An Exploratory Study of Project Teams' Learning Environment:

Examination of Norms, Behaviors, and Tools of the Project Manager

Beverly Hollandsworth-George

B.S., 1993, Bachelor of Science, St. Edward's University, Austin, Texas
M.S., 1996, Master of Science, Houston Baptist University, Houston, Texas

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Dissertation Chairperson:	Dr. David R. Schwandt
Dissertation Committee Members:	Dr. Denis F. Cioffi
	Dr. Andrea Hornett

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ABSTRACT

This study examined the relationship between the role of the project manager and learning within the project team. Little empirical research has been conducted on examining the structuring functions of the project manager's role in conjunction with project team's learning with respect to the production of products or services. Most of the research has studied the process and methods of project management. However, the role of the project manager is becoming strategic in nature, and knowledge creation is needed for long-term survival of the organization (Argyris & Schon, 1978; Copestake, 2000; Schwandt, 1995, 1996; Schwandt & Marquardt, 2000; Senge, 1994; St. Germain, 1997).

The theoretical basis of this study is built upon Katz and Kahn's (1966) views of organizations and roles as being related through a system approach. In addition, this study is grounded in Parsonian action theory (1951) and Giddens' structuration theory (1984), and it looked at the structuring variables associated with the project manager's role in the learning within the project team (Schwandt, 1995, 1997; Schwandt & Marquardt, 2000). The structuring variables associated with roles can be represented through role definition and the project manager's norms, behaviors, and tools.

Twenty-two project managers and 20 project team members, drawing from Schwandt's learning model (1995, 1997; Schwandt & Marquardt, 2000), as measured by the Organizational Learning Survey (Johnson, 2000), provided data concerning the processes for creating project team learning. A quantitative approach was employed as a research design method. The unit of analysis was the role of the project manager.

The study addressed two questions: (1) Is there a relationship between the role of the project manager and overall learning perception within the project team? And (2) drawing upon the Dissemination and Diffusion (integration learning) subsystem of the Schwandt model, does the role disseminate and diffuse information within the project team? The findings associated with these questions resulted from the separate analyses of the learning functions of the Schwandt model (1995, 1997; Schwandt & Marquardt 2000) as measured by the Organizational Learning Survey (Johnson, 2000) and the project manager's role characteristics of norms, behaviors, and tools drawn from the Project Management Institute (PMI) literature (1996, 2000). While there are several methods used to measure project management, the PMI institute has broad acceptance in the United States and was utilized by the company participating in this study. Pearson product correlation, Cronbach alpha, and multiple regression analysis utilizing SPSS (Statistical Package for the Social Sciences) were employed to analyze the data. As a result of this study, the researcher concluded that, within the boundaries of this study and this project management sample group, (a) there was an overall perception that the project manager's role contributes to project learning; (b) the project manager's role disseminates and diffuses information and provides structure and process for the project team to implement the team's goals and objectives further supporting Schwandt's Organizational Learning Theory and Model (1995, 1997; Schwandt & Marquardt, 2000); and (c) the project manager's behaviors and tools are significant to project team learning capability.

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CHAPTER 1

INTRODUCTION

Overview

Today's business demands continuous improvement of products and services to survive. Companies are changing; requiring project managers to go through rapid changes to respond to the forces at work in a globalized economy. Such forces include continuous interactions of e-commerce, virtual organizations, and the crossing of organizational boundaries to promote supplier/buyer relations among companies. Rich D'Adamo, president of Workforce Solutions LLC, said, "Project managers will be crucial to the success of e-government as well as many other IT and non-IT initiatives" (interview in O'Hara & Frank, 2002, p. 2). The complexity of working with multiple reporting structures resulting from these global forces at work has contributed to the replacement of traditional bureaucratic organizational designs and has led to more open and chaotic systems (Lundberg, 1989; Schein, 1992). A search for new and better ways to handle the complexity of business and to increase organizational productivity has resulted in a growth in project management (Kuprenas, Jung, Fakhouri, & Jerif, 2000; Abdel-Hamid, Sengupta, & Swett, 1999; Milosevic, 1996). Companies see project managers as

a means to sort good ideas from bad, understand the complexity and risk of each project, and provide estimates of costs and schedules. Unfortunately, project managers are often unprepared for the assignment. In many environments, this skill has been called a "no-brainer," a skill everyone should possess (St. Germain, 1997), but this has not been the case. Some see the role as simply one of control and coordination, but what about improved performance and learning? The question is this: is there a relationship between the role of the project manager (norms, behaviors, and tools) and team learning actions (Schwandt, 1995, 1996; Schwandt & Marquardt, 2000) within the project team in order to help the organization survive? And does the role of the project manager account for the variation in the actions of dissemination and diffusion (integration learning) of information and knowledge within the project team?

Researchers are exploring this question by studying the concept of the learning organization (Schwandt & Marquardt, 2000). Organizational and team learning is a complex, multidimensional, interdependent phenomenon whose purpose is creating an environment to support learning throughout the organization. Glynn, Milliken, and Lant (1991) identified three key issues for students of organizational learning: (1) organizational learning through two conceptual lenses—cognitive and behavioral; (2) the need to explain the differences among learning, adaptation, and change; and (3) the issues of level of analysis—individual, group, or organizational. In the first area, cognitive, empirical research has been conducted around the concept of decision making (Cyert & March, 1963; Fiol & Lyles, 1985). Studies on organizational learning from a cognitive development perspective have looked at knowledge structures, beliefs, rules, and routines

(Argyris & Schon, 1978; Duncan & Weiss, 1979; sensemaking (Gundlach, 1992), knowledge acquisition and distribution (Huber, 1991), and organizational and collective memory (Casey, 1994; Walsh & Ungson, 1991). From a behavioral perspective, empirical studies have focused on change in responses or actions (Levitt & March, 1988; Nonaka, 1991).

