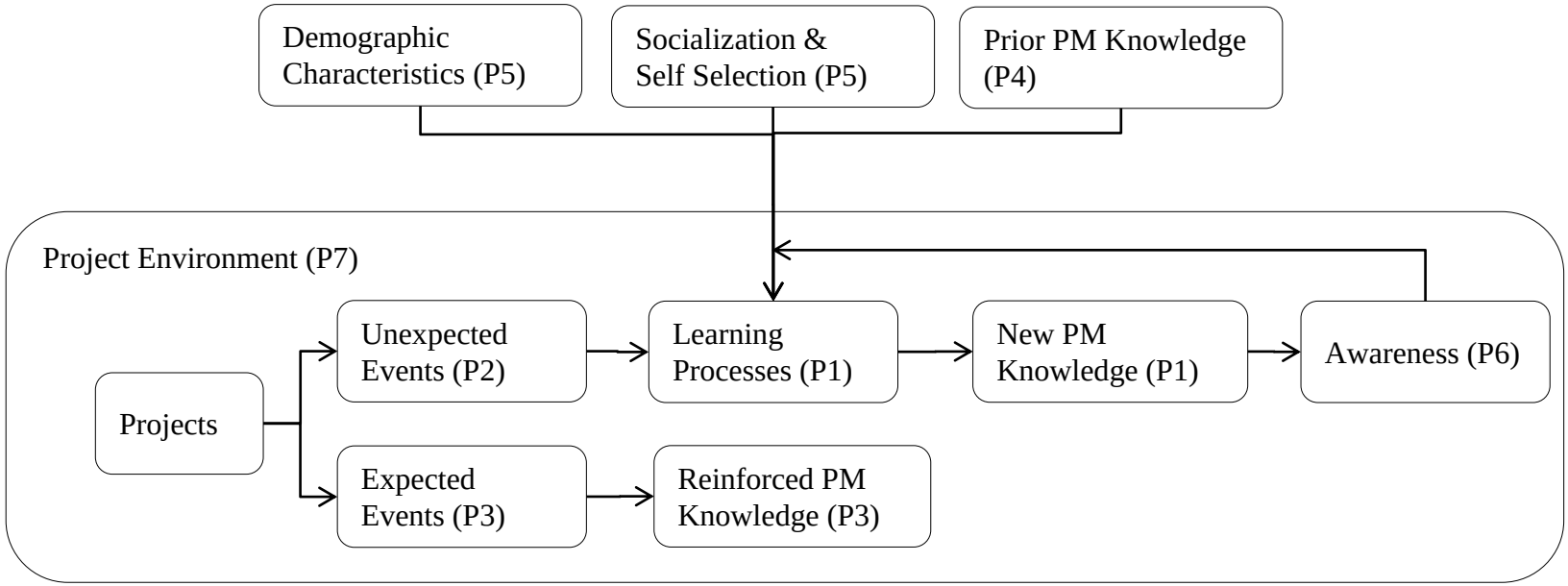

Figure 1. Information Technology Project Manager Learning Logic Model Illustrating the Key Concepts from the Research Propositions. Propositions are designated as P1 through P7.

Method Overview

Because case studies are well suited to answer how and why questions (Yin, 2014, Chapter 1), this research follows a case study design to answer the question, "How do project managers in large financial services IT organization learn from experience to manage projects?". This study gathered data about project manager experiences and learning from project managers using semi-structured interviews, which were analyzed using concept mapping and pattern matching to identify the major themes from the perspective of the participants. In addition to the interviews, project manager histories were collected, the organization structure was reviewed, numerous observations were made about how FSF operates, and other artifacts such as previous in-house surveys and reports from consulting engagements were reviewed. In this study, the case is project manager learning in a large IT organization. This focus is consistent with Yin's (2014) recommendation that "the desired case should be some real-life phenomenon that has some concrete manifestation" (p. 34). In this study, project manager learning manifested as new project management knowledge that is observable by project managers, managers of project managers, and other members of the project team. This is the study of a single case of how project managers at FSC are learning to manage projects.

Chapter Summary

This chapter explained why understanding how project managers learn from experience matters to practitioners and scholars. For practitioners, it is a way to improve project outcomes, and for scholars, it is a way to remain relevant in the project management

community. This chapter also described how the phenomenon of project manager learning could be studied. This study can be conducted by inquiring into the experiences of project managers themselves to discover what it is that happens to transform these experiences into project manager knowledge using Kolb's Experiential Learning Theory (KELT) to guide the study. Chapter 2 will describe the research literature relevant to this study.

Definition of Key Terms

Abstract Conceptualization: Abstract conceptualization is one of four learning abilities suggested by KELT, and it is the ability "to create concepts that integrate their observations into logically sound theories" (David A Kolb, 1984, p. 30). Abstract conceptualization is one of two modes of grasping experience also known as comprehension in KELT. The mode of grasping through abstract conceptualization influences and is influenced by the mode of grasping experience through concrete experience. The interaction between abstract conceptualization and concrete experience creates a dialectic as the two grasping modes interact, and differences are resolved (David A Kolb, 1984, p. 41). Abstract conceptualization involves translating experiences into symbols such as words, mathematical symbols, or models to explain what has been experienced (David A Kolb, 1984, p. 45).

Active Experimentation: Active experimentation is one of four learning abilities suggested by KELT, and it is the ability "to use these theories [from abstract conceptualization] to make decisions and solve problems"(David A Kolb, 1984, p. 30). Active experimentation is one of two modes of transforming experience known as extension in KELT. Active experimentation

involves behavior – taking action and observing the results(David A Kolb, 1984, p. 51). See also "extension".

Apprehension: The process "of grasping or taking hold of experience in the world… through reliance on the ·tangible, felt qualities of immediate experience" (David A Kolb, 1984, p. 41).

Case Study: Yin (2014) proposes that case studies can be defined by their scope and features as follows:

> 1. A case study is an empirical inquiry that investigates a contemporary phenomenon (the "case") in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident.
>
> 2. A case study inquiry copes with the technically distinctive situation in which there will be many more variables of interest than data points. One result relies on multiple sources of evidence with data needing to converge in a triangulating fashion, and another result benefits from the prior development of theoretical propositions to guide data collection and analysis. (pp. 16-17)

Comprehension: The process of "grasping or taking hold of experience in the world… through reliance on conceptual interpretation and symbolic representation" (David A Kolb, 1984, p. 41). See also "apprehension" and "abstract conceptualization".

Concrete Experience: Concrete experience is one of four learning abilities suggested by KELT, and it is the ability of people "to involve themselves fully, openly, and without bias in new experiences" (David A Kolb, 1984, p. 30).

Consciousness: "The quality or state of being aware especially of something within oneself", "awareness" ("Consciousness - Definition and More from the Free Merriam-Webster Dictionary," 2015).

Development: In KELT, development is growth that occurs through a "dialectic process of adaptation to the world" (David A Kolb, 1984, p. 213).

Extension: The process "of transforming that grasp or 'figurative representation' of experience…through… active external manipulation of the external world" (David A Kolb, 1984, p. 41). See also "Intention" and "active experimentation".

Experiential Learning Theory (ELT): In Adult Education, Experiential Learning Theory is usually associated with theories and practices of learning based on reflection on concrete experience (Fenwick, 2001, p. 9). Kolb's Experiential Learning Theory is an example of one of these theories and is referred to as KELT in this paper to distinguish it from other theories of experiential learning.

KELT: Kolb's Experiential Learning Theory. I Adopted the use of KELT from Bergsteiner, Avery, and Neumann (2010, p. 29).

Intention: The process "of transforming that grasp or 'figurative representation' of experience…through internal reflection" (David A Kolb, 1984, p. 41). See also "extension" and "reflective observation".

Learning: "Learning is the process whereby knowledge is created through the transformation of experience" (David A Kolb, 1984, p. 38).

Project: A temporary organization created by the firm's management for a specific purpose that cannot be realized through the firm's existing routine organizational structures and processes (Packendorff, 1995, p. 327).

Project Management: The application of knowledge, skills, tools, and techniques to realize the purpose of the project (Project Management Institute, 2013, p. 5). Typically, this means integrating the effort of multiple disciplines or organizational functions towards the purpose of the project.

Project Manager: The term project manager typically refers to the person leading a project team. In practice a distinction between project manager, program manager, and project portfolio manager may be made, but in this paper the term project manager includes all three roles. Examples of how project manager is defined in the project management literature over the past 45 years include the following:

- A project manager is the "person designated who can supervise the trade-off between each of the work units involved in the task accomplishment" (Goodman, 1967, p. 396).
- A project manager is a person that "integrate[s] various supporting disciplines in a continuously changing work environment… [and] he must often cross functional lines to deal with personnel over whom he has limited direct formal authority. Moreover, he has to build teams at various levels of the project organization" (H.J. Thamhain & Wilemon, 1977, p. 102).
- "The person assigned by the performing organization to lead the team that is responsible for achieving the project objectives" (Project Management Institute, 2013, p. 555).

Reflective Observation: Reflective observation is one of four learning abilities suggested by KELT, and it is the ability "to reflect on and observe their experiences from many perspectives" (David A Kolb, 1984, p. 30).

CHAPTER 2: LITERATURE REVIEW

Chapter 1 discussed the idea that project manager learning can improve the project manager's performance and how this improvement can boost project outcomes. This chapter discusses the research literature relevant to project manager learning to summarize what is known about this topic. To start, over the past twenty years, the project management literature has discussed at least seven ways that project managers learn to manage projects as summarized in Table 1. (These references are indicative of learning methods discussed in the literature, but they do not represent how often these topics appear in the literature.)

Table 1

A Summary of Some Learning Methods Mentioned in the Project Management Literature

Learning Method	Reference(s)
1. Learning from personal experience by managing projects	(Crawford & Gaynor, 1999, p. 5; Egginton, 2012, p. 523; Swan, Scarbrough, & Newell, 2010; Hans Jurgen Thamhain, 1991, p. 41; Tukiainen, Aaltonen, & Murtonen, 2010; Turner et al., 2000; Vanessa Darrell, David Baccarini, & Peter E. D. Love, 2010)
2. Learning from experiences of other project managers by observing them at work	(Taylor & Woelfer, 2009; Hans Jurgen Thamhain, 1991, p. 41)
3. Learning from simulated experience	(Iverson et al., 2002, p. 3; Wee-Leong Lee, 2011)
4. Learning from what others know through coaching, mentoring, and consulting	(Carbone & Gholston, 2004, pp. 14–15; Hans Jurgen Thamhain, 1991, pp. 42–43; Turner et al., 2000; Vanessa Darrell et al., 2010)

Table 1 (Continued)

Learning Method	Reference(s)
5. Learning from participation in social networks such as communities of practice, pairing, and special workgroups such as Quality Circles or project teams	(Hans Jurgen Thamhain, 1991; Turner et al., 2000)
6. Learning from formal instruction through training, education (including degree programs), workshops, or conferences	(Carbone, 2006, p. 355; Egginton, 2012, p. 523; Iverson et al., 2002; Taylor & Woelfer, 2009; Hans Jurgen Thamhain, 1991, p. 42; Turner et al., 2000)
7. Independent learning (self-study) such as reading project management literature	(Taylor & Woelfer, 2009; Hans Jurgen Thamhain, 1991, p. 42)

Also discussed in the literature are learning practices such as how to manage project manager experiences to improve learning (on-the-job training, job rotation, and career pathing), how to manage the learning environment to improve learning (blended learning), and how to get the most out of project management experiences (reflective practices); however,they are not listed separately because they are included in the methods listed in Table 1. It could also be argued that each of these ways that project managers learn are themselves experiences, e.g., the experience of reading a book, and that all of these ways of learning are forms of learning from experience. However, the learning experience involved in reading a book is a reading experience and not a project management experience, so this paper will define learning from personal experience to mean learning from project management experience.

Rethinking Project Manager Development

Though many methods for developing project managers are available, many researchers express a need to improve how we develop project managers. To start, some argue that we need to rethink project management, and as a consequence of this, to rethink project manager development, as well. A notable example is the UK's Engineering and Physical Sciences Research Council (EPSRC) *Rethinking Project Management: Developing a New Research Agenda* program that was funded in 2003 and operated between 2004 and 2006. This program was a response to the widening gap between project management practice and the dominant project management theories to "enrich and extend the field beyond its current intellectual foundations, and connect it more closely to the challenges of contemporary project management practice" (Winter et al., 2006, p. 639). The principal finding of this research is that there is a "need for new thinking in the areas of project complexity, social process, value creation, project conceptualization and *practitioner development* [emphasis added]." (2006, p. 641) One illustration of this need for research on practitioner development comes from a study by Crawford (2005) who studied 208 project managers and their supervisors from Australia, the United Kingdom, and the United States to understand the relationship between the project manager's knowledge of the Project Management Body of Knowledge (in the United States) and the Australian National Competency Standards for Project Management (in the United Kingdom and Australia) and how their performance is perceived by their supervisor. Crawford concluded that there is no evidence that project manager performance on selected standards is related to the supervisor's perceptions of

project manager performance. Therefore, based on Crawford's findings, knowing the project management standards is not a predictor of performance on the job. It also indicates that successful project managers know something about managing projects that is not in the standards. In subsequent research, Crawford et al. (2006) argue that project manager development and education practices have not kept pace with changes in project management over the past 30 years:

> Organizations interested in training and developing their project management staff look for help from professional and academic authorities in the field. Prima facie, it would seem sensible to look for international standards that training and development might help practitioners to achieve – in the hope that this would signify, to some degree at least, a certain level of competence. *In fact, we contend, what they would find would not be adequate to address many of their needs* [emphasis added], certainly the needs of those managing in the more challenging project, or program, environments (2006, p. 723).

Building on the Rethinking Project Management work, Sauer and Reich (2009) investigated the mindset needed by project managers to operate in a changing environment that requires new ways of thinking to succeed. To do this, they interviewed 57 highly effective project managers from Canada, the U.S., the UK, and New Zealand to understand how they think about project management. They identified an emerging mindset for project managers comprised of clear sighted realism, personal responsibility, long term perspective, and willingness to let go (not control). They state:

> Our description of a new mindset that is reshaping the practice of IT project management has implications for practice and further implications for research. Organizations will need to recruit and *develop individuals with the appropriate mindset* [emphasis added]. While our articulation of relevant principles and qualities can help recruiters recognize the ‘‘right stuff’’, researchers can assist by investigating what psychology, what intellectual caliber, *what experience* [emphasis added] disposes an individual to the appropriate mindset. *Further, we need to understand what human resource and management interventions can accelerate development of the appropriate mindset* [emphasis added]. (p. 192)

In short, this research indicates that learning project management standards is not sufficient to teach project managers what they need to know to be successful, nor are current development practices adequate to fill this gap; therefore, more research is needed to understand more effective ways to develop project managers.

The Role of Experience in Learning to Manage Projects

One possibility for filling this gap between the knowledge needed to succeed as a project manager and the knowledge available from the project management standards is to make more effective use of the project manager’s experiences as a source of learning. Numerous examples in the literature point to this idea. To start, Thamhain (1991) interviewed 220 project managers from 18 organizations across five industries and reported that “85 percent of all skill developments are derived from experience.” (p. 41) He also reports that of the

skill development derived from experience, 75% is from experiential learning and 25% is from observations, formal on-the-job training, coaching, and job rotation. Crawford and Gaynor (1999) explored this idea of project managers learning from their work experience and surveyed 390 project personnel from four countries to develop a project manager profile, and they reported that "project personnel are largely well educated" (73% have at least a first degree though not in project management), "have higher levels of abstract reasoning than the general population", few have formal project management qualifications, and yet over 80% have more than six years of project management experience (p. 5). Also, just over 50% participated in professional education during the previous six years, 23% have some involvement in project management professional associations, and 24.7% spend at least five hours at project management conferences each year. This data describes these project managers as a group that has successfully managed projects, yet to a large degree has had little formal training in project management. These findings suggest that their professional development is informal and takes place in the workplace.

Sharing this view with researchers that experience is a primary teacher of project management, many organizations rely on project management experience combined with supportive practices to develop their project managers. For instance, Turner, Keegan, and Crawford (2000, pp. 8–20) interviewed 44 members of 19 historically profitable project based companies from 8 countries and 3 continents to understand the practices these firms use to develop their project management capabilities. (They define a project based firm as one where the majority of their products and services are developed for custom orders.)

These firms view experience as the primary way to develop project managers, so they emphasize managing and supporting the project manager's experiences rather than relying solely on experience to develop their project managers. Common development practices include moving project managers and future project managers from function to function, mentoring, career review committees, support groups, networks, and pre-experience and post-experience training and education. Along these same lines, Iverson(2002) describe how Marriot International created a project management development program in response to issues they were facing in their projects. Before this program, they had relied on hiring practices and project manager experience alone to develop the project management skills that they needed. Under the new approach, management selected high potential project management candidates and supported their first year of experience with a program comprised of 21 days of training over a 9-month period. They supported subsequent development by reimbursing project managers for project management courses that they took and by paying for membership in professional associations. Another example cited by Carbone and Gholston (2004) is a program used by Fairchild Semiconductor to develop their project managers that includes training, mentoring, and project management experience to learn how to manage projects. They also studied the project management development programs at seven other firms, but they did not find the same level of development support as they saw at Fairchild. Instead, they noted that one of the firms did not have a project manager title, four of the firms did not have a project management career path or structured development program, and the other three had slightly different approaches relying on

various combinations of external training programs, internal training, and professional certifications. In addition to studying Fairchild and the seven firms, Carbone and Gholston surveyed working project managers active in project and engineering management professional societies using a web-based survey from which they received 123 survey responses (37% response rate). Much like Crawford and Gaynor's (1999) survey, Carbone and Gholston found their respondents were well educated and experienced project managers: 35% had over 15 years of experience, 12% had a project management specific degree, and 87% had degrees from other areas. The vast majority of the respondents (85%) had less than four days of project management training per year, 11% worked in firms that had extensive or comprehensive training, 74% worked in firms with minimal training or less, and 53% were working in firms that had a project manager career path. They also reported that while the availability of a training and development program had a positive influence on project managers feeling prepared for the project manager job, respondents identified experiential learning opportunities and coaching as necessary for success. In a subsequent conference paper about Fairchild's project manager development program, Carbone (2006) argued that blended learning provides a useful framework for developing project manager competencies in an organization but acknowledged that one of the challenges with this program is the effort required to keep the curriculum current. In another study, Taylor and Woelfer (2009) interviewed 23 project managers from 11 organizations to understand how those project managers had learned to manage projects. They found that experience was the primary means for developing project management skills in IT project managers. They also found that

project managers learned by observing other project managers, that they valued coaching and mentoring, and reported that training could be helpful, but noted that training often followed experience. Based on these findings they concluded that formal development could be useful as a way to support experiential learning. And finally, in a longitudinal study of project managers Egginton (2012, p. 518) found that formal project management education decreased in value as the project managers spent more time on the job. After 12 months on the job, 56% of students were not able to apply most of what they had been taught in project management courses. The biggest barrier to applying what they learned was differences between training and on-the-job approaches to project management. Said another way, Egginton found that what is learned in class becomes less valuable with more experience. Not surprisingly then, he also found that only 18% of the students took additional project manager training during the 18 months of the study. Each of these studies found that project management experience was essential to learning to manage projects. Moreover, to varying degrees and in varying ways, many organizations support their project managers learning from experience. These studies do not provide insight into the experiences themselves, but other researchers do provide some insight into these project management experiences.

Unexpected Events as a Source of Learning

One type of experience that is common in projects and to the experience of project managers is the unexpected event which is anything that happens that deviates from the project manager's expectations. Hallgren and Wilson (2007) suggested that these unexpected events (also called project plan deviations) could be a source of learning. They propose that

resolving these events would follow a pattern similar to the "muddling through" decision making process followed by policy makers as described by Lindblom (1959), and they suggested that this variation of Lindbloom's process be called mini-muddling because (a) it was a problem resolution process rather than a strategy formulation process, and (b) it did not require the number of iterations described in "muddling through"; often project deviations were resolved in a single iteration. They did observe that problems had to be resolved quickly, creating time pressure and that the project team often did not fully understand the consequences of their decisions until they saw the results of their decisions. This research is significant for this study because it points to unexpected events as experiences that can lead to learning, and it attempts to describe how that learning occurs. Two criticisms are relevant to this study. First, while the authors argue that learning happens when the project teams see the results of their decisions, they do not provide an explicit list of what the project teams or organization learned. Instead, the authors listed the problems and reported a muddling pattern for each problem and from that inferred that learning was happening. Also, though they discussed the possibility that unexpected events could be resolved with existing knowledge or knowledge created for new situations, it was hard to tell which type of problem resolution was used on the events they reported. The second criticism is that other explanations about how decisions are made and learning happens might be better explanations than mini-muddling, but other views are not discussed. For instance, Kolb's Experiential Learning Theory (1984) seems to offer more insight into the learning cycle suggested by the authors than the mini-muddling pattern they describe. And Naturalistic Decision Making (NDM)

may be a better fit to describe the type of quick high stakes decisions made from incomplete information that the project teams face when responding to unexpected events (Zsambok & Klein, 1996). Still, their contribution of viewing unexpected events as sources of learning points to a phenomenon that may explain how project managers learn from experience. In another study, Kaulio (2008) investigated the relationship between leadership and unexpected events using the Critical Incident Technique to look at events that the project leaders were not expecting. To collect data about the critical incidents, 48 leaders from 48 projects were interviewed, and 48 critical incidents were identified. Though the purpose of this study was not to understand how these project leaders were learning, Kaulio did observe that some incidents could have been prevented through better planning, but other incidents could not have been anticipated and therefore required the team to learn and adapt when these incidents emerged. This observation again points to the unexpected event as a source of learning when teams adapt to respond to the event. In other research, Söderholm (2008) conducted multiple case study research to learn how project managers respond to unexpected events that are triggered by the environment. He found that project managers respond to these environmental disturbances in some common ways (revisions, re-openings, and daily fine tuning) that go beyond the typical planning and execution models of project management. He also observed that innovative action is a key practice of project managers, that it involves going outside the plan and normal procedures to resolve a problem, and noted that some practitioners that he interviewed saw this adaptive practice as the most important practice to project success. In another case study, Tukiainen et al. (2010) examined how

project managers make sense of unexpected events and found that project managers gradually make sense of these events as part of their experience and that this sense-making leads to their responses. He contrasts this with the traditional view that project managers a priori identify a cause and take action. Each of these studies points to the need for project managers to detect the event that does not conform to their expectations, to make sense of the event, and to take action to resolve the event. It is these types of experiences that are created by unexpected events that may trigger a project manager's learning to manage projects from experience.