Garvin (1993) integrated the two perspectives, behavioral and cognitive, with his definition of a learning organization as one skilled at creating, acquiring, and transferring knowledge and at modifying its behavior to reflect new knowledge and insights. Any time that organizations look to improve their methodologies of business processes, the project manager is in the forefront, displaying norms and behaviors that support improved processes. Modified behavior includes increased awareness and the management of knowledge (Nonaka & Takeuchi, 1995). These behaviors can be transferred to others by making knowledge explicit. Accordingly, technology, project management tools, and processes can be considered explicit knowledge that facilitates organizational learning (Daft & Lengel, 1986; Huber, 1991). Berends et al. (2003) takes this further from the structurationist perspective by defining organizational learning "as the development of knowledge held by organizational members, that is being accepted as knowledge and is applicable in organizational activities, therewith implying a (potential) change in those activities" (p. 1042).

A project team survives, in part, on its explicit technical knowledge. The development of knowledge from successes and failures, and the sharing of it with subsequent project teams, is a central piece of a technical profession (Kharbanda & Pinto,

1996). Project organizations must continuously share their knowledge and manage that knowledge in repeatable steps and procedures for future use. Thus, this study looks at the role of a project manager and how that role may create learning within the project team.

Statement of the Problem

The pace of business has increased. Product development windows and life cycles have become painfully short. In a world of reduced workforces, global competition, and continuous change, the amount and significance of the work done in projects translate directly into an organization's ability to meet or beat the competition and to maintain shareholder value (Peal, 2000).

Without question, the work performed through project teams has taken on a strategic focus (St. Germain, 1997). A recent Internet search (using www.google.com) resulted in more than 8 million hits involving "project management" as keywords. In a search using "project manager's value," more than 3 million hits resulted on the same search engine. Professional organizations are formed to share best practices, organizational project maturity, benefits of project management, project management's professional competence, and project management methodology, to name a few. The strategic nature is further promoted by various professional organizations—such as the Project Management Institute (PMI) and Software Engineering Institute (SEI) of Carnegie Mellon University—that offer certification programs to project managers. In addition, global organizations, universities, and online classes expand the offerings to the project manager. These programs develop methodologies and processes that can be applied across the sectors of government and public and private business.

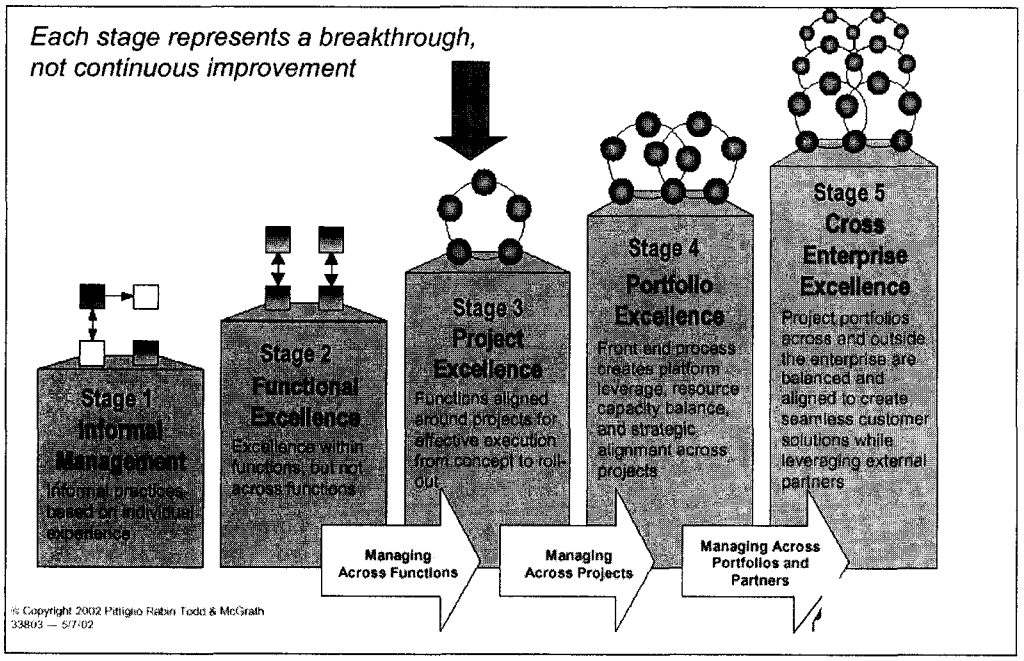
A project can be initiated as the solution to a customer's request or an organizational situation, and it often has a management sponsor. The problem is that, as expectations increase, the role of the project manager needs further delineation to ensure improved performance and to provide an environment for the project team to increase its learning capability.

This study uses the PMI (1996, 2000) definition of project management. PMBOK (1996) defines *project management* as the "application of knowledge, skills, tools, and techniques to project activities in order to meet or exceed stakeholder needs and expectations from a project" (p. 167). A *project manager* is defined by PMI (1996) as the individual who utilizes delegation, coaching, and leadership skills to enable the project team to accomplish the project deliverables. The project manager is responsible for the planning, executing, and closing (PMI Process Flow, 1996, 2000) of the project. Finally, a *project* is viewed by PMI (1996) as any undertaking with a defined starting point and defined objectives by which completion is identified; in practice, most projects depend on finite or limited resources by which objectives are to be accomplished (Duncan, 2000).

For purposes of this exploratory case study, the process that a project manager follows is defined, in accordance with the PMI, as a process of *initiating, planning, executing, controlling, and closing* the project. This process uses company resources to complete a project on time, within budget, safely, and in accordance with specified technical and quality requirements (PMI, 1996). Some projects may not have all the above steps; other projects may have more, depending on the complexity of the project.

Finally, the project manager is measured in terms of norms, behaviors and tools. Norms are defined as specific rules and procedures followed as part of the PMI methodology and also the maturity of the organization's project management thrust (PMI, 1996). Project manager's behaviors and tools were drawn from the project management literature. There are also levels of deployment that measure the maturity of the organization in utilizing project management. Figure 1 draws upon the supply management process as an example to highlight the different levels of capability and maturity viewed in the transactional part of project management processes as well as the capability stages occurring from flexibility and adaptability of refining the process. Figure 1 (adapted from Pittiglio, Rabin, Todd, & McGrath, 2002) demonstrates how the project manager's role can evolve in an organization over time. As the organization learns and progresses, the process utilized in project management becomes more transferable, and processes are repeatable from organization to organization. Figure 1 also speaks to the system concept (Parsons, 1953), highlighting the tension between stability and equilibrium in any system. In addition, change and adaptation processes help to manage the multiply dynamic variables of a project. Learning is the process of managing the tension of these two systems (Johnson, 2000).

Figure 1. Execution of project management—capability stages.



Note. Adapted from Execution of Project Management – Capability Stages, by Pittiglio Rabin Todd & McGrath, 2002, Retrieved from http://www.ncausa.org/public/pages/SupplyChainTrends_NCAWebcast_Jan142003_PRTM.pdf

Within each of the capability stages, the project manager must demonstrate a set of *norms, behaviors, and tools* (PMI, 1996) that support the capability stages. In most cases, a project manager is held accountable for the success of a project and is responsible for all functions. In addition, the project manager role is significant in identifying human resource needs, getting the right person assigned at the right time, and building effective communications within and outside the team's boundary (Ancona & Caldwell, 1992).

For the role of the project manager to be effective, activities may need to be structured around norms, behaviors, and tools that support the project team's goals and create knowledge. Depending on the capability state, certain norms, tools, and behaviors will be exercised. The premise of this study focuses on the project manager's role as measured by norms, behaviors, and tools defined within the PMI methodology (PMI, 1996, 2000). A project team is faced with learning at each stage of the project management. The project team is required to *adapt the plan* to meet the dynamic changing environment, keep focused on the *goal attainment, integrate the processes* of the project management methods (Schwandt, 1995) to carry out the project deliverables and meet the customer expectations, then *document* the process and results of the project to provide the history. Without a learning process that can communicate improvements and ideas to the project team, the project team would not have a successful project.

For example, requirements of *Quality Management* require (PMI, 1996, 2000); *Quality Planning* identifies the quality standards relevant to the project and determining how to satisfy them. Then *Quality Assurance* evaluates the overall project performance on a regular basis to provide confidence that the project will meet the customer's needs. Finally, *Quality Control* monitors specific project results and determines whether the needs of the customer are met and identify ways to eliminate causes of unsatisfactory performance. Each step of the project team process from *Planning, Executing* and *Closing* the project requires a cyclical process of adapting and working the plan to stay on schedule, on budget, and according to specifications to meet the customer's expectations.

This process of adaptation can create an environment within the system to express or negate learning. The outcome of this adaptation directly affects the performance of the project team. Thus, both systems are needed for the project team to learn and perform their project objectives.

Schwandt (1995) compared the complexities of the learning organization to a struggle between order and chaos (p. 365). The project manager's role is caught between this order and chaos. Globalization, partnerships, joint ventures and other business strategies expand the complexity of projects, requiring the project manager to utilize skills that require adaptation to the environment, goal focused, integrative and reflective activities, thus creating learning that directly corresponds to the performance of the project deliverables. Vaill (1996) described this pressure as "permanent white water."

Conceptual Frame

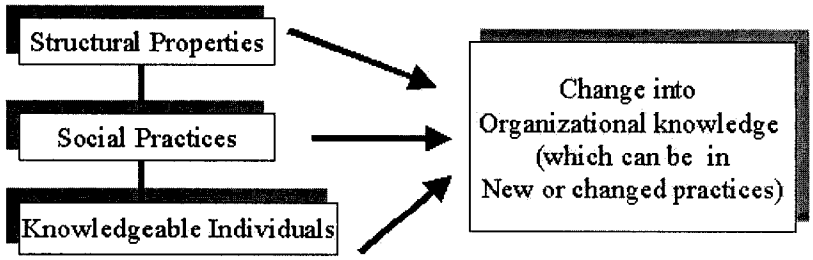
This study was designed to understand the project manager's role and how that role may contribute to the learning in the project team. The conceptual frame for this study consists of two major constructs: (1) the role of the project manager and (2) organizational learning. A *team* is considered an organization that can learn. A *project manager* is defined as an individual responsible for managing a project. The project manager solicits project team members, ensuring that specific assignees have the requisite expertise. The project manager is responsible for taking the project from the planning phase to the close-out phase of the project. The work is delegated to team members, both regular employees and subcontractors.

The second construct of the study is organizational learning. *Organizational learning* is defined as "a system of actions, actors, symbols, and processes that enables an organization to transform information into valued knowledge that in turn increases its long-term adaptive capacity" (Schwandt & Gundlach, 1992, p. 11). The integrating relationship between the role of the project manager and project team learning is structuration, based on Giddens' structuration theory (1979).