Experiential Learning

Much has been written about the role of experience in learning to manage projects, and unexpected events have been identified as a common experience that can lead to project manager learning, but little is written about how this learning takes place. The experiential learning literature is vast, and much is written about how learning from experience is thought to occur. A broad view of this literature is provided by Fenwick (2001) in her review of the experiential learning literature. She suggests that there are five perspectives on experiential learning in the literature: constructivism perspectives, psychoanalytic perspectives, situative perspectives, critical cultural perspectives, and enactivist perspectives. Of the five, the constructivist perspectives are the most discussed, and the various constructivist viewpoints share the idea that cognitive reflection by the individual on their concrete experience leads to learning. This idea of learning challenges the view that knowledge is something defined by experts, existing outside individuals, and learning is the process of ingesting this information

from the experts. Thus, it challenges the view that project managers can be developed by filling their heads with standardized project management knowledge. The psychoanalytic perspectives share the idea that there is an unconscious dimension where desire and resistance exist that influences experiential learning. This leads to the conclusion that reflection alone is not sufficient for learning because it is limited to conscious thought, and something is needed for unconscious thought. The situative perspectives share the idea that there is a collective dimension of experiential learning arising from the connections between individuals and their communities of practice. This idea means that knowledge is created through participation in a group and exists within the group rather than solely in the individual. Because knowledge can exist in a group, there may be project management knowledge that is unique to the project setting that cannot be codified and transferred from project to project. The critical cultural perspectives share the idea that power and inequity structure experience and experiential learning can promote social transformation. Because the amount of power the learner has in the learning environment will influence their learning, it is possible that the power structures in a project management setting will influence what is considered valid knowledge: why projects succeed, why projects fail, how project success is seen, and what practices are best. The enactivist perspectives use an ecological systems view and see experiential learning as co-emerging in systems of human action, organization, cultures, and nature. The implication for project managers is that they are working and learning within a larger project management system that operates within a larger organizational system that operates within a still larger society. As these systems interact

and change one another, new project management knowledge naturally emerges as part of the changes. Fenwick (2001) argues that it is unlikely that these five perspectives will be integrated into a single theory of learning; therefore, educators must look across these perspectives to find what they need for a given situation. Yet Kolb's Experiential Learning Theory (KELT) attempts to integrate many ideas about learning, including integrating ideas (though imperfectly and incompletely) from the five perspectives described by Fenwick, making it a useful theoretical framework for this study (A. Y. Kolb & Kolb, 2005; David A Kolb, 1984).

Kolb's Experiential Learning Theory

Kolb's Experiential Learning Theory (1984, Chapter 2) is a prominent and influential theory of experiential learning (possibly the most cited theory) that links experience, perception, cognition, and behavior into a cyclical learning process where learning takes place as people move from feeling (experience), to perceiving (reflection), to thinking (cognition), to acting (behavior) and creates a new experience that starts the next iteration of the learning process. In addition to suggesting the learning process is cyclical, KELT suggests the propositions summarized in Table 2 about the learning process.

Table 2

Summary of Kolb's Experiential Learning Theory Propositions with Implications for Project Manager Learning

Proposition	Description	Implications for Project Manager Learning
Learning is Best Conceived of as a Process, Not in Terms of Outcomes	"Ideas are not fixed and immutable elements of thought, but they are formed and reformed through experience." (David A Kolb, 1984, p. 26) "…the failure to modify ideas and habits as a result of experience could be maladaptive and result in non-learning. " (David A Kolb, 1984, p. 26)	This means that the project manager's knowledge is constantly changing as the project manager gains experience. It also means that a static definition of project management knowledge could hinder project managers' ability to learn if they are unable to integrate their existing knowledge with new knowledge.
Learning is a Continuous Process Grounded in Experience	When experiences violate our expectations, we learn, and this means that learning is often relearning. In other words, learners not only take on new ideas but must dispose of or modify old ideas as well (D.A. Kolb, 1993, p. 28). This tension with old ideas can often result in resistance that must be managed in order to learn (D.A. Kolb, 1993, p. 28).	This means that project managers must be able to let go of old ideas about project management to learn new ideas, but this could be a challenge if they view the ideas they have as fixed and unchanging. This also supports the idea that unexpected events can be a source of learning as they violate the project manager's expectations.

Table 2 (Continued)

Proposition	Description	Implications for Project Manager Learning
The Process of Learning Requires the Resolution of Conflicts between Dialectically Opposed Modes of Adaptation to the World	Learners have four types of adaptive abilities that KELT labels *concrete experienc*e, *reflective observation*, *abstract conceptualization*, and *active experimentation*. These four abilities can be seen as end points along two dimensions: concrete experience and abstract conceptualization, and active experimentation and reflective observation. (See Figure 2.) The way these dialectically opposed adaptive modes interact determines the level of learning (David A Kolb, 1984, pp. 30–31).	How project managers see these conflicts between project management experiences and project management concepts will determine if they learn and what they learn. How they manage the tension between taking action and reflecting on experience will also influence their ability to learn to manage projects.
Learning is a Holistic Process of Adaptation to the World	KELT addresses the nature of specialized human functions (cognition, perception, behavior, and feelings) and how they are integrated to support human adaptation to the physical and social environment. Learning encompasses other more limited adaptive concepts such as creativity, problem solving, decision making, and attitude change that focus on one area of adaptation that often also use cyclic descriptions similar to KELT (D.A. Kolb, 1993, pp. 31–34).	This means that a project manager's ability to adapt is made up of many learning abilities that interact with one another in a learning process.

Table 2 (Continued)

Proposition	Description	Implications for Project Manager Learning
Learning Involves Transactions Between the Person and the Environment	KELT considers the interplay between these two forms of experience: (1) personal and subjective referring to internal state such as happiness, and (2) objective and environmental. KELT uses the term transaction to describe this interplay because it implies a fluid condition between objective conditions and subjective experience. Learning in this setting is seen as an active, self-directed process (D.A. Kolb, 1993, pp. 34–36).	The project management environment typically has organizational components that influence the project manager's experiences such as Program Management Offices that set policy for how projects are managed.
Learning is the Process of Creating Knowledge	Knowledge is created out of the transaction between social knowledge and personal knowledge (David A Kolb, 1984, pp. 36–38).	In project management, social knowledge is codified in various project management bodies of knowledge, the practitioner literature, exists in what is known within the firm through groups such as the Program Management Office, and may conflict with the project manager's personal knowledge about how things work and how to get things done.

Creating knowledge. Kolb's ELT suggests that the four learning abilities identified in his propositions about learning are based on learning structures innate in every person. KELT proposes that these four abilities create grasping and transformational learning structures in people that are described in psychology, philosophy, and physiology. The first structure, grasping, is made up of two different and dialectically opposed processes for seizing experience: apprehension and comprehension. Apprehension relies on how the immediate experience feels, and comprehension relies on conceptual interpretation and symbolic representation of experience; apprehension focuses on concrete experiences, and comprehension focuses on abstract conceptualization of those experiences. For instance, a common task for a project manager is to manage work that must be coordinated among multiple groups that depend on one another to achieve the purpose of the project. In managing these interdependencies, a project manager may experience conflict in a status meeting where groups are blaming one another for delays on the project. The way the project manager manages this conflict will depend on how he or she grasps the experience through what they notice (apprehension) as well as their mental model of how people behave on project teams (comprehension). If their mental model is based on the idea that people operate independently of their environment, the project manager may seek to find who is at fault and then take action once he or she has determined who is at fault. However, if their mental model includes the idea that they are working within a larger project management system that itself influences behavior, then the project manager will consider whether or not the issue is a symptom of a larger systemic problem and not simply poor performance or

personality conflicts. In this case, the project manager may look for the organizational forces behind the conflicts. In this concrete-abstract conflict, KELT describes what can happen if the project manager's apprehension is inconsistent with their comprehension. So if the project manager believes people operate independently of their environment but notices that this experience of blaming among groups has occurred on different projects with different team members, he or she may begin to question why different people are behaving the same way on different projects. Thus, this conflict can lead to learning as the project manager seeks to integrate what he or she believes with what he or she is experiencing. In addition to grasping, there is a second structure, transformation, and it is made up of two dialectically opposed processes for transforming what has been grasped through apprehension and comprehension called intention and extension. Intention is the process of internal reflection about what has been grasped, and extension is the application of what has been grasped by manipulating the external world. Returning to the previous example, the project manager may reflect on the experience of conflict on a project team and conclude that factors in the environment are the cause because this pattern has happened before with different people. The project manager may then decide to take action to change the system or raise awareness of the system to alter the social forces at work on the team. It is the action of transforming what has been grasped that creates new knowledge. As Kolb (1984) states

> The central idea here is that learning, and therefore knowing, requires both a grasp or figurative representation of experience and some transformation of that representation. Either the figurative grasp or the operative transformation

> alone is not sufficient. The simple perception of experience is not sufficient for learning: something must be done with it. (p 42)

These examples illustrate how interactions among the adaptive processes create four different types of knowledge shown in Figure 2 that are related to the four adaptive processes.

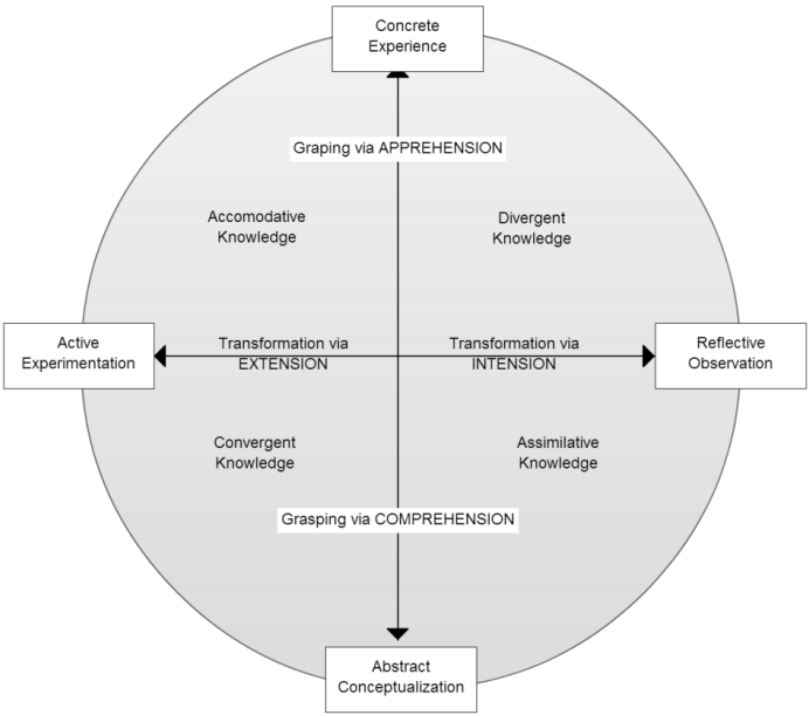

Figure 2. Knowledge Creation in KELT Resulting from the Interaction of the Four Adaptive Processes Leading to Different Kinds of Knowledge. Adapted from Kolb, D. A. (1984). *Experiential learning: experience as a source of learning and development.* Englewood Cliffs, N.J.: Prentice-Hall.

Learning styles. Up to this point, the description of the four adaptive processes and the learning cycle have been generalizations about how individuals learn; however, at the level of the individual, experiences and environmental factors shape this generic learning process by creating preferences for different adaptive processes in individuals that Kolb refers to as learning styles. In KELT

> Learning styles are conceived not as fixed personality traits but as possibility processing structures resulting from unique individual programming of the basic but flexible structure of human learning. These possibility processing structures are best thought of as adaptive states or orientations that achieve stability through consistent patterns of transaction with the world; for example, my active orientation helps me perform well in active tasks, and since I am rewarded for this performance, I chose more active tasks, which further improves my active skills, and so on. (David A Kolb, 1984, pp. 97–98)

In other words, the learning process is not the same for everybody, and the learning process is shaped by choices made by the individual and the experiences that those choices create. For instance, the learning style of a project manager is shaped both by the preferences of the project manager and the demands of the project manager role that the project manager chose. These styles of learning can be complex and difficult to reduce into a typology because (a) individuals may combine the basic adaptive processes in more complex patterns, (b) an individual's preferences may vary from one setting to another, and (c) cultural experience influences the development and the expression of cognitive functioning. For instance, the

project manager that is faced with resolving a problem of growing scope (called scope creep) on a project needs an answer or at least an actionable plan to execute. In this setting, the project manager may draw on his or her mental models (abstract conceptualization) of how the project scope is defined and managed and recognize that ambiguity in the requirements is a source of scope creep. Using this idea, the project manager then decides to review the requirements (active experimentation) with the team to see if they have a shared understanding of what these requirements mean. This belief that ambiguous requirements lead to increasing scope is an example of comprehension (clarity of requirements influences clarity of scope) interacting with extension (a requirements review can reveal issues in requirements) to create convergent knowledge (one way to manage scope is to clarify requirements) that is useful in problem solving situations. But during the requirements review, the project manager discovers that the team has a shared understanding of the requirements, but that the requirements assume that the organization is capable of certain tasks that the organization cannot perform. In other words, the scope creep is a result of trying to remove organizational limitations and barriers that are beyond the scope of the project. What is needed now is a more accommodative kind of knowledge that is created when extension interacts with apprehension. In this example, the project manager apprehends the limitations of the organization and then modifies the action taken to accommodate those organizational limits. Therefore, seeing that the problem is not requirements clarity but unrealistic requirements, the project manager now takes action to escalate this issue to the project sponsors for resolution. This simple example illustrates one

possible way that the dialectic conflict between apprehension and comprehension is transformed by extension, and that the result of that extension is then apprehended and further transformed again by extension. It also illustrates that the learning approach was influenced by the project manager's setting that called for problem solving and working within organizational limitations.

Human development and learning. In addition to describing a learning cycle and learning styles that create knowledge, KELT also describes human development as taking place across four dimensions (affective complexity, perceptual complexity, symbolic complexity, and behavioral complexity) that correspond to the endpoints of the grasping and transforming KELT dimensions. As development takes place, higher order abilities result as shown in Table 3.

Table 3

The Relationship between Learning and Development in KELT Showing How Learning Can Lead to Development

Learning Mode	Development Dimension	Results In
Concrete Experience	Affective Complexity	Higher Order Sentiments
Reflective Observation	Perceptual Complexity	Higher Order Observations
Abstract Conceptualization	Symbolic Complexity	Higher Order Concepts
Active Experimentation	Behavioral Complexity	Higher Order Actions

As these abilities are developed, there is a need for higher order integration to connect these abilities and resolve the dialectical conflicts described in KELT. For instance, as a project manager develops his or her behavioral skills, they may progress from feeling they have no

power to influence team members reporting to other managers to realizing that they can escalate issues to management to get a response to then realizing that they can offer to help other teams to get a response without a need for escalation to management. Further, as their experience on projects grows they may begin to form mental models that help them detect early in the process who is in trouble (or will get into trouble) so they can begin to take action sooner. For instance, a new project manager may accept that a supplier will perform as expected based solely on the assertions of the supplier even though the supplier does not provide any evidence they can get the job done. An experienced project manager may look at this same situation using a more mature mental model that tells them that if the supplier cannot demonstrate that they are in command of the work, then it means that the supplier is already in trouble, regardless of how much they insist they are on top of things.

KELT also suggests that the four dimensions of development become more integrated with increasing development and divides this process into three phases: acquisition, specialization, and integration. Acquisition typically takes place from birth through adolescence when a person is acquiring the adaptive processes described by KELT. Following that, the individual choices about education and career path begin to shape their development as they interact with their educational and working environments. Often people self-select paths that are the best fit for their individual learning preferences and what is needed by society. For instance, a person may select the role of project manager because they feel they have the skills and abilities demanded by the role (self-selection) and because they also are willing to develop the skills and abilities demanded by the role (socialization).

This interaction with the world that shapes the person and their world is a key characteristic of this specialization phase of development. The final phase suggested by KELT, integration, occurs when the person's specialization to meet the needs of society is at odds with their need for fulfillment. Though not everyone has this experience, for those who do, it is marked by conflict, and they begin to use learning processes that were previously blocked by their specialization.

Learning and consciousness. A final characteristic of KELT is how it explains the relationship between learning and consciousness. KELT defines three levels of consciousness that differ from one another qualitatively: simple registrative consciousness, increasingly interpretive consciousness, and integrative consciousness. In simple registrative consciousness, an experience is taken in through the senses, and the person is aware of the experience, but the person will not make meaning of this experience. For instance, a project manager operating at this level of consciousness will be aware that a team must hire staff and that the labor market is competitive, but they will be unable to interpret these signals to determine that hiring in a competitive market poses a risk to the project; they are unaware of what these emerging signals may mean. In increasingly interpretive consciousness, learning modes combine creating a process that selectively interprets experience and leading to more highly integrated forms of behavioral, affective, perceptual, or symbolic complexity. So in the previous example, a project manager with an interpretive consciousness level will recognize that projects have leading indicators signaling problems that can be acted on even if other team members do not agree that there is a problem. In integrative consciousness, the

person can center an experience between the grasping and transformation dimensions of KELT. In doing this, the person can draw on a wider range of adaptive processes for learning. For the project manager, this means that they are conscious of multiple ways to view their project management experiences, making them able to adapt to a wider range of situations and see multiple viewpoints. Said another way, KELT proposes that learning can lead to greater awareness as a person uses their adaptive abilities. And in a project management setting, this increasing awareness can help project managers to be more effective at anticipating the needs of the project.

Criticisms of experiential learning. Though KELT has been influential in shaping ideas about experiential learning, there are some criticisms. Fenwick(2001) identifies the following criticisms of the constructivist perspective of experiential learning from which KELT originates:

- The constructivist view of reflection is limited to what the learner is conscious of and ignores the influence of unconscious desires that can influence learning.
- The constructivist view sees context as separate from the learner, so it does not consider the relationship of the learner to the environment and how that relationship influences learning and the nature of knowledge.
- The constructivist view separates experience from reflection, but it is possible that experience itself is knowledge driven, and knowledge is constructed in power-laden social processes that define experience. For instance, how a project manager experiences a project is influenced by what the project manager knows

about project management, but project management knowledge itself is shaped through political processes within the standard setting bodies and within organizations.

- The constructivist view sees the learner as the same in all contexts, but other perspectives argue that the learner changes based on the context.

Consistent with the criticisms summarized by Fenwick, Kayes (2002) notes that the primary theoretical criticisms of KELT are that it decontextualizes the learning process and ignores the psychodynamic, social, and institutional forces that influence learning. However, he argues that Kolb's Experiential Learning Theory occupies a unique place in the study of management learning because it integrates ideas about experience, reflection, action, and abstraction into a formal theory of learning that highlights how these interact in the learning process. He points out that criticisms of KELT fall into two categories: (a) criticism of the validity of the Learning Styles Inventory (LSI) instrument, and (b) the theoretical criticism previously mentioned. He notes that the LSI has been revised twice and that few criticisms remain about the instrument. Acknowledging the theoretical criticism, he proposes that the primary weakness in KELT leading to this criticism is that it does not adequately account for the relationship between the personal world of experience and the social world of abstraction. In fact, Kolb (1984) spends less than two pages in his book explaining this relationship. Kayes's approach to explaining this relationship is to preserve the place of experience, reflection, action, and abstraction in the learning process while connecting these adaptive modes in a way that shows the relationship between personal and social knowledge. The

result is what Kayes calls the K Schema (see Figure 3) which illustrates how personal and social knowledge interact through the adaptive processes involved in personal knowledge (experience and reflection) and social knowledge (action and abstraction). This diagram illustrates that a break occurs as personal knowledge is translated into symbols such as words or math symbols needed to articulate social knowledge so that others can understand it. This break is a result of losing something of the personal knowledge as the translation into symbols takes place.