Structuration

Berends et al. (2001) suggested four reasons why structuration theory is relevant when discussing the relationship between the individual and organizational learning. First, the relationship between individual and collective phenomena is at the heart of structuration theory (Berends et al (2003). Second, Giddens (1979) put the knowledgeability of actors on the forefront of his theory. This makes his theory useful for the analysis of knowledge and learning in organizations. Third, Giddens' analysis of structure provides a starting point for the description of the interplay of different structural elements. The structural elements used by the project manager in the present study are GANTT charts, resource planning, risk management, project plans, and many other processes. These structured elements are important in understanding the capability stages of development for a project. Figure 2 shows the fourth reason for the relevance of structuration theory is that it sketches a dynamic picture of social reality that well suits the dynamic nature of the phenomenon under study (Berends et al. (2003).

Figure 2. Outline of a structurationist model of organizational learning.



Note: From The structuration of organizational learning, by Berends et al., 2003, Human Relations 56 (9), p. 1043.

Rose (1998) suggested that the "structuring properties allow the binding of time space in social systems, the properties which make it possible for discernible similar social practices to exist across varying spans of time and space which lends them to a systemic form" (p. 3). The project team environment is dynamic in nature, having multiple bosses, customers, and inputs to the daily process. Therefore, it is important to look for common elements of social practices that lend to a systemic form.

Giddens' (1979) theory stated that interaction among actors in a social system creates and maintains a structure of interaction. Similarly, Weick (1990) defined *structuration* as the production and reproduction of a social system through member use of rules and resources in interaction. Accordingly, organizational systems are built from human interaction and rules. These structures are both the medium and the outcome of human interaction. People (e.g., project managers) create structures that constrain their actions (Turner, 1987). Structuration is both "constraining and being constrained" (Weick, 1990, p. 18). The social technology shapes the user, and the user likewise shapes the technology.

Poole and DeSanctis (1990) studied group decision support systems and suggested a technology based on Giddens' (1979) dialectic of control. For purposes of this study, *structuration* is the dynamic process that integrates norms and roles with the technological features of project management methodology. Understanding the influence of structuration on the project team members and examining the project manager's norms, behaviors, and tools in the context of team learning helps to define the project manager's role.

Organizational Learning

The second construct of this study is organizational learning. "Organizational learning is seen as the process of improving actions through better knowledge and understanding" (Fiol & Lyles, 1985, p. 803). Schwandt (1999) suggested that for the organization to survive it must learn. To learn, the organization communicates information through processes and organizational structures essential to the flow of information. For the organization to adapt through learning, it must also interact with the external environment (Daft & Huber, 1987; Schwandt, 1995).

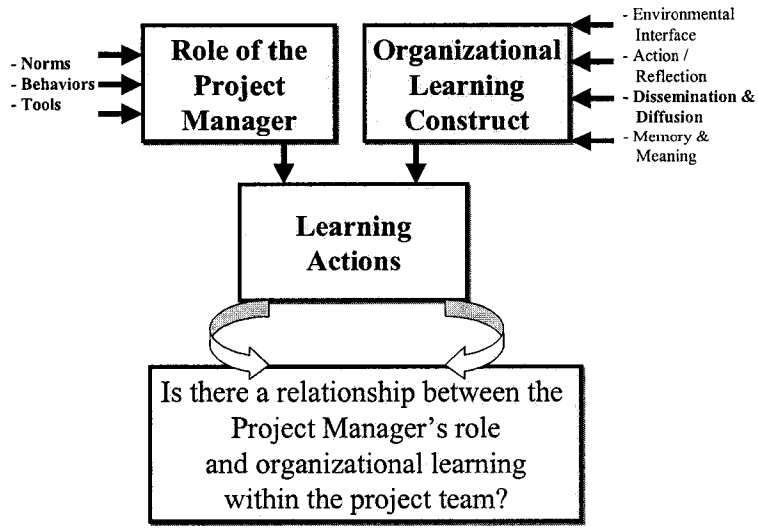
Framework

The two above constructs—structuration, as seen in the role of the project manager, and organizational learning—provide the conceptual framework for this study. The intersection of these constructs (as shown in Figure 3) provides a holistic view of the phenomenon under study: How does the project manager (or project manager's role) contribute to project team learning? The left side of the conceptual frame depicts the role of the project manager as consisting of norms, behaviors, and tools. The right side depicts

the four functions of the Schwandt's Organizational Learning Model (1995, 1996, 1997; Schwandt & Marquardt, 2000) of a learning organization: Environmental Interface (adaptation learning), Action/Reflection (goal learning), Dissemination and Diffusion (integration learning), and Meaning and Memory (latency learning). Dissemination and Diffusion (integration learning) is the subsystem through which the project manager acts (through structuration) to enhance project team communication and shared learning.

Through the Dissemination and Diffusion (integration learning) function, as depicted by Schwandt's model (1995, 1996, 1997; Schwandt & Marquardt, 2000), the project manager can demonstrate that behaviors can promote team information sharing, leading to team learning. The Dissemination and Diffusion (integration learning), as measured by the Organizational Learning Survey (Johnson, 2000), transfers information and knowledge to the other learning functions of the model. Dissemination and Diffusion (integration learning), as a structuration subsystem of the total organizational learning system, includes acts of communication and other actions supporting the movement of information and knowledge (Schwandt, 1995). To explore the structuring system, this study used three discrete variables that relate to the role of the project manager and the interrelationships contributing to learning within a project team: namely, (1) the norms associated with the project manager role, (2) behaviors utilized in implementing the role of the project manager, and (3) a sample of tools associated with the project manager's role.

Figure 3. Conceptual frame.



This conceptual framework provides a description of specific structuring mechanisms (dissemination and diffusion) and variables (norms, behaviors, tools) that were investigated in this case study. All three variables are directly related to the role of the project manager and are also evidence of structuration (Giddens, 1979). This study's hypothesis is that, as project managers disseminate information (Schwandt & Marquardt, 2000), they use norms, behaviors, and tools that structure the project, the team's learning about the project, and project management as an organization.