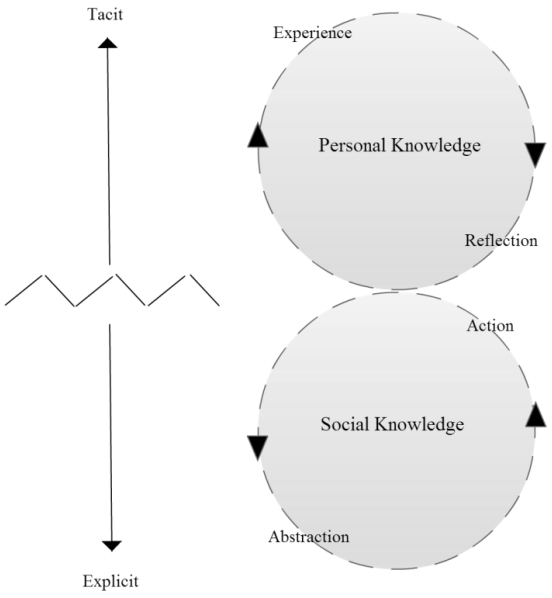

Figure 3. K Schema Illustrating the Relationship Between Personal and Social Knowledge and the Adaptive Processes Defined in KELT. Adapted from Kayes, D. C. (2002). Experiential Learning and Its Critics: Preserving the Role of Experience in Management Learning and Education. Academy of Management Learning & Education, 1(2), 137–149. http://doi.org/10.5465/AMLE.2002.8509336.

Kolb and Kolb (2005) acknowledge Kayes's contribution and introduce the concept of learning space to answer the criticisms that KELT is individualistic, cognitivist, and technological. The learning space is defined by the grasping and transforming dimensions of KELT that can be viewed as a two dimensional map of the learning space. The learner's position on the map is determined by their individual disposition and the characteristics of the learning environment. This learning space can be divided into nine regions made up of KELT's original four learning styles plus an additional five learning styles that have been identified since KELT was introduced. These learning styles provide a typology of different types of learning based on the extent to which they require action or reflection and thinking or experiencing. Experiential learning can be viewed as a process of locomotion through these learning regions that is influenced by a person's position in the learning space and their abilities to move about the space. Their position in the space defines their experiences and thus their reality. With the introduction of these ideas, KELT attempts to account for the influences on learning that it had previously ignored or not made explicit. Yet even with these changes, it is an imperfect model, and there likely will be other considerations about learning that it does not or cannot consider. But its ability to integrate many ideas about learning still makes it a useful model to understand how project managers learn from experience.

Chapter Summary

As mentioned in the first chapter, IT organizations bring their ideas to reality through projects that are led by project managers who influence project outcomes; therefore,

organizations seek ways to develop their project managers to improve project outcomes. Unfortunately, formal project manager training has not kept pace with the changes in project management over the last 30 years, creating a deficit in the project manager development capabilities available to organizations. One reason for this deficit is that the project management standards themselves do not capture much of the knowledge that project managers need and because most of the training is based on these standards, the training cannot provide what the project managers need in practice. Therefore, organizations seeking to develop their project managers need a form of training that is more effective than what is currently available. In response to this, some organizations develop their own programs made up of coaching, career management, and inside and outside training to supplement project manager experience. This approach of supporting experience with coaching, career management, and training can be effective, but it can be difficult to sustain this type of program, and little is known about what experiences are the most helpful in teaching the project manager. This situation makes this inquiry into how project managers learn to manage projects important to practitioners of project management. However, as the literature that has been discussed in this chapter has shown, this inquiry is also important to scholars.

The importance of this inquiry to scholars can be illustrated through several observations about the research literature discussed in this chapter. First, there is a need to rethink project management, and as a consequence of rethinking project management, a need to rethink how to develop project managers. This change is a result of the increasing complexity of projects that are difficult to manage solely with the methods of planning and control emphasized in

the project management standards. Second, experience is often mentioned as the key to learning to manage projects. Third, unexpected events are identified as a source of learning for project managers, but little inquiry has been made into how this learning occurs or what types of events support what type of learning. Fourth, experiential learning is discussed in the literature extensively, and KELT is one of the most discussed experiential learning theories. It is relevant to this inquiry because it provides insight into the inner workings of the learner and what kinds of external factors may influence learning. Nevertheless, there are criticisms of KELT, and even though Kolb and Kolb have answered many of the criticisms, not everyone will find their answers satisfactory. However, the benefits of KELT's integrative framework make it useful in this line of inquiry, though it does have limitations. In short, there is a need to understand more about how project managers learn to manage projects, and there is prior research that can support this investigation. How this investigation will be conducted to understand more about project manager learning is discussed in Chapter 3.

CHAPTER 3: METHODS

Chapter 1 discussed the need to understand more about project manager learning, and Chapter 2 discussed what is known about project manager learning that can inform this study. The purpose of this chapter is to discuss how and why this research followed a case study design and to describe the methods used to collect and analyze the data.

Research Design

The purpose of the research design discussed in this chapter is to show how the data collected, analyzed, and interpreted answers the following research questions first posed in Chapter 1.

1. How do project managers in a large financial services IT organization learn from experience to manage projects?
2. How do different kinds of project management experiences lead to different kinds of learning?
3. Why do some project management experiences have more impact on project manager learning than other experiences?

To answer these questions, this study followed a case study design to inquire into project manager learning in the workplace using the practices recommended by Yin (2014). I used this approach because case studies are useful for exploring how and why questions, such as those posed by this study, that need to be studied in a field setting (Yin, 2014). Benbasat, Goldstein, and Mead (1987) explain that case studies are well suited to inquire into how and

why questions because these questions deal with operational links to be traced over time rather than with questions about frequency. This need to identify operational links is important in this study because it attempts to link project manager experiences to the learning that results from these experiences.

In addition to being an effective way to study how and why questions, case studies are an effective way to study phenomena in IT settings (Benbasat et al., 1987; Cavaye, 1996; A. S. Lee, 1989; Markus, 1983). Benbasat et al. (1987) argues that case study research is useful at many stages of the information systems knowledge building process (a) to study practices in a natural setting to generate theories from practice, (b) to explain by answering how and why questions, and (c) to study areas in which few previous studies have been carried out. In particular, "…the case study research strategy is well-suited to capturing the knowledge of practitioners and developing theories from it."(Benbasat et al., 1987, p. 370) Last, case research is a proven research approach for studying learning phenomena (Clarke, 2006; Lohman, 2000). Though case studies have been successfully used in IT settings, there is a wide range of meanings for the term "case study" that could cause confusion; therefore, some discussion of what is meant by the term "case study" is needed.

Though there does not seem to be any "generally accepted definition of case research" (Cavaye, 1996, p. 228), Yin (2014, pp. 16–17) proposes that case studies can be defined by their scope and features as follows:

> 1. A case study is an empirical inquiry that investigates a contemporary phenomenon (the "case") in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident.
>
> 2. A case study inquiry copes with the technically distinctive situation in which there will be many more variables of interest than data points. One result relies on multiple sources of evidence with data needing to converge in a triangulating fashion, and another result benefits from the prior development of theoretical propositions to guide data collection and analysis.

Several ideas emerge from this definition of case study that are relevant to this study. To start, case studies focus on contemporary phenomena which, according to Yin (2014), are phenomena in the present or recent past where people who observed the phenomena are still living but not phenomena from the past where the people who observed the phenomena are no longer alive. For this study, learning phenomena that happened during 2013, 2014, or 2015 were studied, though the majority of the learning experiences took place since mid-2014. The second implication of Yin's definition is that case studies employ "no experimental control or manipulation" (Benbasat et al., 1987, p. 370) though the researcher may be able to "take advantage of natural controls and treatments either already in place or likely to occur" (A. S. Lee, 1989, p. 39) during the case study. Lee (1989) states that Markus (1983) uses natural controls in her case study of a management information system implementation when she observes differences in behavior of an accountant when he was

working in the corporate accounting group compared to when he was working in the divisional accounting group. In like manner, this study did not attempt to control the learning environment, but this study did identify natural controls in the learning environment that were used to understand the learning phenomenon. The third implication of Yin's definition is that the intent of a case study is research rather than participation or intervention (Benbasat et al., 1987) as is done with action research (Baskerville, 1997). Along these lines, this study did not attempt any interventions to influence project manager learning or project outcomes. The fourth implication of Yin's definition that comes from the idea of using multiple sources of evidence is that case studies are flexible in the range of methods that can be used (Cavaye, 1996). Benbasat et al. (1987, p. 370) also states, "A case study examines a phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities (people, groups, or organizations)." Unfortunately "a comprehensive and standard catalog of research designs for case study research has yet to emerge" (Yin, 2014, p. 27) to help manage this range of methods, but even without a catalog of research designs case studies can adhere to rules and procedures that provide a clear chain of evidence from research question, to data, to analysis, and finally to conclusions (Benbasat et al., 1987; Yin, 2014). To provide this chain of evidence, this study relied on the rules and procedures described by Yin (2014) who is recognized as a case research methodologist (Brown, 2008).

Research Questions

The questions this study investigated include the following:

1. How do project managers in a large financial services IT organization learn from experience to manage projects?
2. How do different kinds of project management experiences lead to different kinds of learning?
3. Why do some project management experiences have more impact on project manager learning than other experiences?

Following Yin's (2014) recommendation to develop propositions, I investigated these questions using the following propositions:

1. Project Managers learn to manage projects from their experiences as project managers using the grasping and transforming processes described in KELT.
2. Unexpected events during the life of a project are the primary source of experiences that lead to project manager learning.
3. Expected events are not a source of learning because they do not create the kind of dialectic conflict that KELT predicts is necessary for learning to occur.
4. What the project manager learns from unexpected events will be shaped by how they see project management. Those that see the purpose of project management as planning and controlling project events will often see

unexpected events as failures of planning and control; therefore, they will learn that better planning and control is needed when unexpected events occur. Those that see project management as responsible for facilitating change will often learn new ways of adapting and facilitating change when unexpected events occur.

5. The project manager's ability to learn from unexpected events will be shaped by their learning style as defined by Kolb. Those with accommodating and divergent styles will report more learning from unexpected events than those with convergent or assimilating learning styles. Project managers with more integrated learning abilities will report more learning from unexpected events than those with less integrated learning abilities. In other words, those who operate in multiple learning styles will learn more from unexpected events than those who do not.
6. The project manager's ability to learn from unexpected events will be shaped by their own awareness of the ways in which they can influence project outcomes. Those with a greater awareness of their ability to influence project outcomes will report more learning from unexpected events than those with less awareness.
7. The project manager's learning will be influenced by the project environment.

Participants

I selected the five participants in this study through snowball sampling beginning with those that were known to the researcher. I included only project managers who were (a) currently employed at the study site and reporting into one of the IT organizations, (b) were actively managing IT projects at the time of the interviews, and (c) had at least 12 months of project management experience at FSC. Participants were working in a variety of roles such as those designated as project manager, program manager, and project portfolio manager.

Role of the Researcher

Because the researcher acts as the measurement instrument in a case study, it is important to understand the researcher's relationship to the case study setting and the case itself because these relationships can influence the outcomes of this study. To start, I have worked in various technology professions (Industrial Engineering, consulting, programming, systems analysis, project management, program management, and organizational management) for over three decades. I have participated as a project team member on numerous projects of varying sizes, I have personally managed projects as a program manager or project manager, and I have managed people that were managing projects. This has given mean a deep practitioner view of project management including what it has taken for me to learn to manage projects. It has also instilled in me knowledge and beliefs about how this job ought to be done that could be both helpful and limiting in conducting this study. In addition, because of my experience, much of what I know is tacit and may be difficult to make explicit. To manage my own biases, I described how I conducted this research in detail so

that my advisor and others could review and comment on my approach. In addition to being transparent with my plan, I followed Yin's (Yin, 2014) recommendations for conducting case studies. Further, as I collected and analyzed data, my advisor was involved throughout the process.

Data Collection

The logic model shown in Figure 1 identifies the concepts to study, and these concepts were refined to identify the data needed to study each concept. I refined the concepts by following Yin's (2014, p. 240) recommendation to identify the mental line of inquiry which consists of the "questions and topics that drive a researcher's thinking (or 'mental agenda') in doing a case study." In addition to developing a mental line of inquiry, I also developed a verbal line of inquiry, as Yin (2014) recommends, that contained "the actual words used in querying a person during a case study interview." (2014, p. 241) The results from this process of moving from concepts suggested in the logic model to defining the mental line of inquiry to defining the verbal line of inquiry and finally to identifying the source of the data are summarized in Appendix A. The results of this analysis showed that far more data was needed than was possible to collect within the time available from each participant. To determine what data to collect, I developed a participant's interview guide (see Appendix B) to describe what information to gather about the participant's learning experiences.

The first step in the data collection process was to create a case study database to store all of the case study artifacts and work products, which ensured that the chain of evidence and artifacts would be preserved during and after the study. (Appendix C desccribes the

procedures I used to secure the data and to protect the participan'ts confidentiality.) Next, the project managers provided a project manager portfolio describing the projects that they had managed over the past 12 to 18 months. (Appendix D shows the template used to collect this data.) These portfolios helped to quantify their project management experiences in terms of project size, project duration, the number of projects, and to prompt the project managers to think about their project management experiences. The level of detail in these portfolios varied from participant to participant, with some being very detailed and others providing minimal detail. I then used the project histories in the project manager interviews to start the discussion. These interviews took from 60 to 90 minutes. Two interviews were done over the phone, one was done by video conference, and two were done in person. Each interview was recorded using a small hand held recorder. Following the interviews, I transcribed the recorded conversations using Transcribe software ("Transcribe - online transcription and dictation software," 2016). The transcription process was to listen to the recordings and type the spoken words and verbal pauses made during the interview. Because of differences in talking and typing speed and occasional background noise, I had to listen to each recording at least twice. I then updated each transcript with punctuation that preserved the intent of what participants were saying, and this process often required listening to the recording a third time. To ensure consistency in how the transcripts were formatted and punctuated, I developed a style guide to define the conventions that were followed. (This guide is available in Appendix E.) In several instances, following the interview I created memos to capture my initial reactions and observations. After creating the transcripts, I downloaded

the project manager's resumes from Linked In ("World's Largest Professional Network | LinkedIn," 2016), and the information from the resumes and the project histories was summarized.

Data Analysis

I analyzed the data gathered to understand how project managers learn by following the pattern matching approach suggested by Yin (2014). I analyzed the data in terms of the concepts defined by the logic model so that those findings could be compared with the predictions made by the logic model. The initial analysis of the data identified 31 learning experiences and 95 knowledge statements. I further analyzed these learning experiences and knowledge statements to understand how learning was taking place and how the project managers conceptualized and valued the knowledge created. Subsequent to this analysis, I analyzed the other factors predicted by the logic model to understand how they influenced learning.

Learning experience: How learning happens. To begin the analysis, I first loaded the full interviews into NVIVO so that they could be coded to identify the concepts defined by the logic model. I intended to use the unexpected events as the defining feature of learning experiences, but it became apparent that learning was happening with expected events; therefore, the need for a new approach to defining learning experiences emerged during the initial analysis. The new approach was to identify project outcomes, such as introducing a change to Agile practices, that could be used to identify the learning experiences. With this change in approach, the learning experience rather than the unexpected event became the

primary unit of analysis in this study. These experiences were then pulled from the interviews by looking for a project outcome that could be used to define each experience. For instance, one project manager was responsible for staffing a large offshore team, so the outcome of staffing the team was used to identify which events were included and excluded from this experience. The interviews were coded in Microsoft Word to identify what was said about each experience and to identify portions of the interview that did not get coded to any of the learning experiences. In each interview, the majority of the discussion was included in the learning experiences, and introductory comments, concluding comments, and discussions about next steps were excluded. In many cases, these experiences were constructed from multiple parts of the interview because references were made to experiences throughout the interview as the discussion evolved or information about previous experiences was recalled by the participant while talking about other experiences. After these experiences were coded, I created a separate learning experience document for each experience by inserting all of the dialogue from the interview transcript that was part of each experience into these documents. I noted in the learning experience documents where breaks in the conversation about an experience occurred. I loaded these 31 learning experience documents into NVIVO for additional coding and analysis. I also created a spreadsheet to summarize the 31 experiences. During this process, I gave each experience a title to summarize the experience and created a short description of the learning process observed in each learning experience. I then classified each experience into one or more knowledge areas corresponding to a common view of the project life cycle (structuring, planning, or

executing) often discussed in practice ("IT Professional Development: Developing the Human Side of Technology," 2016). I then coded each learning experience to capture the four KELT adaptive processes. Having identified the learning experiences and KELT processes at work, I then conducted additional analysis to understand the knowledge created through these learning experiences.

Knowledge creation and concepts learned from experience. I reviewed each learning experience to identify the knowledge created during the learning experience. In some cases, the project managers made explicit statements about learning, and in other cases they were less direct, but knowledge created during the experience could be observed. I used NVIVO annotations to code statements that the project manager made that indicated that knowledge was created, and I summarized the knowledge created as part of the annotation. Ninety-five knowledge statements were created in this manner. These knowledge statements became the second unit of analysis used in this study. To analyze these statements, I loaded them into a spreadsheet, linked them to the learning experience summaries, and reviewed them to identify the learning situation and learning methods used by the project manager. Following this, additional analysis was done to gain insight into how the project managers thought about this knowledge.

The analysis of the learning experiences and knowledge created gave insight into how learning was happening but provided little insight into the value of the knowledge created and how it was seen by the project managers. Therefore, I conducted additional analysis to understand how participants thought about what they were learning. For this analysis, I used

concept mapping, which is a term that has multiple meanings that range from representing ideas in pictures or maps to a structured methodology for organizing the ideas of a group of people (Kane & Trochim, 2006, Chapter 1). In this study, concept mapping refers to a structured method that will be used to organize the ideas from a group of people and represent those ideas and their relationships to one another through a concept map. I based the process for developing the concept maps on the approach defined by Kane and Trochin (2006) and it consisted of (1) generating knowledge statements as previously described, (2) structuring the statements so they could be grouped into themes by the project managers participating in this study, (3) using card sorting to have the project managers organize the knowledge statements by theme and importance, (4) performing the concept mapping analysis to create the concept maps, and (5) interpreting the concept maps.

As previously described, I drew the knowledge statements from the interviews and structured them using NVIVO annotations. I then exported the knowledge statements to a spreadsheet for further review and refinement, and following this I updated the NVIVO annotations with the changes made to the knowledge statements in the spreadsheet. I then used card sorting to understand how the project managers conceptualized the knowledge that was created by the 31 learning experiences. To do this, I printed each knowledge statement on a 3x5 card, and instructed the project managers to sort the cards into piles "in a way that makes sense to you" subject to two constraints: (a) all statements cannot be put into a single pile, and (b) all statements cannot be put into their own pile – participants could not put one card per pile. After the cards were sorted, the participants assigned a placeholder name using

another 3x5 card that was added to each group of cards. After the cards were grouped, I updated the label card with the participant's id, the numbers of the statements in the group, and the number of cards in the group. Participants then rated each statement to indicate how important this knowledge was to managing projects. The rating was done using a five point Likert scale using the prompt "this knowledge is critical to a project manager's success". The process for rating was to sort the cards into one of five groups corresponding to the five points on the Likert scale. Once done, I updated the label card with the participant's id, the numbers of the statements in the group, and the number of cards in the group. After each sort, I counted the number of cards in each group to ensure all 95 cards were included in the sort. I then scanned the label cards from both sorts (these contained the results of each sort) and stored them in the case study database.

After the participants had sorted the cards, I prepared the data from the cards for Multi-Dimensional Scaling (MDS) analysis by creating a similarity matrix in MS Excel. I used SPSS to conduct the MDS analysis. The results of the MDS analysis was a pair of coordinates for each of the 95 knowledge statements that were used to plot the statements on a two dimensional map. Once the statements were assigned coordinates and plotted, I used hierarchical cluster analysis to group the statements into clusters of statements that reflect similar concepts based on the proximity of the statement's coordinates. I used Ward's algorithm for the hierarchical cluster analysis as recommended by Kane and Trochin (2006). The output of the cluster analysis was 19 sets of clusters showing how statements would be grouped if there were 20 clusters, 19 clusters, and so on down to 2 clusters. I drew the

clusters graphically on the statement map, and I ultimately selected four clusters to represent the key knowledge concepts discussed by the project managers. I then analyzed the themes defined for each statement by the project managers to see what themes emerged for the final four clusters. I used a spreadsheet containing one row per knowledge statement and a column for every theme the project managers identified during the card sorting to conduct this analysis. As much as possible, I ordered the themes based on the number of statements that they had in common so that the themes with a high number of statements in common would be adjacent to one another. Themes with no statements in common would be further apart. From this grouping, I identified the themes related to the final four clusters.

The impact of prior knowledge on learning from experience. To understand how the knowledge and beliefs a project manager has acquired influence their learning on the job, I coded the interviews in NVIVO to identify prior knowledge and beliefs described by the project manager. In addition to this, the project manager's resume provided some insight into their previous learning experiences. Because the interviews did not focus on prior knowledge, these observations were limited to what the project manager volunteered as part of the ongoing discussion. However, even with this constraint, the information provided by the project managers does reveal some ways in which prior knowledge influenced the current learning experiences.

Learning preferences: The impact of learning style. To understand the project manager's learning style, I coded each experience in NVIVO to identify each time that the project manager described one of the four adaptive processes defined by KELT: concrete

experience, reflective observation, abstract conceptualization, and active experimentation. The coding revealed that each of the project managers described each of these adaptive processes. Based on the coding, I used NVIVO to count the words associated with each adaptive process to see how much emphasis each project manager placed on each process. I determined the emphasis that each project manager placed on each adaptive process by calculating the percent each adaptive process represented from the total discussion about adaptive processes. The results are summarized in Table 4.

Table 4

Adaptive Processes Discussed in Project Manager Interviews

PM[a]	CE[b]	RO[c]	AC[d]	AE[e]	Total
Helen Davenport	18%	36%	27%	19%	100%
Isaac Wilson	29%	57%	10%	4%	100%
Lisa Ward	35%	30%	10%	26%	100%
Sara Cooper	42%	19%	34%	5%	100%
Teresa Lopez	20%	43%	19%	17%	100%
PM Average	29%	37%	20%	14%	100%

Note. [a]project manager [b]concrete experience [c]reflective observation [d]abstract conceptualization [e]active experiementation

Learning environment: The social-technical forces that shape learning. I analyzed the social-technical forces that impact the project managers by coding the interviews in NVIVO to capture any comments that were made related to the project management environment. I made additional observations about the environment based on my own history with the organization and understanding of how FSC operates.

Criteria for interpreting the findings. I used the seven research propositions to interpret findings by comparing predicted with observed findings. This led to conclusions about which propositions were supported and to what degree and which propositions were not supported. I then used these conclusions to evaluate the original logic model and to suggest some changes to align the logic model with these findings.

Ethical Considerations

The participants in this study were protected in the several ways. First, participation in this study was voluntary and participants could opt out of the study at any point. Second, the information provided by the participant has been kept confidential. Specifically, I have used participant identifiers and aliases to identify participants in the study. I have also used aliases for any individuals mentioned by the participants during the interviews. Third, I have also masked information that could be used to derive a participant's identity. For instance, it would be possible for someone familiar with FSC to determine who the participants are if they had the names of the projects, organizations, or IT products mentioned in the interviews, so I have masked these names as well. I will maintain a cross reference between names, identifiers, and aliases until the study is complete. Finally, each participant signed an informed consent form that explained these points to them before their participation in this study began.

Chapter Summary

This chapter has presented the data collection and data analysis methods used to understand how project managers learn to manage projects. It has attempted to show how the

research questions, research propositions, data collected, data analysis, and interpretation of the findings are connected to provide a chain of evidence connecting the research questions to the findings from this study. Chapter 4 will discuss these findings.

CHAPTER 4: FINDINGS

The purpose of this study is to answer the following questions that were posed at the start of this study:

1. How do project managers in a large financial services IT organization learn from experience to manage projects?
2. How do different kinds of project management experiences lead to different kinds of learning?
3. Why do some project management experiences have more impact on project manager learning than other experiences?

To answer these questions, I interviewed five project managers to understand how they learn to manage projects on the job. I transcribed and analyzed these interviews to identify 31 learning experiences. These experiences were the primary unit of analysis in this study, and they were analyzed (using NVIVO and spreadsheets) to identify the KELT adaptive processes described by the project managers, to summarize the knowledge created about project management, and to classify the learning situations and learning methods that emerged during the analysis. I analyzed the KELT adaptive processes to gain insight into the project managers' learning styles, and I analyzed the knowledge statements with concept mapping to identify the major learning themes and their importance to project managers. Finally, I analyzed the prior knowledge and beliefs held by the project managers to understand the relationship between their prior knowledge and current learning. I then

compared this analysis to the research propositions to compare predicted with observed findings. The results of this comparison are the subject of this chapter. To start, the participants in this study will be described to provide background on who is learning in this study. Following that, I will compare each of the seven propositions suggested by this study with the findings to determine the level of support for each proposition. I will then discuss some implications for the conceptual framework suggested by these findings.

Participants

The learning done by the participants is the focus of this study; therefore, understanding who these participants are will provide some context needed to understand the findings presented later in this chapter. The five participants in this study included four females and one male, and all were employed as full-time project managers at the time of the interviews. As shown in Table 5, they have from 8 to 16 years of IT project management experience, and all of the participants have additional IT experience in non-project manager roles. These project managers are well educated. All of them have Bachelor's degrees, two have Master's degrees, and one is currently pursuing a Master's degree. All have worked for other firms, their IT experience ranges from 8 to 32 years, and their tenure at FSC ranges from 3 to 22 years. This combination of education, IT tenure, and project manager experience means that this group is one that is well versed in managing projects in an IT setting. This is a group of experienced and successful IT project managers with over 50 years of paid project manager experience and experience with current project management practices. They are also managing challenging projects. Two of the participants were managing large complex

programs critical to the firm's strategy with annual run rates of $30M or higher. One was managing a portfolio of projects also critical to the firm's strategy, but with a smaller annual run rate of $5M. The remaining two project managers were managing programs with annual run rates of $1-2M. All of the projects managed by these project managers were developing capabilities that were customer facing, and any problems they had in the delivery of these projects would have impacted the customer's experience. So these efforts were visible to management and closely monitored. The participants represented three different IT groups that reported up into three different divisions of the firm. All of the project managers were leading cross-functional teams made up of staff from multiple groups including development, technology architecture, quality assurance, systems operations, infrastructure groups, database groups, user interface design, and more. In addition to these technology groups, the project managers were working with business stakeholders including project sponsors, product owners, business analysts, and others, as well.

Table 5

Project Manager Experience Summary

Participant	Education	PMP?	Non-PM Roles Held	Prior Firms	PM Experience (Years)	Non-IT Experience (Years)	IT Experience (Years)	FSC Experience (Years)	Current Role
Teresa Lopez	Masters, Technology Systems, Performance Improvements, 2008 - 2011 Bachelor of Arts (BA), History, 1990 – 1994	Yes	• Systems Analyst • Account Manager • Software Engineer	2	12	0	18.5	15.4	VP
Sara Cooper	MBA, 2014 - 2016 BA, Humanities, 2005 - 2007 Associate of Arts (A.A.), Modern Standard Arabic, 1998 – 2000	Yes	• Military	3	8.2	7	8.2	3.0	Director
Helen Davenport	School of Management BSBA, Concentration in MIS, 1979 – 1983	Yes	• Software Engineer • Systems Analyst • IT Manager	3	16	0	32.1	3.3	Senior PM
Lisa Ward	BS, Animal & Veterinarian Science	Yes	• Development Manager • Systems Analyst • Software Engineer	2	14	0	28.8	22.0	Senior PM
Isaac Wilson	MBA, 1999 - 2002 BA, Marketing Communications, 1992 - 1995	Yes	• Organizational Leader • Account Manager	1	3.2	0	15.4	15.4	PM

Learning from Experience (Proposition 1)

The first proposition of this study is that Project Managers learn to manage projects from their work experiences using the grasping and transforming processes described in KELT. Analysis of the interviews identified 31 on-the-job learning experiences from the five project managers that are summarized in Appendix F. Analysis of each experience identified numerous instances of project managers using the grasping abilities of concrete experience and abstract conceptualization and the transforming abilities of reflective observation and active experimentation described by KELT. In addition to identifying instances of grasping o ransforming processes, this analysis identified 95 examples of knowledge creation in these experiences, which are listed in Appendix G. Therefore, the grasping processes, transformative processes, and the knowledge creation that results were observed in this study just as KELT predicted. I will now discuss each of these in greater detail.

Grasping processes. The two grasping processes described by KELT, concrete experience and abstract conceptualization, appeared throughout the learning experiences. For instance, Helen Davenport spoke about her own concrete experience when her business sponsor changed direction after the team had expended considerable effort.

> I would say it was pretty stressful because we were actually under a lot of stress to meet that original date. People were working nights. We had just been told to work nights and weekends to make that original date. And then, just to find out, "Oh, wait a minute the business realizes that we should have asked for this big change." (you know) We were almost afraid that people

> would get really demoralized because they had been working so hard to make that original date. And then to find out, "Oh it's okay. We'll just wait a lot longer and do this other thing."

In another experience, Isaac Wilson described his concrete experience while attending meetings with senior and middle managers when the team was recovering from an issue that had the potential to impact the firm's relationship with some of its customers.

> My SVP is - was pretty tough but very fair. I mean they would ask questions, but it never felt - it never felt angry, or malicious, or demeaning isn't really the right word. But (you know) there is definitely personality types where (you know) you feel challenged, you feel well really where the line of questioning it's coming from a lack of trust or something like that.

Though Isaac refers to these questions as challenging, others in this firm call these kinds of sessions interrogations because of the pressure and pace of the questioning that comes from senior managers seeking to understand the situation.

On the other side of the grasping dimension described by KELT is abstract conceptualization which represents the social knowledge contained in words and symbols. This social knowledge is created when personal knowledge is transformed into a form that can be shared with others. Helen Davenport described abstract conceptualization when she said, "So anyway - but after we did the Wilson Trust Diversified Income, and we learned all those lessons, we created this document which was kind of like best practices." In other

words, she conceptualized what she had learned by putting it into written form to convert it from personal knowledge to social knowledge that was available to others. Another example comes from Isaac Wilson, who described the mental model that he has formed about how to schedule work with Agile teams.

> You can kind of slot work for a point in time, but with Agile teams you know, though this Digital Service Impact may be the most important work for the year may not mean it's the most important work for that moment. If you don't need it until October [there is] no value doing it in July, and its kind of balancing the work that has value to the business at the moment with the long term view of the schedule.

Along the same lines as Isaac, Sara Cooper described her own mental model for scheduling work when managing a portfolio of projects that span multiple Agile teams. This description from Sara illustrates her learning since taking her current job and illustrates how she has been able to translate what she knows from personal to social knowledge she can share with others.

> I would say one of my biggest learnings, particularly in managing a portfolio, is that you really have to be on top of the puts and takes right? It's more than just a matter of having something be a zero sum game. And what I mean by that is (there's a lot of clichés in a row sorry about that) - what I mean by that is projects of equivalent size are not necessarily a one for one swap. And so

> you really have to look at the places where you're resource constrained and, what I mean is, if you have a very small number of systems analysts (which tends to be the bottleneck in the work that we do) that's where I start now (right?) trying to make sure that that work is staggered in a way so that my systems analysts have time to go on vacation, or enjoy Christmas, or (you know) not have so many competing priorities that he or she gets overwhelmed. And that's not something that I really would have thought through before in building out a slot plan, and I think generally because we would have expected there would be more flexibility to move things left or right as needed.

These examples illustrate how both concrete experience and abstract conceptualization were described by the project managers as they discussed their learning experiences. In addition, every project manager provided similar descriptions of these grasping abilities that show how the grasping processes described by KELT are taking place in the work place. But KELT also discusses transforming processes that convert experience into knowledge, and these are described next.

Transforming processes. The transforming processes described by KELT are the learning processes that transform personal knowledge into social knowledge. One example of this comes from Teresa Lopez, who was responsible for turning around a large program that had missed dates and was being delivered by a team that was struggling to regain credibility with management. While leading this effort, she made numerous observations

about how the team was operating, which illustrates what KELT describes as reflective observation. For instance, in describing some of the team's limiting behaviors, she mentioned what she terms Agile speak because it was creating dysfunctional behaviors.

> And then the other thing that I - that I noticed was (you know) with Business Solutions, and with our - with our own technology team, and with our own (um you know) our - our own product people - (it seems to matter what - do they make sense) as long as it was in Agile speak everyone felt good about what they were saying.

As Teresa began to question how tasks were being completed, she noticed that people were often working under the belief that they had to operate a certain way. They had come to accept current practices as somehow being mandated practices. Here's how she describes her response upon hearing one of these beliefs from the team:

> And I was like "By who?" "Who told you that?" If nobody told them that it was just sort of urban - urban myth. And that happened a couple of times Mark where the team was not doing something because they thought that there were rules around it.

But her most impactful observation was one she made early on in her tenure as the leader of this program. She described how she noticed that no one had taken the time to align the plans across the various teams supporting this effort. She says "…and realizing, holy shit, nothing matches up! Like the services the app team is saying they can deliver, but the

services won't be ready, so what the fuck! They are not being transparent." Armed with this information, Teresa was then able to challenge how the work was being done and start introducing changes needed to realign the program. In a sense, this observation gave Teresa the authority that she needed to challenge current practice. This need to take action is the other side of transforming knowledge and is discussed next.

The fourth adaptive process described by KELT is the active experimentation that happens when the project managers take action to put their ideas into practice. One example of this comes from Helen Davenport who realized that the project that she was leading was far more complex than anyone had thought. She says

> So I went to my manager and said, "I think I need some kind of help. Like I can't even - this is really - I know that you're saying this is one project, but it's really like six sub-projects."

Another example of active experimentation comes from Lisa Ward who was struggling to either influence or bypass a business sponsor that was a bottleneck on the team because he was acting as an information gatekeeper between several teams.

> I mean we actually even went out - I mean circumvented him at some points and went out to lunch with the UED folks to talk - talk about what it was (you know) they were thinking. So that we could try to - we also created current state documentation so that the UED folks could look at that current state, so that they could understand ok (you know) like this is what is - how it works

> today so that they could keep in mind some of the edge cases that (you know) they had to think about. So those are the things that we tried to do to kinda get around it. I'm trying to think like what else did we do (you know): anything and everything.

These examples illustrate how the transforming process described by KELT is occurring as these project managers manage their projects. The other aspect of learning that is discussed in KELT is that experience is transformed into knowledge by one or more combinations of the adaptive processes, and that is discussed next.

Knowledge creation. As previously mentioned, I identified 95 instances of knowledge creation in the 31 learning experiences. This knowledge creation was predicted by KELT and can be illustrated by a single learning experience. Each experience was given a title, and this one was called *Engaging Marginalized Talent* because it illustrates how Teresa Lopez found ways to align members of the team who had been marginalized prior to Teresa becoming the project manager for this effort. In this learning experience, Teresa had taken ownership of a $30M program that had fallen behind schedule, was over budget, and did not show any signs that the team could deliver. She described the way talent had been marginalized on the team:

> So I would say I'll start with the good. Um...there were some people on the program that were not intentionally marginalized, but I think they were intentionally given more (um) sort of junior type assignments when in

> actuality they were extremely strong leaders, and had great ideas, but were being stifled by the Gary Floress, Paul Robinsons, David Bailey, Donald Turner folks.

In response to this situation, Teresa made changes to re-engage some of the marginalized and under-utilized team members. Here is how she describes the change:

> I mean you know just kind of in general I - I think, and when we gave somebody like a Jerry a real tech lead role, when we gave somebody a real end to end tech lead role, we gave Benjamin the real end to end um project management schedule managing the 3rd party dependencies, (you know) when we gave Anna performance testing: when we really started to assign people things that we knew they would be good at, and they were showing real capabilities in, it really started to create and form the team.

In this experience, Teresa observed what people are capable of doing and how they have been limited in some way from contributing fully to the team. So she used what she had observed, applied a few simple concepts to define the problem, and then took action to make a change. She was careful to watch what happened when she made the first change and made additional observations following the change. I spoke with Teresa numerous times during the life of this program, and there were times when she was keenly aware of the magnitude of the problems the team had, but she seemed able to walk into this setting, take in all of the information about what was going on, and not become overwhelmed by the amount of

information she had pointing to problems, even if at times the volume of problems made her tired. Out of this learning experience, the following three knowledge statements were crafted to summarize the knowledge Teresa created during this experience. (The importance of each statement on a five point Likert scale was also rated by the project managers and is included with the statement.)

- Changing roles of poor performers to something they can do well is essential to rebuilding a broken team (4.20)
- Engaging marginalized talent can be an effective way to rebuild a dysfunctional team that has been unable to deliver. (3.80)
- Making use of the available talent in a way that fits the need and fits their skills is an effective way to re-engage marginalized talent on a dysfunctional project team that has been unable to deliver. (3.80)

In addition to observing the adaptive processes prediced by KELT, I also observed knowledge created during these learning experiences as predicted by KELT. The concept map provided insight into the nature of this knowledge by providing a way for project managers to illustrate the major learning themes and the importance of the knowledge that was created. A summary of these themes and their importance is provided in Table 6. Each of the five project managers rated the importance of each of the 95 knowledge statements (475 ratings in total) on a five point Likert scale ranging from very unimportant to very important. This table shows that over 50% of the statements were considered important or very important learning for project managers by the project managers in this study.

Table 6

Project Manager Learning Themes and Importance Project Managers Placed on Each Theme

Learning Themes	PM Ratings of Knowledge Statements					
	Very Unimportant	Unimportant	Neither Important nor Unimportant	Important	Very Important	Total
Learning to Align People and Practices	12	16	27	50	15	120
Learning to Lead Change and Protect Our Brand	12	13	27	51	17	120
Learning to Manage Barriers & Constraints to Going Fast	24	29	54	101	32	240
Learning to Create Engaging Opportunities to Bring Out the Best in People	5	10	43	54	23	135
Learning to Provide Clear Direction to Guide the Team	1	7	30	37	25	100
Learning to Structure the Team, the Work, and the Message to Deliver	6	17	73	91	48	235
Total	30	46	127	192	80	475

Based on the presence of the adaptive processes described by KELT in the project manager's work setting, the knowledge that is created by these processes in the work setting, and the value of this knowledge as assessed by the project managers themselves, Proposition 1 is supported. Project managers are learning to manage projects using the grasping and transforming processes described by KELT.

Situations that Lead to Learning (Proposition 2 and Proposition 3)

Proposition 1 concerned what happens within the project manager when learning on the job. Proposition 2 and Proposition 3 are concerned with what happens in the project manager's environment that creates a learning experience, and they propose that unexpected events will be the primary source of learning experiences for project managers and that expected events will not be a source of learning. Yet the learning experiences that are analyzed in this study show something different than what was predicted by Proposition 2 and Proposition 3. The analysis of the 95 knowledge statements summarized in Table 7 identified three prominent situations that led to over 90% of the project manager learning observed in this study: *sensing the need for change*, *managing planned change*, and *managing unplanned change*. Therefore, Proposition 2 was partially supported in that managing unplanned change, something triggered by an unexpected event, was observed 22% of the time that knowledge was created. However, Proposition 3 was not supported because expected events were a source of learning 25% of the time that knowledge was created. For example, learning was observed when project managers were managing planned changes such as changing from two to three week sprints, adopting Agile practices, or staffing a large offshore team. Even though these were expected events, the project manager learned from these experiences. A third learning situation was observed that was not predicted by any of the propositions. This situation has been called "sensing the need for change", and it was seen whenever project managers became aware of problems or barriers to delivery.

Table 7

Project Manager Learning Situations and Recurring Learning Patterns

Learning Methods	Sensing the Need for Change	Managing Planned Change	Managing Unplanned Change	Other	Grand Total
	Helen Davenport				
Problem Solving		1			1
Other		2			2
Comparing PM Methods	2	14	2		18
Total	2	17	2		21
	Isaac Wilson				
Problem Solving	2				2
Sense Making	11	4	4	2	21
Other	2				2
Comparing PM Methods			2		2
Total	15	4	6	2	27
	Lisa Ward				
Other			1		1
Comparing PM Methods	1	1			2
Total	1	1	1		3
	Sara Cooper				
Problem Solving		2	7	2	11
Sense Making			1	1	2
Other	1			3	4
Comparing PM Methods	3		4		7
Total	4	2	12	6	24
	Teresa Lopez				
Problem Solving	14				14
Sense Making	2				2
Other	3				3
Comparing PM Methods				1	1
Total	19			1	20
Grand Total	41	24	21	9	95

Project Manager World View (Proposition 4 and Proposition 6)

The first three propositions focus on internal and external learning dynamics that create knowledge. Proposition 4 and Proposition 6 focus on the ways that the project managers' existing project management knowledge, beliefs, and awareness about the impact they have influenced the creation of new project management knowledge. As shown in Table 8, there was evidence of prior knowledge and beliefs influencing the project managers' learning because it influenced both the action that they would take and how they observed what was happening on the project. Teresa Lopez took bold action because of her belief that she did not need to stay in her swim lane; she believed that anything that impacted the project was her business. Not all of the project managers in this study shared that belief, so not all took the kind of action that Teresa did. She was aware of her ability to lead the project, and so she was willing to take action. Her statement "I don't stay in my swim lane" captures her view of her role. Isaac Wilson, the project manager who spoke the most about Agile principles and scrum practices, saw that most problems were challenges with scaling scrum and following Agile principles. His beliefs influenced what he saw. They also limited his ability to take action because he saw the problems as management problems of not understanding Agile. This evidence supports Proposition 4 and Proposition 6 by providing concrete examples of how the project manager's worldview and self-awareness influences the adaptive skills (reflective observation, active experimentation) responsible for transforming experience into knowledge.

Table 8

Impact of Pre-existing Knowledge on Knowledge Creation

PM	Belief	Impact of Belief on Learning
Helen Davenport	Systems analysis skills are important to manage projects because they help a PM to learn how the products and platforms that they are changing work.	Helen took action based on her belief that systems analysis would help a project manager understand what they are delivering. So she applied these skills to learn about the system she was delivering. This course of action set the stage for the next round of learning experiences.
Isaac Wilson	Agile is the right way to deliver projects, and waterfall methods used by management have little relevance to Agile teams.	This belief has limited learning because it led to the belief that nothing can change until management changes. This project manager is waiting for management to change and has not yet identified ways that he or his team could change to improve their situation.
Sara Cooper	Teams must be protected from management that demands too much and does not think about the welfare of the team.	This project manager has been learning how to avoid overcommitting the team in response to organizational pressure. This learning is a result of her belief that management asks for too much and her belief that it's her job to protect the team.
Teresa Lopez	"I don't stay in my swim lane."	This project manager believes that she can operate anywhere needed to deliver the project, so she is willing to change what others may accept as the only way it can be done. She is willing to bypass or change subcontractors that are blocking progress. She sees everything as her sphere of influence and is learning how to influence everything as a result.