Research Question

The basic research question that guides this study is as follows: *To what extent does the role of the project manager, as expressed in norms, behaviors, and tools, account for the variation in learning within the project team?*

Using Schwandt's model of organizational learning (1995, 1996, 1997; Schwandt & Marquardt, 2000) and its companion, the Organizational Learning Survey (Johnson, 2000), the research question can be operationalized by the following two sub-questions:

a. Is there a relationship between the role of the project manager and organizational learning within the project team, as measured by an overall organizational learning score?

b. Is there a relationship between the role of the project manager and variation in the Dissemination and Diffusion (integration learning) function within the project team?

Overview of Method

This study utilized the Organizational Learning Survey (Johnson, 2000), an instrument developed by George Washington University's Center for the Study of Learning. Building on the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000), the survey was developed to measure dynamic social actions as they relate to organizational performance and learning. Developed in the mid-1990s, the survey was designed to identify (1) an organization's learning and performance orientation, (2) functional emphasis of organizational actions as they pertain to the learning and performance systems, (3) measures of organizational learning and performance actions, and (4) organizational sensemaking patterns (Johnson, 2000). The survey is discussed further in the methodology section.

Purpose of the Study

The purpose of this exploratory case study is to better understand the role of the project manager and how that role can affect learning within the project team. The

motivation of this study evolves from the desire to understand the importance of the role of the project manager and how its relationship to project team learning can contribute to successful implementation of projects. A great deal of press has been given to the function of project management. Through the example of military programs, the NASA space program, and major companies such as British Petroleum, organizations have pursued project management as a way to benefit the bottom line, keep costs in line, and produce innovative products and services. How to do that and also learn to improve is the puzzle that motivates this study.

This study looks at the structuration of the project manager role as creating learning within the project team. Therefore, the purpose of this research (using structuration theory as the construct with the defining variables of norms, behaviors, and tools) is to examine to what extent, if any, the role of the project manager correlates to project team learning. A survey method was employed to gather this data.

Significance of the Study

Organizations are becoming aware that they must increase their capacity to learn if they are to function successfully (Schwandt & Marquardt, 2000). The present study provides insights regarding how project management and organizational learning are related. Different learning norms, behaviors, and tools of the project manager may appear at different levels of deployment of project management within an organization.

This study contributes to an understanding of the project manager's role. Understanding how norms, behaviors, and tools interact with learning may help to improve project management capability.

Further, this study adds to current understanding of project team learning. A great deal of research has focused on processes associated with organizational learning (Fiol & Lyles, 1985; Daft & Huber, 1987; Huber, 1991) and on the conditions that influence organizational learning (Garvin, 1993; Senge, 1990; Watkins & Marsick, 1993). The present study adds to this body of work.

In addition, this study adds to the development of knowledge on the practical use of an organizational learning model and provides a baseline for future discovery-oriented research on the role of the project manager and its relationship to the project team.

Assumptions

Several assumptions were made to establish the context for this study.

1. The professionalization of project managers is becoming strategic in nature (St. Germain, 1997).

2. Project teams are organizations that need to be viewed as parts of a larger, dynamic, organizational learning system of interrelated functions (Schwandt, 1995).

3. Projects enter various stages of capability and maturity that requires certain levels of norms, behaviors, and tools, as measured by professional organizations (PMI, 1996, 2000).

4. There continues to be an increased emphasis on organizational learning as a means to organizational survival (Schwandt, 1995).

Limitations

This study is narrowly focused on the role of the project manager and only one organizational structuring component of Schwandt's Organizational Learning Model

(Schwandt, 1995, 1997; Schwandt & Marquardt, 2000) as measured by the Organizational Learning Survey (Johnson, 2000) and the Dissemination and Diffusion (Integration Learning) function. In addition, the levels of deployment identified in the literature—ranging from "ad hoc" (Busch, 1999) to "enterprise-wide deployment" (made popular by Microsoft's [2003] Enterprise Project Management Software)—would be difficult to measure in a single organization. Therefore, three levels were identified from the Project Management Institute (1996, 2000), represented in the literature as capability stages of project management deployment. These levels cannot be determined in this study, for they require extensive auditing from professional external auditors; however, they are used as a frame of reference for the maturity levels viewed within the execution of project management. For example, Pittiglio, Rabin, Todd, and McGrath (2002)—as shown in Figure 1, highlighted the depth of activities, ranging from informal project management to cross-enterprise excellence of deployment in project management.

The three levels of development for this study are as follows.

1. *Initial Level*—The process is characterized as ad hoc, occasionally even chaotic. Few processes are defined, and success depends on individual effort and heroics (Busch & Milosevic, 1999; PMI, 2000).

2. *Repeatable Level*—Basic project management processes are established to track cost, schedule, and functionality. The necessary process discipline is in place to repeat earlier success on projects with similar applications (PMI, 2000).

3. *Defined Level*—The process for both management and engineering activities is documented, standardized, and integrated into a standard process for the organization. All

projects use an approved, tailored version of the organization's standard process for developing and maintaining projects (PMI, 2000).

Other project manager norms, behaviors, and tools lie beyond the three stages of capability under investigation. Project teams can move into the managed and optimizing levels of process maturity, which are beyond the framework of this study.

The small sample of project managers surveyed may have unique single-site characteristics, creating self-defined boundaries that may not be reflective of the entire population of project managers. If so, this limits the generalizability of the study.

Delimitations

The study was bounded by both the phenomenon under investigation and the methodology selected to investigate the phenomenon. The boundaries were consciously adopted to narrow the scope of the study.

The focus of this investigation is to what extent the project manager's role, as described through project managers' norms, behaviors, and tools, is involved in creating project team learning. Project teams are complex entities that involve multiple processes at both the individual and organizational level. A large body of literature and an extensive and well-developed body of theory has described and explained these multiple processes and capabilities. This study examines only one process among many: to what extent the project manager's role creates learning within the context of the project team.