Learning Styles (Proposition 5)

The five propositions discussed so far suggest how the project manager's adaptive processes, the situation creating the learning experience, and the project manager's prior knowledge,

beliefs, and awareness will influence their learning on the job. Proposition 5 suggests that the project manager's preferences for different combinations of the four adaptive processes described by KELT will also influence their learning. The use of these adaptive processes was observed in every interview and every learning experience reported by the project managers. Figure 4 illustrates the use of adaptive processes taken from the analysis of the learning experiences, though it does not provide sufficient data to determine which combinations of adaptive processes the project managers preferred to use. (Appendix I shows the individual learning styles.) Therefore, though every project manager was seen using every adaptive process, it is not possible from the data collected to determine which combinations of these processes the project managers were using and which combinations they preferred. Based on what was observed in this study, it is not possible to find support for Proposition 5.

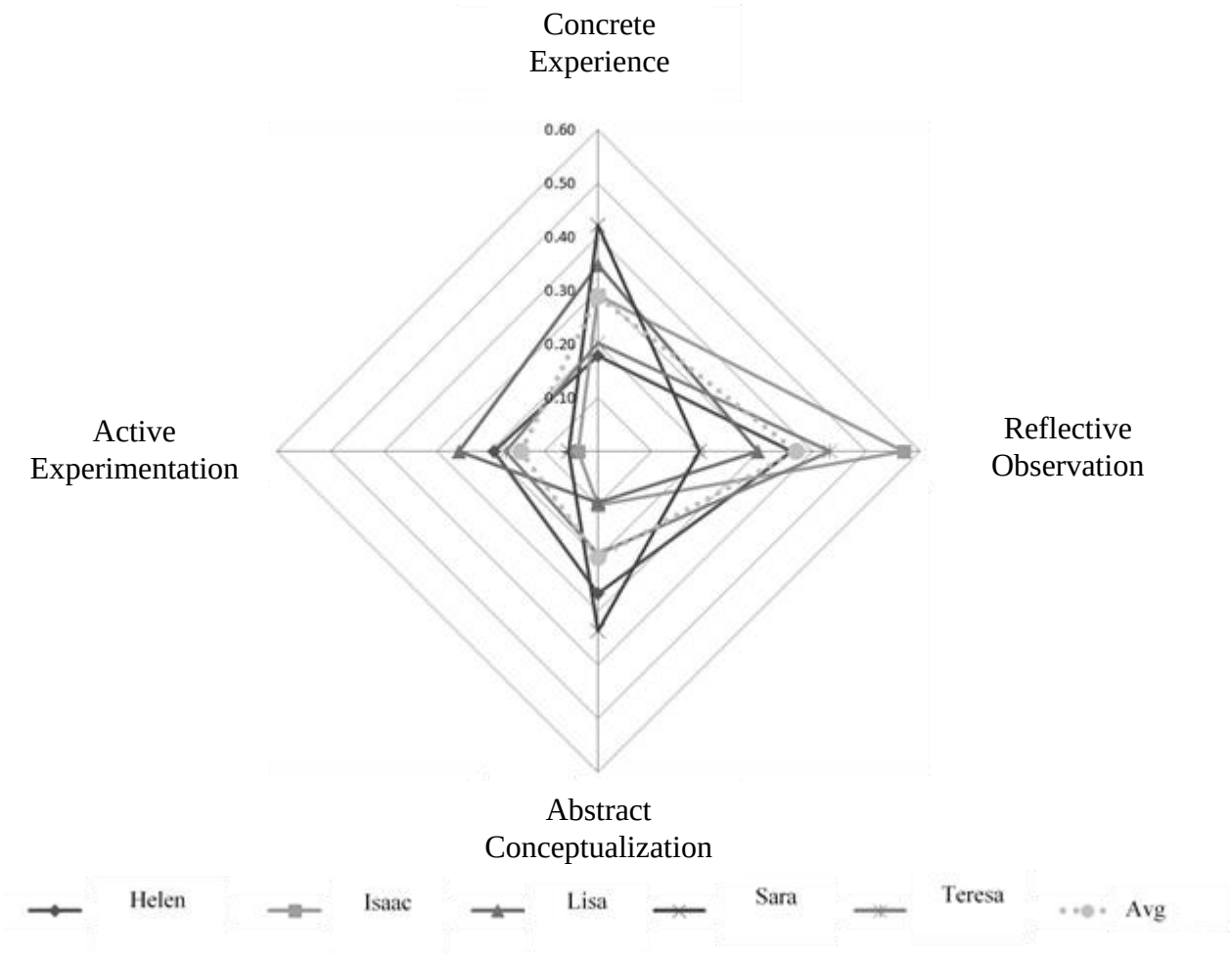

Figure 4. Summary of PM Learning Styles Based on How Much They Spoke About Each Adaptive Process.

The Project Environment (Proposition 7)

The final proposition, Proposition 7, suggests that the project environment will influence learning. Many aspects of this environment were described in Chapter 1 based on the researcher's knowledge of FSC. This section will describe the environment from the viewpoint of the project managers as shared in the interviews. Out of these interviews, three

themes emerged: (1) FSC is challenging to navigate, (2) the project managers' professional environment places demands on their time spent learning, and (3) the volatility and velocity of the market place impacts their projects in ways that influences their learning.

The organizational landscape at FSC. One aspect of FSC's complex organization structure is that policy making is decentralized, making it a challenge for project managers to know what the policies are or even that they exist. One example of this described by Helen Davenport occurred when she was staffing a large offshore team and found out that there are policies about the total number of employees at each site. She says

> …somebody thought we could do that, and it would be okay, and we had - they started hiring in India for this project - Infosys did and all of a sudden I got an email like, "Hey the Offshore Development Center numbers in India are too high - what's going on?" "I don't know. Somebody told us to use Infosys for this project, and they were going to hire people in the Offshore Development Center." But it turns out there's a limit to how many people you can hire in the Offshore Development Center, and nobody told us that.

In this case, Helen felt someone should have told her about the offshore policies regarding staffing. This illustrates an instance where a project manager did not learn from the situation because (at the time of the interview) she was expecting others to change to prevent the problem. More important, though, is that it illustrates the kind of complexity that the project manager's face and how it can impact their ability to deliver and their learning.

Another aspect of navigating FSC is setting priorities because FSC systems are highly interconnected, and different business groups have different priorities. Therefore, when two or more business groups depend on the same team, gaining agreement on what that team should do first is often a challenge that the project managers encounter. Helen Davenport describes her experience with managing priorities:

> So you have to reach out to those people and say, “Hey we need you to change something for us over here in Robo Accounts. And we're just a little bullet on all the work you have to do because you have a whole project for FSC.COM that the FSC.COM team is telling you how to work on, but guess what you got to do something for us too.” And - and they might say, “Oh we're not doing that for you. We're already booked (you know) up. We already know our work for the next six months, and your project isn't on it, and we're not going to do it.” They we're just free to say that. Now the only thing stopping them was that that project was also really important, and we were told to get it done really fast. And the FSC leadership was really good to say, “This is really important, so if somebody tells you (you know) they can't work on this, you come tell me and I'll tell them to work on it.” <Laughter> So I didn't struggle with that too much because there was the correct business priorities set I felt like. So if someone told me they weren't going to work on it, I was like, “Are you sure you really want to tell me that you're not going to

> work on it? Because I'm just going to tell somebody right now, and I can tell you 100% sure you're going to get yelled at."

Another aspect that makes navigating FSC a challenge is working across cultures and time zones. Isaac Wilson says:

> But there are so many differences there. And (you know) even just fundamentally the biggest challenge that we always had working with Dalian was for the first couple of years there were no overlapping hours. If we wanted to work with Dalian we had to - to work at night and (you know) if this developer had a question at three o'clock in the morning, he had nobody to go to. So if he sent his question via e-mail, unless he stayed late the person who is responding to the e-mail would then have to make assumptions about what he was asking, would send an answer and then may or may not actually have answered the question right? So it put a tremendous burden on the team to support Dalian associates by working crazy hours. That's changed a little bit- there's now overlapping hours, swing shifts, when I left they were working on rolling out remote access. But (you know) these are just - these were challenges that were - that made it very difficult to - to have really successful team collaboration.

Another challenge faced by FSC's project managers is the level of effort needed to do resource planning and monitoring: knowing how many people are needed, when they are

needed, where they are needed, with what skills, and how they are spending their time. Policies have been established to guide this process, but these policies can have unintended side effects as described by Sara Cooper:

> And I think the sad thing about that, is that all of these examples will drive a change in behavior on my team, and the change in behavior is not something that's going to get us greater efficiency. Right? The change in behavior is something that's going to get us greater bureaucracy. And I'll just give you a couple of examples (right?) with the - with the PTS and the billing thing (you know) It's $20Ok over in August, but that's not the totality of the problem. The totality of the problem is that we went - we went two months without reviewing actuals versus budget right? So now that kind of has to be undone, and so the response there is for me to tell the project managers in our group, "Hey you guys have to bake this in as part of your normal process" right? When the month closes you have to be Johnny on the Spot reviewing those hours because if they think you're not watching this is a predicted outcome right? So that's one thing.

One of the VPs in Sara's organization commented that an extensive amount of time was spent balancing staffing supply and demand rather than focusing on delivery. Other VPs have commented that the highly projectized funding model makes understanding the costs of platforms and scrum teams very difficult because of the manual steps needed to estimate these answers. In short, there is considerable effort to learn and support the financial

bookkeeping associated with running a project. In addition, the link between this work and project success is often obscure to the project managers. These policies create a situation where it would not be unusual for a team member to bill to ten projects, yet it is unlikely that the team members understand all ten of those projects and are confident about what time to bill to which project. Another observation from Sara Cooper about the decentralized structure is about the internal competition that results. She says:

> So I think the thing that jumps out to me that I feel like most of these have in common is that the way that we're organized is very decentralized right? Everybody has their own platform team, their own territory, their getting their marching orders from their business partner, and everybody's trying to make the case that they are adding value, and preferably at a higher rate than the other teams. <Laughter>

These challenges require the project managers to adapt, but how they should adapt is not obvious, and defensive behaviors can result as project managers look for ways to navigate the organization.

The project manager professional environment. Though the FSC environment is a challenge for project managers to navigate, it is just one part of the project manager's environment. A second part of the project manager's environment is their professional world that exists both inside and outside of FSC. In describing this, one of the project managers,

Isaac Wilson, had this to say about the pressure he feels to have PMI's PMP certification while having doubts about how much it helps him do his job:

> It may be the organization and the business that has built up around it, but I don't know I - I think it's probably that. You know I got my PMP because I felt like it was necessary for my career. I maintain it because I feel like it's necessary for my career. But I think that it is a - I don't know - I think it's a - just a - I think it just became a money making venture unto itself. It's not really - I don't know - and this could just be again my own mindset. I just feel like it's really about making money rather than being really focused on (and this is probably so untrue), but I don't feel like their focus is really on (I know this is not true) managing great projects. I just feel like their more focused on making money. It really just is a personal thing against them (you know). And I also think that - I haven't stopped to really give deep thought to their sort of latching onto Agile as "Oh everything we do is fully compatible with Agile." But it just feel - that also felt like a money grab. And I don't feel like you need to have that level of certification to be successful as a scrum master within an Agile team.

Because the market place often expects project managers to have a PMP, project managers will get the PMP certification whether they believe it will help them on the job or not. This illustrates how the professional environment places demands on the project manger's learning.

The business environment. The third part of the project management environment felt by the project managers is the marketplace external to FSC. FSC operates in a changing business climate where new firms and new products enter the marketplace, creating immense competitive pressure. FSC management frequently talks about the possibility that some of the newer entrants into the marketplace could become disruptive in the same way that Uber has been disruptive to the long standing taxi industry. Because of this environment there is pressure to bring products to market as fast as possible, and this sense of urgency can cause changes in direction that impact in-flight projects. This means that project managers need leadership skills to make these changes in the least disruptive way. In describing one such change and the potential for it to have a negative impact on the team Helen Davenport stated, "We were almost afraid that people would get really demoralized because they had been working so hard to make that original date." Another result of the volatile market is the need to adopt more flexible Agile practices to facilitate these kinds of changes in direction. But changing to more adaptive Agile practices requires a new way of thinking that is hard to acquire in a large organizational setting. Therefore, even though Agile practices sound simple, the move to Agile is hard. Isaac Wilson makes the following observations about this move to Agile that his IT groups are experiencing.

> Basically, the real challenge (I think) in this space is with the move to Agile there isn't a real - with the move to Agile and the fact that development teams have sprung up sort of organically in the various parts of the company - that there are differing Agile practices, there are differing Agile schedules, there

> are differing ways that the Agile teams think about story decomposition, backlog grooming, work intake, or planning. And these all present challenges on their own, and I think the real issue is that at the program management level there is really no preparation for managers to be able to work with these teams in the way that is expected in this Agile culture. A lot of the teams are - a lot of the managers are sort of defaulting to waterfall techniques which creates a real point of friction when you are dealing with teams who want to be Agile.

These comments from the project managers indicate that the project management environment does influence project manager learning by creating an organizational system that they must understand, creating changes that they must manage, including adopting new ways of managing projects, and by creating professional demands that require their attention.

Implications for the Conceptual Model

The findings discussed in this chapter have implications for how this study conceptualizes project manager learning. The implications for the original conceptual model (shown in Figure 5) are:

1. Project manager learning is taking place in the workplace among experienced project managers who have been successful in this role. The knowledge that they create is valuable, and it is being created using the four adaptive processes described in KELT. The original model predicted this, so this will

be retained, though it will be refined based on other findings that will be discussed next.

2. The situations that trigger project manager learning share a common theme of managing change. This makes unexpected events a source of learning, but not the primary source as predicted by the original conceptual model. Therefore, the model will be revised to predict that changing situations rather than unexpected events are the source of project manager learning in the workplace.
3. Expected events can be a source of learning, so the prediction that expected events would lead to reinforced learning is not supported. If expected events create changing situations, then learning will occur. Therefore, the model will be revised to show that changing situations lead to learning and will continue to assume that reinforced learning happens, but from routine situations rather than from expected events.
4. The original concept of the learning process used in the first model encompassed only the KELT adaptive processes, but this study revealed that the learning situation has influenced learning. The concept of the learning process is being broadened to include both the learning situation (routine and changing) and the KELT adaptive processes.
5. The project managers' view of their role and their awareness of the impact that they can have were shown to influence their learning by influencing what

they observe and the action they take. This was predicted by the original model, but the model viewed awareness as part of the environment rather than part of the project manager. Therefore, awareness will be retained but shown as part of the project manager's knowledge and beliefs that are ever changing as learning occurs and which are something that they carry with them into each new learning experience that will influence how and what they learn.

6. This study did not reach any conclusions about project managers' preferred learning styles; therefore, no changes will be made to the conceptual model for learning styles. The model allows for learning styles, but it does not try to predict how they might influence project manager learning.
7. The original model predicts that the project environment will influence learning, but it does not predict what forces are at work in the environment that will influence learning. This study has observed three forces at work in the project management environment: (a) social-technical forces within the firm that result from how it operates, (b) social forces in the project manager profession, and (c) market forces that impact FSC and, as a result, FSC projects. These forces act on both the project manager and FSC, but this is not shown by the current model. The model will be revised to define further what is meant by project environment.

These changes were applied to the original logic model to create a revised logic model that is shown in Figure 6.

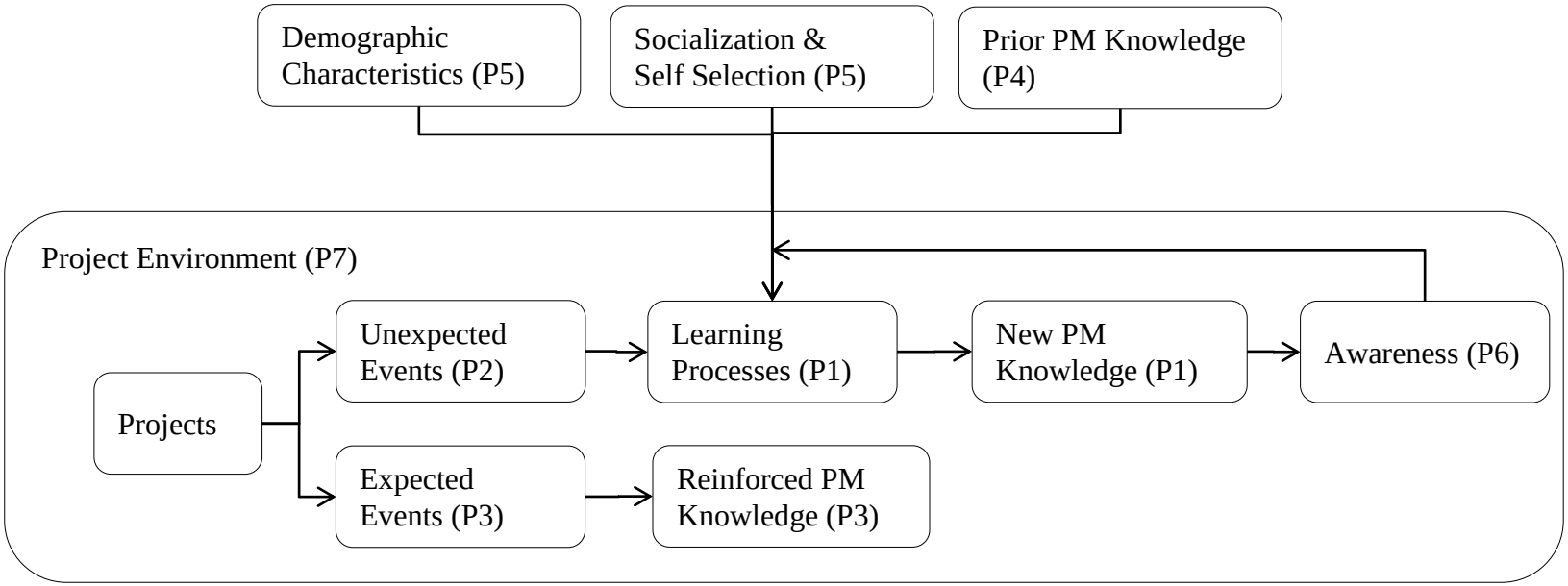

Figure 5. Original Logic Model Illustrating Key Concepts Used at the Start of This Study.

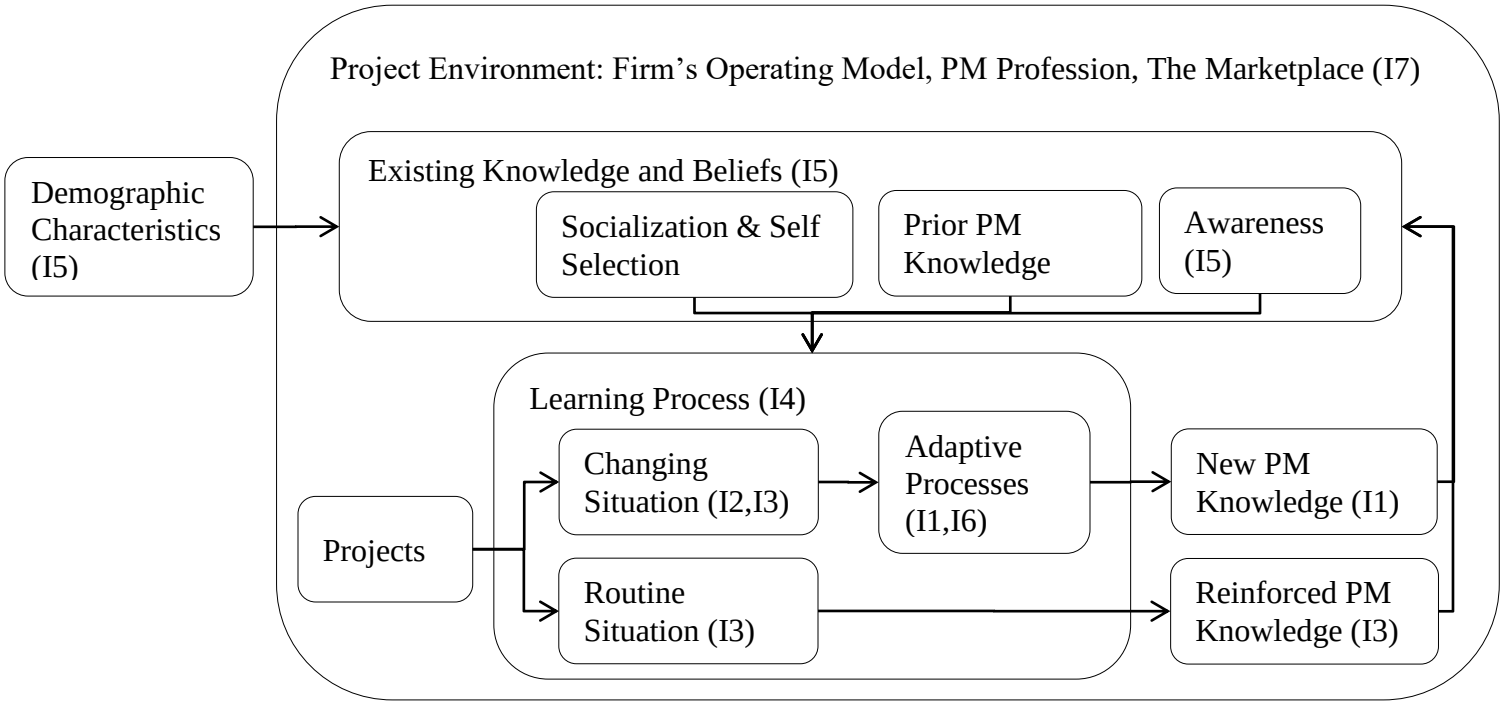

Figure 6. Revised Information Technology Project Manager Learning Logic Model Illustrating the Key Learning Concepts Discussed in Implications. I1 refers to Implication 1, I2 refers to Implication 2, and so on.