This study made methodological choices that delimited both the project team characteristics and the type of data collected. The unit of analysis is also delimited. The individual level of analysis of the project manager is explored in this study. The study's

expectations were accomplished by looking at the individual norms, behaviors, and tools in the role of the project manager and at evidence of the collective learning in the project team at various levels of project deployment. What occurs at the broader organizational level beyond the team was not part of this study.

Not all project teams are candidates for inclusions in this study; only a small sample of an extensive array of possible project teams (Gibson & Kirkman, 1999) is considered. "Purposeful sampling" (Fraenkel & Wallen, 1996, p. 101) restricts the sample frame to the organization that is under study. The purposeful, criterion-based sampling strategy used in the survey of the project teams excluded all formal work teams that failed to meet the specific selection criteria. The project teams studied focused on delivery of a product or service. The survey data collection strategy is the only data collection method selected for this study. Other data concerning the teams are outside the scope of this study and were not collected.

CHAPTER 2

REVIEW OF THE LITERATURE

This literature review is divided into three lines of research: (1) organizational learning, (2) role theory with an application of structuration theory to the role of the project manager, and (3) the project manager's role performed through norms, behaviors, and tools with literature to support this delineation. These three lines of research constitute each of the components of the conceptual framework of this study (Figure 3, in the previous chapter).

Organizational Learning Theory

The concepts and ideas of organizational learning have become popular within the last decade in business journals and academic literature. Dewey (1916) provided the early recognition of organizational learning as a process. Revans investigated learning as an action process in the 1960s. Argyris and Schon (1978) wrote the first book dedicated to the subject. Interest in learning processes in academic and practitioner communities has grown exponentially since Senge's (1990) popularization of the term "learning organization." In the mid 1990's a query found nearly 100 books and journals on organizational learning. A recent query using only one search engine (www.google.com)

provided more than 3 million references to organizational learning and books. This rapid expansion and interest in organizational learning increases the complexity of analysis and academic study on the subject.

Several published studies have reviewed the literature on organizational learning (Levitt & March 1988; Huber, 1991; Dodgson, 1993) and have identified a lack of an integrated theory. While Senge (1990) provided a rich theoretical framework in his five disciplines, Popper and Lipshitz (1998) stated, "Despite its impressive progress, certain conceptual problems concerning organizational learning remain unresolved" (p. 162). Fiol and Lyles (1985) observed that "although there is widespread acceptance of the notion of organizational learning, no theory or model of organizational learning is widely accepted" (p. 803). In addition, the theories populate several domains: organizational theory, organizational behavior, information technology, system theory, information systems, and human resource development. The practitioner's literature is derived from a variety of programs: Plan, Do, Check, Act (PDCA)—Quality Programs (Kotnour, 2000), as well as continuous improvement programs (Gieske & Brocke, 2000). The variety of perspectives and lack of a unifying theory can lead to confusion. As Schwandt and Marquardt (2000) recognized, organizational learning "as a concept has been teetering on the boundary between a useful construct (usually seen as the learning organization) and a 'fad' that offers metaphorical insights, but fades as the newest quick fix to arrive on the organizational scene" (p. 19).

Many organizations see organizational learning as a portal to the knowledge age of the new economy. Hinds (1995) reviewed the organizational learning literature and

concluded that "although the current base of organizational learning literature provides a substantial amount of theoretical background work, very little has been reported that operationalizes the theory" (p. 27). Schwandt & Marquardt (2000) attributed this to the absence of dynamic models, which inhibits the development of useful propositions that link constructs and researchable questions.

Definitions of Organizational Learning

Regardless of the differences in perspectives between individual and organizational learning, most theorists have agreed that it is unrealistic to believe that an organization can function and grow without learning. Dixon (1994) suggested that despite the acknowledgement that learning is a requirement and that individual and organizational learning are integrated, there is not a consistent definition of organizational learning. Dixon (1994) cited eleven definitions with a variety of meanings and common themes (Ayas, 1997) and concluded that an organizational model must be based on organizational learning and individual learning, whether it is implicitly or explicitly expressed.

Operationalizing organizational learning theory centers around two questions: (1) Can organizations learn? And (2) does the organization as an entity learn beyond the cumulative learning of all members of the organization? Giddens' (1979) structuration theory provides the key. The next section discusses the concept of individual learning as linked to organizational learning. This is important for two reasons: the individual level of analysis is used in this study, and individual learning is seen as the mechanism for

adaptation and changes within the project team. This link is important in looking at the role of the project manager and how that role may create learning within the project team.

Individual Learning

Many disciplines touch upon the concept of learning, including education, social psychology, group psychology, industrial manufacturing, industrial economics, information technology, psychology, organizational theory, and international studies. While not all have not directly and explicitly dealt with learning, all have contributed to the concept (Ayas, 1997). However, there is little agreement, within or between disciplines, as to the definition of learning and how it occurs (Fiol & Lyles, 1985). This section of literature review presents aspects and differing perspectives on individual learning as it affects the foundation of the approach taken in this study.

Seminal writers, such as John Dewey on education, Kurt Lewin on group theory, and Jean Piaget on education, influenced later theorists, including Greg Bateson, Reg Revans, Chris Argyris, David Kolb, Malcom Knowles, Jack Mezirow, and Alan Mumford (Dixon, 1994) to use their understanding of the individual learning process as a starting point for an organizational learning construct. Dixon (1994) captured the essence of learning as a threefold process that can be applied to individuals, where (a) learning is about interpreting what one experiences in the world, (b) one creates one's own interpretations, and (c) the meaning one creates mediates one's actions (p. 34).