CHAPTER 5: DISCUSSION

This study provides an example of how five experienced project managers learn to manage IT projects. These five project managers did most of their learning in situations where unexpected change, planned change, and emerging changes were taking place. However, though the project managers were encountering new learning experiences, there were some recurring patterns in how the project managers responded to these changes and learned from them. The three most prominent learning patterns, accounting for over 90% of the learning observed in this study, were comparing project management methods, problem solving, and sense making. These observations about project manager learning are relevant to both practice and HRD and are the focus of this chapter.

Implications for Practice

The project managers participating in this study have all been successful as project managers; therefore, understanding their learning process should be relevant to practitioners looking for ways to improve their skills on the job. One of the differences among these project managers that influenced what they were learning was in how they thought about themselves and their role. Their viewpoints could be described as team protector, relationship builder, project administrator, Agile champion, and project CEO. Out of these viewpoints, learning emerged which was shaped by the choices the project managers made, what they observed, and how they conceptualized what they were learning. The team protector found new ways to protect the team, the relationship builder found new ways to work around organizational barriers that hurt the relationship, the project administrator

learned new ways to organize the work and the team, the Agile champion noticed ways Agile was used, not used, or misused, and the project CEO made decisions quickly to course correct and mobilize a team that was struggling. All of these viewpoints are valid ways to think about the project manager's role, yet they can hinder learning when they become the only way project managers think about the role. Therefore, one way that project managers can improve their learning on the job is to think of their role or the project itself in different ways by using different metaphors. This will help them to think about the role in new ways so that they can make new observations about what is happening and so that they can experiment with new ways of acting. Two such metaphors are to (a) see the project as an organization led by the project manager, and (b) to see the project as a change initiative led by the project manager.

Seeing the project as an organization. Looking at projects as a temporary organization can help project managers gain insight about how to manage their projects. Perhaps the greatest impact of seeing the project as an organization is that it will help project managers to see themselves as organizational leaders empowered to create high performing teams. The project managers in this study each had their own understanding of the project manager's role. In many cases, they shared a common set of beliefs such as the project manager is responsible for delivering the project, for managing a project budget, and for having some kind of plan. However, beyond this, each project manager had some core beliefs that influenced what they were learning. Sara Cooper felt that she had an obligation to protect the team from excessive management demands or from manipulation by some of the project

stakeholders. Helen Davenport took a more administrative approach to her work. Teresa Lopez felt that she had the mandate to make things happen and was not hesitant to challenge any individual or team working on her project. Lisa Ward felt compelled to build relationships even when it meant working around some organizational guidelines that placed process above the relationship. Isaac Wilson was looking for ways to apply Agile practices to create a high performing team. Some of these differences in views of the role could be explained by the project manager's distance from the CIO and their length of experience: those closest to the CIO felt the most empowered, and those with the most organizational tenure in their roles felt the most empowered. But it could also be argued that those closest to the CIO are the ones who have learned to exercise their power to complete tasks without waiting for permission. In describing this, Teresa Lopes, who reports directly to one of FSC's CIOs, said, "I don't stay in my own swim lane." So the project manger's view of their role will influence what they observe and what action they take, and these are two important determinants of what they will learn. Managers who want to help their project managers be more effective should take the time to understand how their project managers see their role and then work with the project managers to expand their understanding of the role. Project managers wishing to be more effective should reconsider how they see their role and think about how they would manage the project if they saw themselves leading an organization. One aspect of leading an organization, leading change, provides a way of looking at project management that can help project managers to be more effective in their role and in their learning about the role, and this is discussed next.

Seeing the project as a change initiative. During the time that this study was being done, two Director level project managers were hired into the same department within FSC. One began immediately to introduce changes and point out where her team was lacking, and the other spent time learning about her team and how the work was done. The first was confident and had the plan to turn things around; the other was overwhelmed by the organization and looking for help. After several months of this, the first project manager had been unable to make any changes, had a turn over problem on her team, and was being sent to coaching by her manager. But the second project manager had built relationships, and her grasp on the organization was improving. She had a support network in place, and was emerging as the stronger leader because she could influence those around her. Though both were new and both saw aspects that they wanted to change, they took very different paths. The first used position level power, and the second built relationships and used influence as those relationships grew. Whether they knew this or not, the first was using practices that limit change, and the second was using practices that encouraged change. Had the first had a better grasp of her role as a change leader and how to introduce change, she could have avoided the pain she now faces as she repairs her brand. This story is not unique in IT, though the side-by-side comparison of two project managers operating within the same organization may be a bit unusual. However, it illustrates the idea that seeing projects as change initiatives would help project managers to see themselves as change leaders. Change leadership practices offer project managers insight into how to make changes that stick by engaging their teams in a way that improves their chances of success. Given the amount of

change the project managers in this study were facing, seeing their projects as change initiatives and themselves as change leaders could help them to improve their learning on the job.

Implications for HRD

In addition to being relevant to practice, this study adds to what is known about project manager learning in the workplace by describing the experiences project managers have that help them to learn, the learning process that created new project manager knowledge, and the methods project managers are using to learn. It also describes the type of knowledge being created and its relevance to practice. This study also suggests additional questions to study. To start, this study could be extended to answer how other project managers in this setting learn to manage projects as well as how project managers in other IT settings learn to manage projects. This would indicate whether these ideas are applicable in more than the current setting. This study identified a conceptual view of what these project managers are learning; understanding more about how project managers think about project management would give additional insight into their learning. Investigating the mental models used by project managers could suggest more adaptive ways of looking at project management in practice. Finally, seeking to understand how what is being learned by project managers in the workplace aligns with what is being taught in the project manager classrooms could shed insight into the gaps between the classroom curriculum and the demands of practice.

Limitations of this Study

This study was limited to the insights that could be gained from studying a single case at a single site. Therefore, any conclusions drawn from this study should be seen as preliminary. Another limitation of this study is that it was limited to five participants, so it is likely that additional insights about project manager learning could be gained by interviewing additional participants. Another limitation is that the five participants were interviewed in a single round of interviews. A second round of interviews to follow up on new questions that emerged from the initial analysis would have strengthened this study. Yet even with these limitations, this study provides insight into how project managers are learning to manage IT projects and suggests ideas for future research that can give insight into what is known about project manager learning.

Concluding Remarks

Project management is a profession that plays a critical role in the success of IT organizations. This makes understanding more about project manager learning valuable to practice. By studying project managers at work, this study has provided insight into how this learning took place and suggested some practices to help project managers. This study has also pointed to future areas of research to extend what is known about project manager learning. Continued study along these lines can help to improve our understanding of project manager learning and provide insight into how best to support project managers as they learn to manage projects.

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APPENDICES

Appendix A: Analysis of Data Needed to Answer Research Questions

Table 9

Analysis to Determine Data Needed to Answer Research Questions

Concept (Proposition)[a]	Mental Line of Inquiry[b]	Verbal Line of Inquiry[c]	Evidence[d]
1. PM's Demographic Characteristics (P5)	• What are the demographic characteristics of the project manager? • The intent of this question is to understand the characteristics of the project manager that can influence how they learn.	• What is the PM's gender? • What is the PM's job title? • What is the PM's job grade? • What is the PM's age? • How long has the PM worked in IT? • How long has the PM worked as a PM in IT? • How long has the PM worked as a PM in a non-IT setting?	• Project manager semi-structured interview • Corporate Directory • Resumes & LinkedIn

Note. [a]The concepts identified in the logic model and the related proposition. [b]The questions to ask to identify the information needed. [c]The questions to ask to gather the information. [d]The source of data collected to answer the questions.

Table 9. (Continued)

Concept (Proposition)	Mental Line of Inquiry	Verbal Line of Inquiry	Evidence
2. PM's Education & Working Experience (P5)	• What is the project manager's prior educational and working experience? • The intent of this question is to understand the self-selection and socialization processes that have shaped the project managers learning style.	• What projects has the project manager previously managed? • What formal education has the project manager had? • What formal project management education has the project manager had? • What jobs has the project manager held?	• Project manager semi-structured interview • Project manager's resume or Linked In page
	• What is the project manager's current educational and working experience? • The intent of this question is to understand the project managers current project management experiences	• What projects is the project manager currently managing? • What is the project manager's current job? • What is the distance of the PM from their CIO? • What is the distance of their CIO from the company president? • What is their manager's job grade?	• Project manager semi-structured interview • Project manager's resume or Linked In page • Company Directory

Table 9. (Continued)

Concept (Proposition)	Mental Line of Inquiry	Verbal Line of Inquiry	Evidence
3. PM's Learning Style (P5)	• What is the project manager's learning style? • The intent of this question is to understand the project manager's preferred learning style	• How do project managers describe their learning style? • How do project managers describe their adaptive skills? • What is the project managers learning style?	• Project manager semi-structured interview
4. Prior Project Management Knowledge (P4)	• What is the project manager's project management world view? • .	• How do you determine your success as a project manager? • What is the contribution you make as a project manager? • What beliefs do you have about managing projects that guide your decision making? • What is the purpose of the project plan? • How should change be managed on a project? • How should unexpected events be managed?	• Project manager semi-structured interview • Project Manager Resume & LinkedIn

Table 9. (Continued)

Concept (Proposition)	Mental Line of Inquiry	Verbal Line of Inquiry	Evidence
5. Project Management Environment (P7)	• What is the project manager's current project management working environment like?	• Who are the organizations that the project manager works with to do their job? • What is the role of these organizations on the projects the PM manages? • How do these organizations influence project success? • What are the primary demands and challenges project managers face in their current role? • How do project managers manage these demands and challenges? • How does the firm support your development as a project manager?	• Project manager semi-structured interview • Manager semi-structured interview • Documentation from previous studies conducted internally or by consultants • Current Organization Structure

Table 9. (Continued)

Concept (Proposition)	Mental Line of Inquiry	Verbal Line of Inquiry	Evidence
6. Actual Project Events	• This item is an aggregation of unexpected and expected events that are covered separately, so there is no need to cover this concept with additional questions.	• What are the key events that took place during the project? • Which of these events were unexpected?	• Project manager semi-structured interview

Appendix B: Participant Interview Guide

The purpose of this guide is to provide sufficient structure to the interview process to ensure that critical steps are completed, e.g. informed consent is discussed before any data collection begins, and to provide sufficient structure to conduct an effective semi-structured interview. As the interviews progress, additional questions needed to explore the specifics of a given response will be asked to understand the participant's learning experiences fully.

Step 1: Create Case Study Database

- Create a secure directory where all artifacts from this study can be collected and saved while safeguarding the privacy of the participants
- Ensure the database has automatic offsite (and encrypted) backups to prevent information from being lost

Step 2: Engage the Participant

- Schedule 30 Minute Introductory Meeting with the Participant
- Review Informed Consent Form with the Participant
- Discuss the Pre-Interview Questions about the Project Portfolio with the Participant
- Schedule 2 Hour Participant Interview

Step 3: Participant Completes Project Portfolio Questionnaire

- Review Project Portfolio When Returned
- Clarify Questions about the Project Portfolio Responses with the Participant

Step 4: Interview the Participant

- Help Participant Brainstorm a List of Unexpected Events they have Experienced while Managing Projects

  - One of the challenges that project managers face is managing deviations from the project plan where the work does not progress as expected. The impact of these unexpected events can range from events that help the project to events causing significant disruption requiring rework and changes in committed dates and budgets. As you think about your project management experiences on these projects since the start of 2014 list the unexpected events that you recall. Do not worry about the impact of the event or the cause, just focus on those events that took place that you had not expected to occur.
  - As you reflect on these events now, what is the most prominent aspect of each event that you notice?
  - As you think about these events which ones led you to change how you manage projects or will manage projects in the future? This could include changes in how you think about projects as well as project management practices. What is the change you have made or plan to make in the future?

- Review Each Event that Led to a Change in How the Participant Manages Projects or Thinks about Projects

  - Can you describe the situation leading up to the unexpected event?
  - What stands out to you now about the situation that led up the event?

- Can you describe what you expected to happen and how the unexpected event differed from what you expected?
- What were you feeling as this event was unfolding?
- What did you observe about this event as it was unfolding?
- Did this event fit patterns you had previously seen in projects?
- Did this event support or challenge your ideas about how to manage projects?
- Were you able to draw on your existing knowledge to determine how to manage this event? What knowledge were you able to use? Did you modify this knowledge in any way?
- Did you employ practices in managing this event that you had not used before? What led you to try these practices? What new or modified practice did you use?
- How did you respond to this event? What do you notice about your response that stands out to you now?
- What was the result of your response to this event?
- What is the change you have made or plan to make in the future to better manage projects as a result of having had this experience?
- How would you characterize the impact of this experience on your learning to manage projects?

 Review Events that Did Not Lead to Change if Time Allows

- Can you describe the situation leading up to the unexpected event?

- What stands out to you now about the situation that led up the event?
- Can you describe what you expected to happen and how the unexpected event differed from what you expected?
- What were you feeling as this event was unfolding?
- What did you observe about this event as it was unfolding?
- Did this event fit patterns you had previously seen in projects?
- Did this event support or challenge your ideas about how to manage projects?
- Were you able to draw on your existing knowledge to determine how to manage this event? What knowledge were you able to use? Did you modify this knowledge in any way?
- Did you employ practices in managing this event that you had not used before? What led you to try these practices? What new or modified practice did you use?
- How did you respond to this event? What do you notice about your response that stands out to you now?
- What was the result of your response to this event?
- What is the change you have made or plan to make in the future to better manage projects as a result of having had this experience?
- How would you characterize the impact of this experience on your learning to manage projects?

- Immediately after the interview capture notes about what happened in the interview and review and clarify the written notes.

Step 5: Transcribe the Interview

- Transcribe each interview into written form within 48 hours of the interview taking care to mask all identifying information that could be used to identify the participant or firm that is the site of the study. (This is to be done by the investigator who conducted the interview.)

Step 6: Code the Transcript

- Identify Knowledge Statements and ideas that can be used as input to the Concept Mapping
- Identify statements related to the concepts identified in the conceptual framework

Step 7: Prepare for Card Sorting

- Following the steps outlined in Chapter 3 prepare statements about project manager learning that can be sorted by each participant
- Print one set of statements on 3x5 cards for sorting for each participant and include the participant id on each card they will sort (the goal is to be able to drop all the cards and still sort them back into the groupings provided by each participant)
- Print labels that identify each grouping of cards (Group 1, Group 2, Group 3…) created by each participant during the sorting process (the goal is to be able to recreate the groupings for each participant even if the cards are dropped)
- Schedule one hour with participants to sort the cards

Step 8: Sort the Cards

- Explain the card sorting process to the participant
- Participant's sort cards into groups that make sense to participants
- Sort cards into groups that indicate the importance of each statement to project manager learning

Step 9: Develop Concept Maps

- Determine coordinates for each learning statement using multi-dimensional scaling
- Determine the number of clusters to use in the concept map using Ward's Algorithm
- Develop concept maps
- Review maps with project managers to test the validity of the maps

Step 10: Comparison of Observed and Expected Results

- Compare the learning concepts identified in the interviews with the conceptual framework and document how the two compare
- Compare learning concepts identified in the concept maps with the conceptual framework and document how the two compare

Step 11: Interpret Findings

- Identify ways in which the project manager interviews interpret and make sense of the results of comparing the observed and expected results

Appendix C: Data Security

Data will be collected through interviews, a pre-interview questionnaire completed by participants, participant resumes, prior studies about project management done at the same firm by consulting firms, and project management artifacts that may be relevant to this study. At every stage of this study, data will be anonymized by substituting participant, organization, and project identifiers in place of actual names in interview transcripts, interview notes, resumes, analysis artifacts, and other documents that may be obtained or developed during this study. A separate key to cross reference the identifiers with actual names will be maintained until this study concludes the analysis phase. No identifying data such as phone numbers, addresses, social security numbers, account numbers, license numbers, photographs, or the like will be collected. All of the data will be stored in a case study database that is housed on a desktop computer in my home.

Case Study Database Security

Physical access to the computer where the data is stored is restricted to two people. Access to the case study data is further restricted by login credentials available only to me. These credentials are unique to this login, i.e., they are not used for other purposes such as logging in to web sites, and they are not written down where they could be accessed by anyone else.

The computer is connected to the internet and access to the computer from the internet is restricted by a firewall and anti-virus software provided by ESET Smart Security ("ESET Smart

Security," n.d.). The hard drive where data is stored is encrypted with FIPS compliant 256-bit encryption using DesLock+ ("DESlock+ : Full Disk Encryption," n.d.). All documents stored in the case study database will be encrypted as they are added to the database.

The case study database is continuously backed up to multiple sites using Carbonite's backup software. The data is encrypted using 128-bit Blowfish encryption for both transport to and from the backup site as well as storage in the backup environment ("Secure Online Backup | Carbonite," n.d.).

Audio Data Security

Data that is collected through interviews will be recorded (audio only) and transcribed by the interviewer, if the participants consent to be recorded. In cases where participants do not consent to be recorded, the interviewer will rely on notes taken during and immediately after the interview. When interviews are recorded, the recordings will be made with a small hand held recorder and moved to an encrypted case study database for transcription within 24 hours of the interview. Once moved to the case study database the recordings will be deleted from the hand held recorder. The recordings will be kept in the case study database until the end of completion of this study when they will be deleted from the case study database.

Data Transmission Security

Even though all of the data will reside in a case study database, there will be times during the life of this study where data temporarily resides outside the case study database. Data gathered during the interview process will temporarily reside on a secured laptop (encrypted hard drive, firewall, and antivirus software running at all times) hard drive until it is moved into the case study database. There will also be situations where handwritten notes are taken during interviews, and these will be kept in the possession of the interviewer until they are scanned directly into the case study database using a direct connection to the database (not transmitted over the internet). The original copies of the notes will be destroyed after they are scanned into the case study databases.

Because it will be necessary to share data with my advisor during the course of this study, there will be times when data is transmitted from the case study database. The process to protect this data will be to transmit only anonymized data in encrypted .PDF files using North Carolina State e-mail or Google drive.

Other Security Considerations

No video recordings or photographs will be made at any time during this study.

Appendix D: Data Collection Worksheets

Table 10

Prototype Portfolio Summary Sheet for Collecting Data from Project Managers Prior to the Interview: Part 1 of 2 (Columns 1 through 8)

Participant ID	Year	Project Name	Annual Budget ($s)	Technology Teams Involved	Project Start (MM/YYYY)	Project Complete (MM/YYYY)	% of Time Managing this Project
A	2014	Project A	$2M	DBAs CRM Team Desktop Team QA Performance Testing Phones Branches Back Office Processing Record Keepers Legal, Risk, Compliance Web Site Teams Mobile App Teams	08/2014	03/2015	50%

Note: Participants could be identified by the combination of their role as a project manager and the project name, so the project name will be masked.

Table 11

Prototype Portfolio Summary Sheet for Collecting Data from Project Managers Prior to the Interview: Part 2 of 2 (Columns 9 through 15)

Primary Objective	Development Method(s) Used	Complexity	Reason for Complexity	Key Challenges	Project Success	Reasons for Success
Improve Customer Experience	Select One of the Following: Agile (Beginner) Agile (Intermediate) Agile (Advanced) Waterfall Waterfall with Agile Practices Other	Select One of the Following: Very High High Neither High nor Low Low Very Low	List the reasons for how you rated the complexity of the project	List the key challenges you had on the project	Select One of the Following: Very Successful Successful Neither Successful Nor Unsuccessful Very Unsuccessful	List the reasons for how you rated the success of the project.

Table 12

Participant Key for Tracking Participant Progress through the Interview and Card Sorting Process

Name[a]	Participant	Permission Granted?	Pre-Work Complete?	Interview Complete?	Interview Date	Interview Duration (Minutes)	Date Transcription Complete	Date Transcribed Interview Sent for Review	Date Transcribed Interview Reviewed	Ideas Sorted?	Ideas Rated?
	A										
	B										
	C										
	D										
	E										
	F										
	G										
	H										

Note. [a]This is the only document that contains the participant's name. The participant's name will be removed from this document at the conclusion of this study.

Appendix E: Transcription Procedures

The procedure used to transcribe interviews from audio recording to text generally followed the procedures described in this Appendix.

1. Transcribe from voice to text by listening to the audio recording and typing what was being said. This required listening to the audio recording multiple times.
    a. As many verbal pauses as possible were captured during this process and included in the text as well.
    b. Comments about what was happening during the interview were added in angle brackets. For instance, <Laughing> might be inserted to indicate who was laughing at that point in the interview.
    c. Time stamps were periodically inserted in the interview to make re-listening to a portion of the transcript easier at a later date. Time stamps appear as [HH:MM:SS].
    d. Adding speaker names to indicate who was saying what during the interview. The researcher was referred to as Researcher to make it clear who was being interviewed.
    e. Adding line breaks to make the transcribed text more readable.
    f. In many cases, transcribing words as they sounded, e.g., gonna for going to.
2. Revising the transcribed text in the following manner:
    a. Adding punctuation in a way that clarified the speaker's intent.

b. Substituting made up names for all identifying information such as people names, product names, and organization names. A name key was used to ensure names appearing in multiple interviews were masked with the same made up name.
c. In some cases, it was necessary to change articles preceding masked names to match the masked name. For instance, “an Application Development Environment” could become “a Software Development Environment.”
d. In most cases expanding acronyms used by the speaker to make them more readable. For instance, expanding ODC to Offshore Development Center.
e. Adding footnotes to comment on what was being said or to explain some of the wording being used.
f. Inserting clarifying text in brackets to make the intent of the text clearer to the reader. For instance, verbal pauses were often used to indicate a connection between ideas so in some instances including connectors such as [and] made the text more readable.
g. Putting verbal pauses in parentheses. For instance, (um) and (you know) were common pauses used during the dialogue that were enclosed in parentheses.
h. Crossing out words that had no value and seemed to be used almost as verbal pauses. This was not something that was needed very often, but it was helpful in few cases.

i. Broke out words that ran together in some cases. For instance, on audio it sounds “shouldof” but it became “should have”.

Appendix F: Learning Experiences

Table 13

Learning Experiences Described by Project Managers.

Num.	Learning Experience	Learning Process	Knowledge Area
		Helen Davenport	
1	Finding the Structure that Works	Realizing that the program was too large to be managed in the current structure the PM took action to restructure the program and then compared the manageability of the program before and after restructuring too place.	Structuring
2	Managing a Change in Direction with an Overworked Team	While managing change in business direction the PM needed to determine the impact of the change on the project and the best way to communicate the change to the team.	Planning
3	Managing Delivery While Adopting Agile	While managing change in development methods the PM trys new ways of managing dependencies and monitoring the work.	Planning Execution
4	Managing the Adoption of a New Development Technology as Part of Delivering a Product	While managing change in technology the PM notices the impact of the change on estimates and forecasts.	Planning

Table 13 (Continued)

Num.	Learning Experience	Learning Process	Knowledge Area
5	Navigating a New Organization to Deliver a New Product with a New Team	After joining a new organization, the PM uses analytical skills acquired as a systems analyst to learn how the organization develops its products.	Structuring
6	Staffing a Large Offshore Team for the First Time	While implementing management's plan to build a flexible staffing model with offshore teams, the PM notices that the effort required to onboard new team members was greater than what others in the organization had predicted.	Structuring
7	Taking Time to Align the Team and Remove Roadblocks	The PM applies the concept of immersion sessions to align a large project team at key points in the project life cycle and observes the results.	Structuring
		Isaac Wilson	
8	Adapting to Top Down Transformation in a New Setting	While immersed in a large transformation effort the PM notices how people are responding to the changes taking place and questions the effectiveness of the transformation.	Structuring
9	Learning to Work with China in a New Setting	While responding to a production incident, the PM observed weaknesses in US-to-China development practices.	Structuring
10	Reflecting on Career Growth in Project Management	The PM Reflects on the project management industry and what an ideal role would be.	Other
11	Reflecting On How to Have Prevented a Production Incident	The PM refelects on what it would have taken to prevent a production incident and how the choice of development method relates to product quality.	Structuring

Table 13 (Continued)

Num.	Learning Experience	Learning Process	Knowledge Area
12	Reflecting on When to Escalate Problems to Management	While working in an organization that overreacts to escalations, the PM reflects on when and how to escalate issues in situations where the need for escalation is not obvious.	Structuring
13	Repairing the Last Minute Error in a Soon to Ship Release to Prevent Customer Impact	While participating on a team that is scrambling to remove a last minute defect from a soon-to-ship product, the PM makes several observations about how the work is done.	Structuring
14	Scaling Scrum in a New Setting with Little Social Capital to Draw On	After moving into a new organization that is making a big push to use scrum, the PM begins to notice many of the challenges of scaling scrum and reflects on what these mean.	Structuring
		Lisa Ward	
15	A Tale of Two Sponsors: Comparing the Impact of Sponsor Behavior on Project Team Engagement	While working on a program that changes sponsors, the PM notices the impact of the sponsor's leadership style on the behavior of the project team and develops her own ways of adapting to each sponsor's leadership style.	Structuring
16	Top Down Change: Comparing the Impact of Two and Three Week Iterations on Associate Engagement	After changing from three week to two week iterations, the PM notices the impact of the change on the project team.	Structuring

Table 13 (Continued)

Num.	Learning Experience	Learning Process	Knowledge Area
		Sara Cooper	
17	A Tale of Two Sponsors: Comparing the Impact of Sponsor Behavior on Project Team Engagement	After working with two sponsors with different leadership styles, the PM notices how she and the project team adapted to each sponsor and the difference the sponsor's leadership style makes on how the project team works.	Structuring
18	Changing Workarounds That Have Become Best Practice	A PM observes what happens when an installation practice is challenged by a partner team that supports the install.	Execution
19	Defensive Plays, Teflon Coating, and the Growth of Bureaucracy in a Low Trust Setting	After being surprised by the behavior of other teams, the PM begins to develop practices to prevent future surprises and to increase the level of control she has over project outcomes.	Execution
20	Letting the Boss Feel in Control	In working with her boss, the PM observes his tendency to test the limits and has redefined her role in terms of ensuring the limits are not pushed beyond what the team can do	Planning
21	Managing Supply, Demand, and Bottlenecks	In managing a project portfolio, the PM learns about the many considerations that must be made to develop a reliable schedule and the multiple commitments that go with it.	Planning
22	Observations About Getting Things Done When Depending on Others with Different Priorities	While working in a multi-project decentralized environment, the PM recognizes the challenge that competing priorities create when asking other teams to do work. As a result, she creates several work arounds to navigate this setting.	Structuring

Table 13 (Continued)

Num.	Learning Experience	Learning Process	Knowledge Area
23	Promoting, Promoting, Promoting	The PM copies an approach to promoting new ways of working that she saw someone else using to promote her point of view.	Other
24	The Billing Games that Project Manager's Play	A PM that has been surprised by overbilling from some teams learns new ways to manage subcontractor billing to prevent cost over runs.	Execution
25	The Perfect Storm: Fuzzy Requirements, Pressure to Commit, and Brook's Law	A PM trys a new way to deliver a message to help sponsors to realize they aren't as far along as they think they are with their definition of the requirements.	Execution
26	Total Recall: Managing Memories of Convenience and Evolved Thinking	A PM learns new ways to build agreement after experiencing some unexpected disagreements about the plan.	Planning
		Teresa Lopez	
27	Introducing Change on an Unsuccessful Team that Thinks It's Successful	A PM learns to rely on her ability to sense what is needed by introducing change rather than executing a plan after taking ownership of a large complex program that was over budget and behind schedule.	Structuring
28	Engaging Marginalized Talent	A PM learns by matching each person with a need they can fill rather than executing a plan that isn't working.	Structuring
29	Insisting on Clear Accountability to Set Business Priorities	A PM's beliefs about the importance of a decisive product owner are reinforced when she sees the impact the product owner has on a large complex program.	Structuring

Table 13 (Continued)

Num.	Learning Experience	Learning Process	Knowledge Area
30	Integrating Geographically Divided Teams	A PM learns by adapting the hackathon approach to build a shared understanding of the project objectives on a geographically dispersed team.	Structuring
31	Myth Busting a Project Team's Self-Limiting Beliefs	A PM learns by challenging the way things are done and the beliefs that perpetuate the status quo.	Structuring

Appendix G: Knowledge Statements

Table 14

Knowledge Statements Summarizing Knowledge Created While Working as a Project Manager

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Learning to Manage Barriers & Constraints to Going Fast: Learning to Align People and Practices				
A Tale of Two Sponsors: Comparing the Impact of Sponsor Behavior on Project Team Engagement	Sensing the Need for Change	Comparing PM Methods	49. I found that when a sponsor acts as the gatekeeper between different functions that I could bypass the sponsor and work directly with the other functions, e.g., engineering working directly with user interface design, in order to reduce the delays that the gatekeeping introduced into the process. (Lisa Ward)	3.60
A Tale of Two Sponsors: Comparing the Impact of Sponsor Behavior on Project Team Engagement	Managing Unplanned Change	Other	50. I have compared my experiences of working with different sponsors and found that the behavior of the sponsor makes a huge difference in how the project team performs. (Lisa Ward)	4.00

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
A Tale of Two Sponsors: Comparing the Impact of Sponsor Behavior on Project Team Engagement	Managing Unplanned Change	Comparing PM Methods	52. I have noticed that the sponsor's behavior has a big impact on how we approach our work. With some sponsors, we must work very hard to pin down decisions in writing and then aggressively manage changes to those decisions, or the sponsor will have a very different interpretation of what we are doing than we have. (Sara Cooper)	3.40
Adapting to Top Down Transformation in a New Setting	Managing Planned Change	Sense Making	24. I wonder if our current transformation effort has already become background noise because what it means to individuals is not yet clear. (Isaac Wilson)	3.20
Learning to Work with China in a New Setting	Managing Unplanned Change	Comparing PM Methods	26. We were unsuccessful in creating a feedback loop for one of our China development teams to let us know if they encountered any logic changes to the code base that had not been anticipated in our analysis. As a result of this feedback loop not working some changes were made to the code that triggered a production incident due to downstream impacts of the code changes. We found that even with our best efforts making a handoff from team to team is difficult to do well especially when teams are separated by time, distance, language, and culture. (Isaac Wilson)	4.00

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Learning to Work with China in a New Setting	Managing Unplanned Change	Comparing PM Methods	27. I found that collaboration with our China team was a challenge when we did not have overlapping hours because the communication between offshore and onshore was limited to email and the turnaround time between question and answer required a day. (Isaac Wilson)	3.80
Myth Busting a Project Team's Self-Limiting Beliefs	Sensing the Need for Change	Problem Solving	96. I found that it could be almost impossible to influence the organization to hold a low performing partner team accountable so finding ways to work around them and compensate for them may be needed. (Teresa Lopez)	3.40
Observations About Getting Things Done When Depending on Others with Different Priorities	Other	Problem Solving	63. I have seen that we often depend on other teams operating with different priorities than us, and this difference in priorities can make getting the job done very difficult. (Sara Cooper)	4.20
Observations About Getting Things Done When Depending on Others with Different Priorities	Other	Sense Making	64. I have noticed that when there is not a level of management available to resolve conflicts in priority across different teams that it becomes very difficult to get the job done. (Sara Cooper)	3.80
Promoting, Promoting, Promoting	Other	Other	65. I have noticed that when someone repeats something often enough that it will often become broadly accepted as truth. (Sara Cooper)	3.00

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Reflecting on When to Escalate Problems to Management	Managing Unplanned Change	Sense Making	32. I have found that when escalating a risk or potential problem on a project that the response can snow ball with more and more people getting involved. And the potential for this type of response causes me to be very cautious in what I escalate and when. (Isaac Wilson)	4.00
Scaling Scrum in a New Setting with Little Social Capital to Draw On	Sensing the Need for Change	Sense Making	35. I have noticed that I attend many meetings where nothing valuable happens. (Isaac Wilson)	2.80
Scaling Scrum in a New Setting with Little Social Capital to Draw On	Sensing the Need for Change	Sense Making	37. One issue I have observed is that there is really no preparation for program managers to be able to work with Agile teams in a way that is expected in an Agile culture. (Isaac Wilson)	3.40
Scaling Scrum in a New Setting with Little Social Capital to Draw On	Sensing the Need for Change	Sense Making	38. A lot of program managers are defaulting to waterfall techniques rather than working with Agile teams as they would expect in an Agile culture (Isaac Wilson)	2.80
Scaling Scrum in a New Setting with Little Social Capital to Draw On	Sensing the Need for Change	Sense Making	39. On one of my projects we have been trying to put together a release schedule across several Agile teams for four months (so far), and I believe this is because we do not have any tools for managing scale in scrum. (Isaac Wilson)	3.20

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Scaling Scrum in a New Setting with Little Social Capital to Draw On	Sensing the Need for Change	Sense Making	40. Management demands to know the status of agile projects is causing program managers to rely on waterfall methods and excessive meetings to understand the status. This situation is creating friction between program managers and Agile teams and is deflating for many team members because this type of work is not seen as valuable by the Agile team members. It is an unpleasant experience and many comment that it should not be this hard. (Isaac Wilson)	3.60
Scaling Scrum in a New Setting with Little Social Capital to Draw On	Sensing the Need for Change	Problem Solving	41. One of the ideas I have is that we could eliminate meetings by meeting weekly on some topics instead of several times a week (or even daily) to talk about the same topic when nothing is changing between meetings. (Isaac Wilson)	2.00
Scaling Scrum in a New Setting with Little Social Capital to Draw On	Sensing the Need for Change	Other	43. I have concluded that the large number of meetings we have is driven because we have so many stakeholders who feel they have an ownership stake in the projects. (Isaac Wilson)	2.80
Scaling Scrum in a New Setting with Little Social Capital to Draw On	Sensing the Need for Change	Problem Solving	44. After moving into a new role, I found that my manager and I attended many of the same meetings, and this left me feeling like I was (or he was) wasting time. I believe there is a way for us to efficiently cover these meetings and then share information. (Isaac Wilson)	2.40

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Scaling Scrum in a New Setting with Little Social Capital to Draw On	Sensing the Need for Change	Sense Making	46. I have found that it can be challenging to determine what improvements to make to our processes and practices when there are other related changes taking place across the organization that may also improve these practices and processes. But I have not yet found an effective way to manage the tension between these local and global changes. (Isaac Wilson)	4.00
Scaling Scrum in a New Setting with Little Social Capital to Draw On	Sensing the Need for Change	Sense Making	47. I have seen situations where we spend little to no time on making sure business requirements are covered and connected when the work spans multiple teams. While we seem to work to get the technical interfaces right, we will miss making sure the way we are executing covers the intent of the requirements. (Isaac Wilson)	4.40
Staffing a Large Offshore Team for the First Time	Managing Planned Change	Comparing PM Methods	18. When staffing a large offshore team with Infosys, I found that there is significant onboarding pain to get members of the team the equipment and access they need to do their jobs. (Helen Davenport)	3.60
The Billing Games that Project Manager's Play	Managing Unplanned Change	Problem Solving	68. I have found that rejecting a timesheet does nothing to stop teams from overbilling my projects. So I have started deleting positions once they have billed 100% of their allocation and this prevents them from billing any more time. (Sara Cooper)	2.20

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
The Billing Games that Project Manager's Play	Managing Unplanned Change	Sense Making	69. I have learned that thinking of time billing as a game where other teams try to overbill my projects to cover their staff helps me to anticipate where overbilling will happen and how to stop it. (Sara Cooper)	2.40
Learning to Manage Barriers & Constraints to Going Fast: Learning to Lead Change and Protect Our Brand				
Adapting to Top Down Transformation in a New Setting	Managing Planned Change	Sense Making	22. I have seen that many team members working in a scrum team for the first time are uncomfortable with how different working in a scrum team is than working on a waterfall team. (Isaac Wilson)	3.40
Adapting to Top Down Transformation in a New Setting	Managing Planned Change	Sense Making	23. While working with teams learning to use Agile I have not seen any effort to help individual team members understand what Agile means to their role. (Isaac Wilson)	3.00
Adapting to Top Down Transformation in a New Setting	Managing Planned Change	Sense Making	25. I have noticed that the rollout of Jira and Agile feel very fractured at the moment because they are being treated as separate things, but to do the job the scrum teams need to define how to use Jira to implement Agile (Isaac Wilson)	3.00
Changing Workarounds That Have Become Best Practice	Managing Unplanned Change	Comparing PM Methods	53. I have noticed that a practice that begins as a work around to solve a problem can become a mainstream practice that the team sees as a best practice or the right way to be working. (Sara Cooper)	3.60

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Defensive Plays, Teflon Coating, and the Growth of Bureaucracy in a Low Trust Setting	Managing Unplanned Change	Problem Solving	54. I have found that it's important to save project documents, not because they are needed to deliver, but because I may need them to defend myself and my team should things go wrong on the project. (Sara Cooper)	3.00
Defensive Plays, Teflon Coating, and the Growth of Bureaucracy in a Low Trust Setting	Managing Unplanned Change	Problem Solving	55. I have found that I need to send emails to confirm agreements to protect myself and my team should things go wrong on the project. (Sara Cooper)	3.00
Integrating Geographically Divided Teams	Sensing the Need for Change	Sense Making	85. I noticed that our offshore team was being treated like widget makers where they were given stories to complete without any context, so they did not understand how their work was creating value and this limited their effectiveness (Teresa Lopez)	4.20
Integrating Geographically Divided Teams	Sensing the Need for Change	Other	87. I found that when I suggested keeping people late periodically in a hackathon type format, there was concern over understanding exactly what we'd be doing, rather that awareness we were re-building a team and grounding them in a common understanding of our purpose (Teresa Lopez)	2.60
Introducing Change on an Unsuccessful Team that Thinks It's Successful	Sensing the Need for Change	Other	80. I found that project team members were sticking with plans that were not working even when faced with evidence they were failing. It seems that being able to adapt a plan to account for new information is something people struggle to do. (Teresa Lopez)	4.00

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Letting the Boss Feel in Control	Managing Planned Change	Problem Solving	56. I have concluded that part of my role with my current boss is to influence just how far he pushes the team. So when he pushes for a six-week reduction in a delivery date, I will let him know we can reduce by two weeks but not six. (Sara Cooper)	4.00
Managing Delivery While Adopting Agile	Managing Planned Change	Comparing PM Methods	6. I found that the when leading a team from following waterfall methods to Agile methods there was considerable confusion during the move to Agile. (Helen Davenport)	3.00
Managing Supply, Demand, and Bottlenecks	Managing Unplanned Change	Comparing PM Methods	60. I have found that developers often give me estimates that assume they will spend 100% of their time on the work being estimated. But this rarely happens and so I have learned that doubling their estimates gives a more accurate estimate of the work to be done. (Sara Cooper)	3.20
Myth Busting a Project Team's Self-Limiting Beliefs	Sensing the Need for Change	Problem Solving	89. I found a team was likely to operate within a set of assumptions they thought were organizational policies even when they had not validated these assumptions were actually policy. (Teresa Lopez)	4.00
Myth Busting a Project Team's Self-Limiting Beliefs	Sensing the Need for Change	Problem Solving	92. I found that even a change to something that isn't working like talking to business sponsors about business value rather than points completed will be resisted by some members of the team (Teresa Lopez)	3.40

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Myth Busting a Project Team's Self-Limiting Beliefs	Sensing the Need for Change	Problem Solving	93. I found that team members became focused on measures such as velocity or utilization that were useless at telling us if we were creating value for our customers (Teresa Lopez)	4.00
Myth Busting a Project Team's Self-Limiting Beliefs	Sensing the Need for Change	Problem Solving	94. I found that the team had engaged in practices such as publishing iteration close documents with 50 charts even when no one knew what he or she meant for a year without questioning the value of the practice. (Teresa Lopez)	3.20
Myth Busting a Project Team's Self-Limiting Beliefs	Sensing the Need for Change	Problem Solving	95. I found that a team would rather be in the dark about their progress against a plan than violate their belief that being Agile means there should be no visible plan for managing cross-team dependencies. Even if this plan were derived directly from their existing epics and stories, they would object if it was presented graphically. (Teresa Lopez)	3.00
Observations About Getting Things Done When Depending on Others with Different Priorities	Other	Problem Solving	61. I have learned that working on the last product in the information flow means we are at risk of being blamed for delays in the delivery date, and so we must use extra care when estimating and scheduling work. (Sara Cooper)	3.20
Observations About Getting Things Done When Depending on Others with Different Priorities	Managing Unplanned Change	Comparing PM Methods	62. I have found that it's important to have an evidence trail to demonstrate we did our part so that when things go wrong other groups cannot blame us for the result. (Sara Cooper)	3.00

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Scaling Scrum in a New Setting with Little Social Capital to Draw On	Sensing the Need for Change	Sense Making	36. I have noticed that Agile teams have sprung up organically in various parts of the company, and this has caused there to be different schedules and different practices such as how stories are decomposing, how backlog grooming works, how work intake happens, and for planning. (Isaac Wilson)	2.40
The Perfect Storm: Fuzzy Requirements, Pressure to Commit, and Brook's Law	Sensing the Need for Change	Comparing PM Methods	71. I found that when project teams are working overtime on an extended basis, they start making more mistakes and creating more rework. (Sara Cooper)	4.40
The Perfect Storm: Fuzzy Requirements, Pressure to Commit, and Brook's Law	Sensing the Need for Change	Comparing PM Methods	73. I have noticed that pushing a team to commit to a date does not make the commitment happen. (Sara Cooper)	3.60
Top Down Change: Comparing the Impact of Two and Three Week Iterations on Associate Engagement	Managing Planned Change	Comparing PM Methods	51. I found that my team was becoming burned out when we went from three week to two week iterations because it required a pace that was challenging to sustain. (Lisa Ward)	4.20
Total Recall: Managing Memories of Convenience and Evolved Thinking	Managing Unplanned Change	Problem Solving	74. We found it necessary to document every agreement in writing to protect ourselves when other teams involve in the work have a different recollection of the agreement at a later date. (Sara Cooper)	3.20