Argyris and Schon (1978) went further to see a connection between the collective and the individual. They described learning as a means of change within an organization.

Individual learning, as a mechanism for adaptation and ultimately for survival of the individual, involves a change in behavior (Schwandt & Marquardt, 2000).

In addition to this symbiosis of organizational learning, the human or social context affects learning (e.g., project team's deliverables). Salancik and Pfeffer (1978) argued that the effects of the context and the consequences of past choices, rather than individual predisposition and rational decision-making processes, explain attitudes and motivation. Therefore, social context binds people to behavior through a process of commitment that provides norms and expectations constraining their rationality.

Learning in Organizations

Systems theorists (Senge, 1994; Schwandt, 1995, 1996, 1997; Schwandt & Marquardt, 2000) have suggested that organizations are not just large collections of individuals but also systems for capturing and sharing individual learning. Accordingly, organizing systems are learning systems, and project teams are both organizing and learning systems. Dixon (1994) asserted that "individual learning is dependent upon the collective" and the converse is also true: "collective learning is dependent on the individual" (p. 34). Fiol (1994) added the need for organized action as a requirement for organization learning. In this way, project team members share the need for organized action. Accordingly, they develop consensus around interpretation and frame communications and formats that team members use to construct a framework for action. Salancik and Pfeffer (1978) suggested that there is a reciprocal relationship between action and structures, providing the context for actions. Giddens' structuration theory (1979) supports this also.

This reciprocal relationship is not always positive and dynamic. Senge (1994) noted that traditional organizations are designed to keep people comfortable, to inhibit their taking risks, rather than to encourage them to make changes by reacting to events. He proposed an alternative, combining organizational learning with systems thinking, and identified five disciplines to promote learning:

1. *Systems thinking* is a discipline for seeing wholes: "it is framework for seeing interrelationships rather than things, for seeing patterns of change rather, than a static snapshot" (Senge, 1994, p. 15).

2. *Personal mastery*, "the discipline of personal growth and learning" (p. 12), is a lifelong discipline.

3. *Mental models* "are deeply held internal images of how the world works images that limit us to familiar thinking and acting" (p. 13).

4. *Shared vision* "is a concept that is truly shared among people" (p. 12): "shared vision is vital for learning organizations because it provides the focus and energy for learning" (p. 12).

5. *Team learning* "is the process of aligning and developing the capacity of a team to create the results its members truly desire" (p. 18). "Team learning is vital because teams, not individuals, are the fundamental learning units in modern organizations" (p. 19).

Senge (1990) asserted that the above five disciplines are prerequisites for individual learning to become organizational learning. Individuals learn all the time, yet there may not be organizational learning. If teams learn, they can become a microcosm

for learning throughout the organization (Gorelick, 2000; Hansen & Bolko von Oetinger, 2001). Senge (1990) said that a "team's accomplishments can set the tone and establish a standard for learning together for the larger organization" (p. 236).

Perspectives on Organizational Learning

Perspectives on organizational learning are diverse and include strategic management (Fiol & Lyles, 1985), sociological perspectives (Levitt & March, 1988), communications (Daft & Huber, 1987), information processing (Huber, 1991; Cohen & Sproull, 1991), and human resource development (Dixon, 1992).

Shrivastava (1983) identified four separate perspectives on organizational learning: (1) *adaptive learning*—goals are adjusted to meet environment change; (2) *development of knowledge*—knowledge is created in the process of comparing action with outcomes; (3) *assumption sharing*—actions results from shared values; and (4) *institutional experience*—learning occurs through experience and tradition. Fiol and Lyles (1985) applied the distinctions between behavioral and cognitive learning to the first view, adaptive learning. Their analysis favored cognitive change as real or true learning, versus behavioral short-term adaptations. Learning and adaptation are interrelated, according to Fiol and Lyles (1985), but their research did not provide an insight as to how this might work in a project team setting.

Duncan and Weiss (1979) described a more sophisticated adaptive organizational learning. Their theory poses an improvement in the quality of knowledge due to causal relations between inputs, outputs, and the effects on the environment. Duncan and Weiss (1979) viewed the organization as an open system and suggested that, in order to create

organizational knowledge, the organizing system must be communicable, consensual, and integrated into the organization itself. Accordingly, to acquire knowledge, the organization institutionalizes the learning process, creating a particular learning system method. The main task of this system is for the manager to make changes as necessary, based on data and information from the company. Their model is very similar to a system approach, developing processes to manage a complex project such as PMI (2000) and SEI (2001) with the project manager making the adjustments and changes required to keep the project on track.

Levitt and March (1988) contributed to Shrivastava's (1983) second and fourth types of sociological interpretation of organizational learning and institutional experience. Organizational learning success is measured by how well the organization achieves planned outcomes (Levitt & March, 1988). In Levitt and March's view, three dimensions characterize organizational learning: (1) routine action ("Action stems from logic of appropriateness of legitimacy more than from logic of intention" [p. 320]); (2) actions viewed in terms of past experiences; and (3) actions that are target-oriented. In other words, for an organization to be successful, learning is action-oriented and is focused on outcomes driven by meeting customer's expectations and deliverables. According to Levitt and March (1988), interpretation of past events, stories, and artifacts shapes the routines that drive organizational learning. For example, business process mapping, information re-use, quality audits (which require the routine to be documented in clear and organized manner), and lessons-learned databases are all commonly used in business today and provide evidence of learning actions.

Daft and Huber (1987) departed from Shrivastava's (1983) four types and presented an interpretive and system-structural perspective in their organizational learning theory. They focused on communication and media construction, providing an interesting theoretical lens for the examination of e-mail, online communication, listserv capabilities, and other electronic messaging systems used in e-commerce. Their interpretive perspective focuses on information interpretation and sharing, assuming a system that gives meaning to data. Daft and Huber (1987) posited that meaning making and information dissemination are not mutually exclusive and that both may be used in an organization. While a structural framework transmits and stores tangible data and messages, human participants interpret and make sense of events and information.