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Learning to Structure the Team, the Work, and the Message to Deliver: Learning to Create Engaging Opportunities to Bring Out the Best in People				
Engaging Marginalized Talent	Sensing the Need for Change	Problem Solving	81. Engaging marginalized talent can be an effective way to rebuild a dysfunctional team that has been unable to deliver. (Teresa Lopez)	3.80
Engaging Marginalized Talent	Sensing the Need for Change	Problem Solving	82. Making use of the available talent in a way that fits the need and fits their skills is an effective way to re-engage marginalized talent on a dysfunctional project team that has been unable to deliver. (Teresa Lopez)	3.80
Engaging Marginalized Talent	Sensing the Need for Change	Problem Solving	83. Changing roles of poor performers to something they can do well is essential to rebuilding a broken team (Teresa Lopez)	4.20
Integrating Geographically Divided Teams	Sensing the Need for Change	Other	86. I found that by keeping offshore and onshore teams late several times during the project to hear our business partners talk about the purpose of the work we were doing, both offshore and onshore teams began to understand why we were doing this work and how their efforts created value (Teresa Lopez)	3.60

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Integrating Geographically Divided Teams	Sensing the Need for Change	Sense Making	88. I found that the mechanics of tracking a program had overshadowed the importance of letting teams understand the purpose of the program and how their work contributed to our purpose (Teresa Lopez)	3.80
Introducing Change on an Unsuccessful Team that Thinks It's Successful	Sensing the Need for Change	Problem Solving	77. Identifying team members I can trust and building alliances with them is essential to rebuilding a dysfunctional project team (Teresa Lopez)	4.20
Introducing Change on an Unsuccessful Team that Thinks It's Successful	Sensing the Need for Change	Problem Solving	78. Building a core nucleus team to help lead change is critical to making changes on a broken project team that will be unable to delivery without making some changes. (Teresa Lopez)	4.00
Managing a Change in Direction with an Overworked Team	Managing Unplanned Change	Comparing PM Methods	3. I found that I could validate the plan to make a change when I published the work to be done by each technology provider to support the change because the team was able to identify one provider I had overlooked in the plan. (Helen Davenport)	3.80
Managing a Change in Direction with an Overworked Team	Managing Unplanned Change	Comparing PM Methods	4. I found that it is possible to influence how a project team views a major change in direction by managing both telling the story of why the change is needed and having the right leader tell the story. (Helen Davenport)	4.40

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Managing Delivery While Adopting Agile	Managing Planned Change	Comparing PM Methods	5. I found that the techniques I use for managing dependencies changed when I moved from waterfall to Agile. In waterfall, I had a plan calling out the dependencies, but in Agile I have stories that are managed by the scrum teams and that identify the dependencies. (Helen Davenport)	2.60
Managing Delivery While Adopting Agile	Managing Planned Change	Comparing PM Methods	7. I found that when managing an Agile project using a workflow tool like Jira eliminated the need for the type of detailed task planning I had previously done as a project manager. (Helen Davenport)	3.00
Managing the Adoption of a New Development Technology as Part of Delivering a Product	Managing Planned Change	Comparing PM Methods	11. I found that having an engineering lead to coordinate the efforts of different teams that needed to integrate their efforts to solve the problem was essential to our ability to deliver a project. (Helen Davenport)	2.80
Managing the Adoption of a New Development Technology as Part of Delivering a Product	Managing Planned Change	Comparing PM Methods	8. I have noticed that engineers give optimistic estimates about the effort required when working with technologies they have not used before. (Helen Davenport)	3.00
Managing the Adoption of a New Development Technology as Part of Delivering a Product	Managing Planned Change	Comparing PM Methods	9. I have found that I get more reliable estimates by asking engineers to build in buffer time when they are working with new technologies to allow time for them to learn to use the new technologies. (Helen Davenport)	3.40

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Myth Busting a Project Team's Self-Limiting Beliefs	Sensing the Need for Change	Problem Solving	91. I found that talking to business sponsors about value delivered was much more effective than talking to them about points completed (Teresa Lopez)	4.40
Navigating a New Organization to Deliver a New Product with a New Team	Managing Planned Change	Other	12. When I began working in a new group, I found I needed to determine which technology providers would be needed to build a new customer facing product because it was a new team and no one on the team had done this kind of work before. I found the best way to do this was to begin asking people I knew whom they thought would be needed for this work and then reaching out to each new contact asking them if they did this work or knew who did it. I continued this way until I had identified all f the technology providers needed, what it was they owned, and why they were needed. By doing this, I was able to build an understanding of how the organization operated to deliver a new product to market. (Helen Davenport)	3.60
Navigating a New Organization to Deliver a New Product with a New Team	Managing Planned Change	Comparing PM Methods	13. I have found that the relationships I build on one project often carry forward to subsequent projects and make it easier to do my job. (Helen Davenport)	3.00
Promoting, Promoting, Promoting	Other	Other	66. I have found that I can learn new practices for managing projects by watching others in the organization and copying what I see them doing. (Sara Cooper)	2.60

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Promoting, Promoting, Promoting	Other	Other	67. I have found it's important to assert things with confidence in order to influence your stakeholders and project teams. (Sara Cooper)	3.20
Reflecting on Career Growth in Project Management	Other	Sense Making	28. I have found that I am motivated by working with a group of people delivering something of value. (Isaac Wilson)	3.80
Reflecting On How to Have Preventing a Production Incident	Managing Unplanned Change	Sense Making	31. In comparing waterfall with Agile methods, I concluded that one advantage of Agile was that by taking on smaller pieces of work they could be completed faster so that the team would get feedback on their work faster. And this more rapid feedback is a source of information that will help Agile teams to learn and improve the quality of their products. (Isaac Wilson)	3.80
Scaling Scrum in a New Setting with Little Social Capital to Draw On	Sensing the Need for Change	Sense Making	34. I noticed that the numerous interdependencies from one scrum team to another made the project complex to manage. (Isaac Wilson)	3.60
Scaling Scrum in a New Setting with Little Social Capital to Draw On	Sensing the Need for Change	Sense Making	45. After moving to a new organization, I was surprised at the diversity of practices from one development team to another. This was not something I had expected, and it gave me insights into the challenges of managing work across a group of teams with such diverse practices. (Isaac Wilson)	3.40

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Scaling Scrum in a New Setting with Little Social Capital to Draw On	Sensing the Need for Change	Sense Making	48. One of the recurring problems I have identified is to find a way to document and show a release plan in Agile deliveries that depend on multiple Agile teams. How can planners show these release plans without going back to old waterfall practices such as using Gantt charts? (Isaac Wilson)	3.00
Taking Time to Align the Team and Remove Roadblocks	Managing Planned Change	Comparing PM Methods	20. I found that keeping a positive tone when the team comes together (Helen Davenport)	4.40
The Perfect Storm: Fuzzy Requirements, Pressure to Commit, and Brook's Law	Sensing the Need for Change	Comparing PM Methods	70. I have found that adding resources to a project to speed delivery can often delay delivery because of the time needed to onboard and orient the new team members. (Sara Cooper)	3.80
The Perfect Storm: Fuzzy Requirements, Pressure to Commit, and Brook's Law	Sensing the Need for Change	Other	72. I have found that how I deliver a message about problems on a project has a big impact on how the message is received by the project sponsor. For instance, telling a sponsor we are hitting the pause button while they do some work to answer open questions leaves sponsors feeling better than if I tell them I'm putting the project on hold because they aren't ready to go. (Sara Cooper)	4.00
Finding the Structure that Works	Sensing the Need for Change	Comparing PM Methods	1. While running a large effort and finding I was struggling to stay on top of the work, I found that by breaking the work up into separate tracks of work each with its own lead I was able to better manage the effort. (Helen Davenport)	3.20

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Finding the Structure that Works	Sensing the Need for Change	Comparing PM Methods	2. Because I have worked on projects that were managed as a single effort and then later were restructured into multiple tracks of work, I have been able to compare both approaches and found that structuring work into tracks makes a large effort much more manageable. (Helen Davenport)	3.60
Insisting on Clear Accountability to Set Business Priorities	Other	Comparing PM Methods	84. I found that insisting we have a business partner that will set clear priorities was huge in helping us to deliver (Teresa Lopez)	4.60
Introducing Change on an Unsuccessful Team that Thinks It's Successful	Sensing the Need for Change	Problem Solving	79. Gaining support from management is essential to introducing change on a project team that is failing (Teresa Lopez)	4.00
Letting the Boss Feel in Control	Managing Planned Change	Problem Solving	57. I have learned to watch for cues from my boss that help me to understand the types of give and take that is possible when working with him to define the level of effort needed to deliver a project. (Sara Cooper)	3.60
Managing Supply, Demand, and Bottlenecks	Managing Unplanned Change	Problem Solving	58. I have found that projects of equivalent size differ in other ways such as the skills needed that make it impossible to replace one project for another of the same size when scheduling a portfolio of projects. (Sara Cooper)	3.60

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Managing Supply, Demand, and Bottlenecks	Managing Unplanned Change	Problem Solving	59. I have noticed that when before scheduling a portfolio of projects I need to understand the bottlenecks such as the number of analysts or test environments because those bottlenecks will determine the dates we can hit. (Sara Cooper)	4.00
Managing the Adoption of a New Development Technology as Part of Delivering a Product	Managing Planned Change	Comparing PM Methods	10. I have found that the problems I face on a project often occur on other projects as well, and this prior experience on prior projects helps me to anticipate and solve problems on my current project. (Helen Davenport)	3.40
Myth Busting a Project Team's Self-Limiting Beliefs	Sensing the Need for Change	Problem Solving	90. I found that introducing small changes can be an effective way to build momentum when challenging the current ways of working. (Teresa Lopez)	4.40
Navigating a New Organization to Deliver a New Product with a New Team	Managing Planned Change	Comparing PM Methods	14. I found that the analytical skills I had developed in my previous roles as a systems analyst helped me to understand the work being done to create a product. (Helen Davenport)	3.60
Navigating a New Organization to Deliver a New Product with a New Team	Managing Planned Change	Comparing PM Methods	15. I found that when I worked on a large program with clear business priorities and support from our sponsors I was able to get the work we needed to be done by other teams quickly prioritized in their backlogs so that we could complete our work. Just having those priorities and support made the conversations much easier. (Helen Davenport)	4.20

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Navigating a New Organization to Deliver a New Product with a New Team	Managing Planned Change	Problem Solving	16. I found that setting a delivery date for our products means we must understand the dates of each of our subcontractors to determine when each subcontractor will complete their work. (Helen Davenport)	3.80
Navigating a New Organization to Deliver a New Product with a New Team	Managing Planned Change	Comparing PM Methods	17. I found that my prior work as a systems analyst and engineering manager helped me to be effective as a project manager because the knowledge I gained in those roles helped me to do this job. (Helen Davenport)	3.40
Reflecting on Career Growth in Project Management	Other	Sense Making	29. I have concluded that executing on a product vision as part of a team that is doing a great job of delivering value is an ideal situation for me. (Isaac Wilson)	4.00
Reflecting On How to Have Preventing a Production Incident	Managing Unplanned Change	Sense Making	30. When we experienced a production incident after one of our installs, I started to consider what would it have taken to have prevented this incident from occurring. But I found that these questions were not something that I could find answers to. (Isaac Wilson)	3.00
Repairing the Last Minute Error in a Soon to Ship Release to Prevent Customer Impact	Managing Unplanned Change	Sense Making	33. When working to resolve a critical issue with the potential to impact our customers, I noticed that the high level of collaboration across the primary teams working on this issue helped us to get this work done. (Isaac Wilson)	4.60

Table 14 (Continued)

Learning Experience	Learning Trigger	Learning Methods	Knowledge Statement	Rating
Scaling Scrum in a New Setting with Little Social Capital to Draw On	Sensing the Need for Change	Other	42. After moving into a new organization, I found challenging established practices was more difficult than in my previous role where I had built up social capital to draw on when challenging how we were working. (Isaac Wilson)	3.60
Staffing a Large Offshore Team for the First Time	Managing Planned Change	Other	19. I have learned to be more critical of planning assumptions provided by others when onboarding a large offshore team because I did this once using planning assumptions others provided and found their assumptions were the best case assumptions. (Helen Davenport)	3.40
Taking Time to Align the Team and Remove Roadblocks	Managing Planned Change	Comparing PM Methods	21. I have found by applying the idea of immersion sessions that there are critical points in the life of a large project where it is helpful to bring members of the team together in one location for a day or two to meet and discuss the project's status and plan next steps. (Helen Davenport)	3.80
Total Recall: Managing Memories of Convenience and Evolved Thinking	Managing Unplanned Change	Problem Solving	76. I have noticed that others not accountable for the delivery of the project are more than willing to introduce changes without considering the impact of those changes on delivery. (Sara Cooper)	3.80

Appendix H: Learning Themes Revealed through Concept Mapping

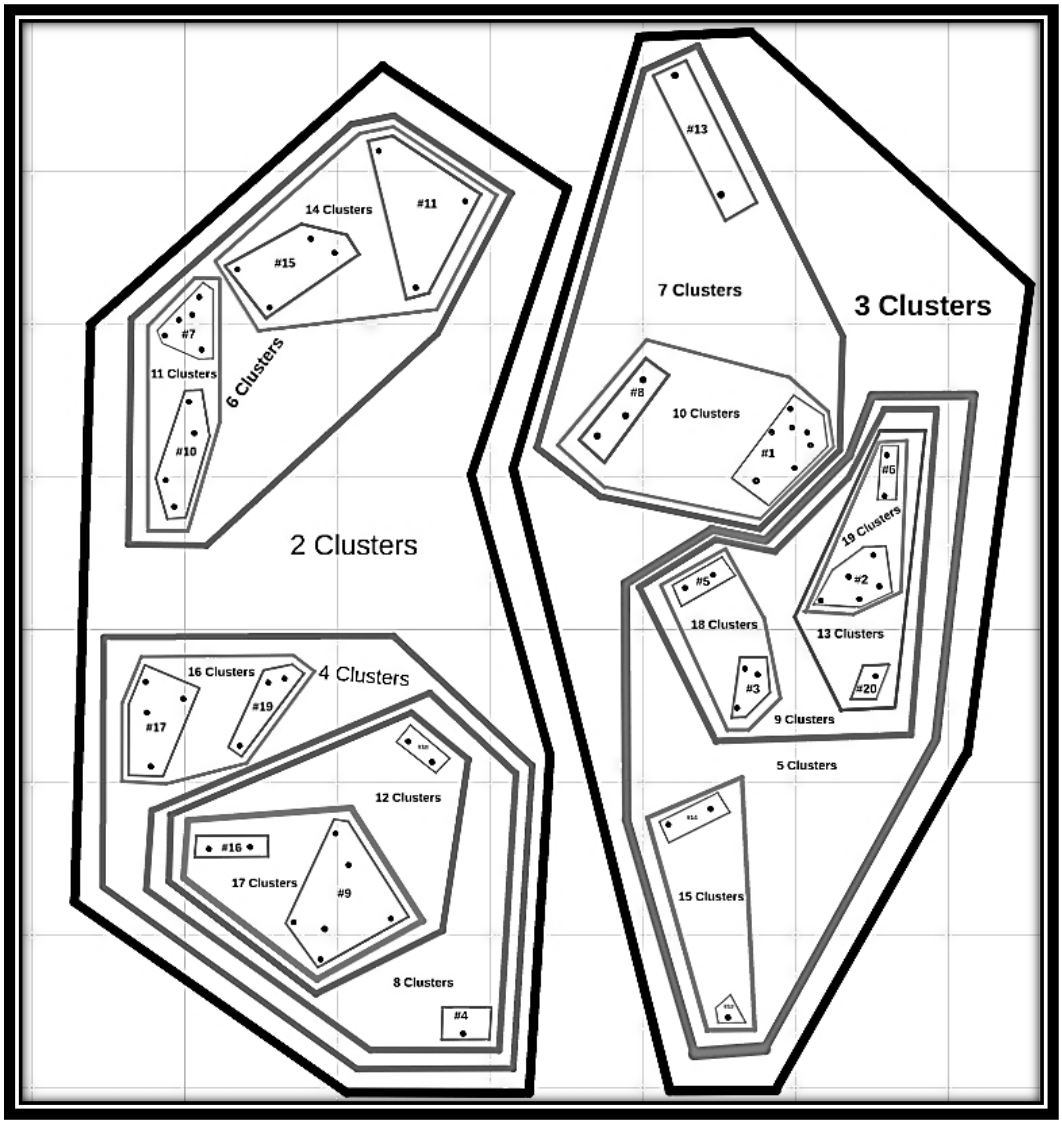

Figure 7. Concept Map Showing Proximity of Knowledge Statements as Seen by Project Managers. Each polygon represents knowledge statements that the PMs grouped together during the card sorting. Statements are represented with dots, but not all 95 statements are shown in this view.

Table 15

Summary of Knowledge Statements Organized by Theme, Method, and Situation

Learning Method	Learning to Manage Barriers & Constraints to Going Fast		Learning to Structure the Team, the Work, and the Message to Deliver		Total
	Learning to Align People and Practices	Learning to Lead Change and Protect Our Brand	Learning to Create Engaging Opportunities to Bring Out the Best in People	Learning to Provide Clear Direction to Guide the Team	
			Sensing the Need for Change		
Problem Solving	3	5	6	2	16
Sense Making	7	2	4		13
Comparing PM Methods	1	2	1	2	6
Other	1	2	2	1	6
	12	11	13	5	41
			Managing Planned Change		
Comparing PM Methods	1	2	7	5	15
Sense Making	1	3			4
Problem Solving		1		2	3
Other			1	1	2
	2	6	8	8	24

Table 15. (Continued)

Learning Method	Learning to Manage Barriers & Constraints to Going Fast		Learning to Structure the Team, the Work, and the Message to Deliver		Total
	Learning to Align People and Practices	Learning to Lead Change and Protect Our Brand	Learning to Create Engaging Opportunities to Bring Out the Best in People	Learning to Provide Clear Direction to Guide the Team	
Managing Unplanned Change					
Comparing PM Methods	3	3	2		8
Problem Solving	1	3		3	7
Sense Making	2		1	2	5
Other	1				1
	7	6	3	5	21
Other					
Sense Making	1		1	1	3
Other	1		2		3
Problem Solving	1	1			2
Comparing PM Methods				1	1
	3	1	3	2	9
Total	24	24	27	20	95

Appendix I: Learning Styles

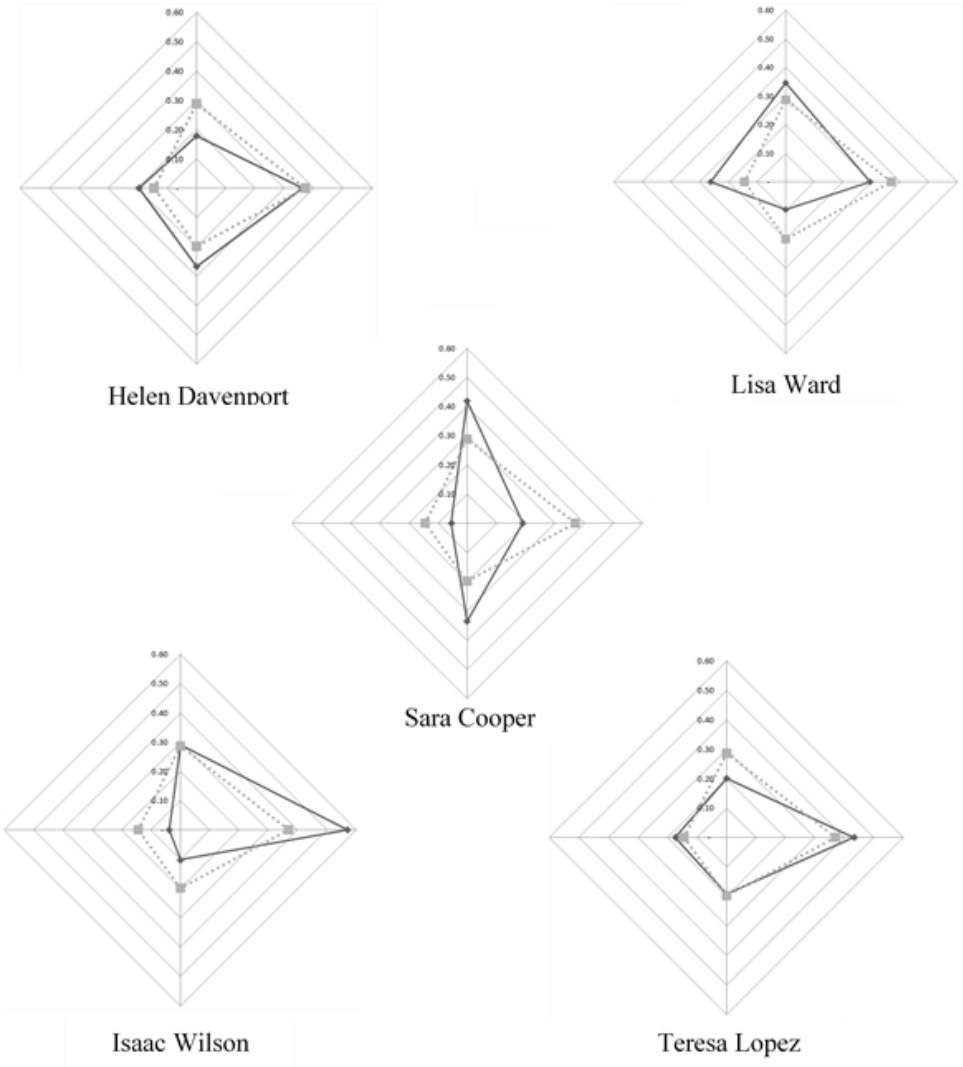

Figure 8. Individual PM Learning Styles (Based on Interviews) Compared with the Average PM Learning Style (Shown with Dotted Lines).