Building on this interpretive framework, also from a sociological paradigm, Walsh and Ungson (1991) stressed that organizations are information-processing systems and that, as part of that system, they have memory. Organizations preserve knowledge through policy, processes, and culture. This creates a collective memory despite individual turnover (Casey, 1994). This is how companies have ensured a cohesive identity in a fast, chaotic environment with the transitory makeup of the project team.

Glynn, Theresa, and Milliken (1994) combined adaptation and learning into an adaptive learning concept and added knowledge development as their concept of organizational learning. These two perspectives, *adaptive learning* and *knowledge development*, differ in assumptions about learning, the level of analysis, and methodologies employed in research. The adaptive learning perspective assumes that the organization is target-oriented and responds to experience by repeating behaviors that

have been successful and avoiding those that have failed (Levitt & March, 1988). In this way, the adaptive learning approach views learning as a process of adjusting behavior in response to experience and fails to capture the complexities of organizational learning and the intra-organizational dynamics that underlie learning (Glynn, Theresa, & Milliken, 1994).

In contrast, the knowledge-development perspective focuses on the content produced by the learning process: i.e., the pattern of cognitive association or cause-effect relationships and the processes through which these causal beliefs or theories-in-use (Argyris & Schon, 1978) are communicated and institutionalized. The knowledge development perspective has been used to study transfer processes, focusing on the transmission of organizational knowledge and, sometimes, specifically the transfer of technological know-how (Glynn, Theresa, & Milliken, 1994). The focus of the knowledge-development perspective has been on patterns of cognitive association among context, structure, process, and outcomes, as learned by individuals in the organization. Technological transfer is what allows teams to learn from previous projects and to share from intra-organizational communication, vital to the matrix management of project team members. Because the focus is knowledge transfer, Glynn, Theresa, and Milliken's (1994) knowledge development perspective can be integrated into Huber's (1991) information-processing perspective.

Huber's (1991) model of organizational learning included four components: (1) *knowledge acquisition*—the process by which knowledge is obtained; (2) *information distribution*—the process by which information from different sources is shared and

thereby leads to new information or understanding; (3) *information interpretation*—the process by which distributed information is given one or more commonly understood interpretation; and (4) *organizational memory*—the means by which knowledge is stored for future use. Huber (1991) identified sub-processes for each component and assumed that information technology plays a specific and integral role in organizational learning by transporting and storing information.

Huber (1991), looking forward, specifically addressed information technology as the major component in his organizational memory construct. According to Huber (1991), "automatic capturing (as seen in on-line databases) and sophisticated retrieval of such information results in computer resident organizational memories with certain properties (as seen in Lotus Notes© databases), including completeness and precision, that are superior to the human components of organizational memories" (p. 106). Walsh and Ungson (1991) supported this theory. They saw organizational learning as the systems that capture, store, and retrieve various decisions and responses that compose the organization's history. Storage environments, or retention facilities, are broader than Huber's (1991) information technology component and include individuals, cultures, structures, and ecologies that make up the organization. Many of the tools utilized in project management are retention facilities. Therefore, both Huber's (1991) work and Walsh and Ungson's (1991) theories are relevant to this research study. However, this study must go beyond transfer and retention to consider learning capability.

DiBella and Nevis's (1998) learning definition addresses the capability aspect of organizational learning. They separated organizational learning theories into *normative*

and *development* perspectives and add a third perspective: *capability*. The normative approach specifies a set of prescriptive conditions or best practices that function as a template to evaluate organizations. In the normative approach, learning is defined as a planned action to develop and use specific skills. The normative perspectives create mechanisms to foster organizational improvement and require disciplined actions or intervention for learning to take place, e.g., formal training by professional organizations to educate and train the project manager and project team. Normative models in the literature include Garvin (1993), Pedler, Burgoyne, and Boydell (1991), and Senge (1990).

The normative perspective assumes that organizational life is not conducive to learning because of barriers such as the way individuals have been trained to think and act as individuals, rather than as a collective. This can be demonstrated in the normative behavior of the project manager's performing "ad hoc" (Busch & Milosevic, 1999) practices while project management systems may be in place. Some organizations may not provide the mechanics for people to find experts to share lessons learned. Alternatively, there may not be an infrastructure to support sharing of ideas, as seen in the recent NASA debriefing of the Columbia space shuttle disaster reported on the television and in several newspapers.

The normative perspective (DiBella & Nevis, 1998) posits that when organizations do not create the appropriate infrastructure or conditions for learning, they suffer from learning disabilities such as amnesia in organizational memory, or else their experiences may be biased in a way that either does not allow the project manager to

make good decisions or causes the project manager to become too paralyzed with fear to act. Another example can be seen in providing project managers with tool training, when the infrastructure on the job does not support the use of the tool as an aid in the decision-making process. The key to successful normative learning processes depends on the active engagement of top management.

Watkins & Marsick (1993) conducted a study of twenty-two examples of organizations that have attempted to establish organizational learning systems. They found that most shared the following attributes:

- "Learning organizations focus on organizational learning and transformation, not just individuals" (p. 10).
- "Learning has a great impact when it involves a greater percentage of employee population" (p. 10).
- "Leaders and employees at all levels think systematically about the effects of their decisions and work within the total system" (p. 10).
- "Learning is built into work structures, politics, and practices" (p. 10).
- "New measurement systems benchmark current knowledge and culture monitors progress toward becoming a learning organization" (p. 10).

Other researchers also suggest:

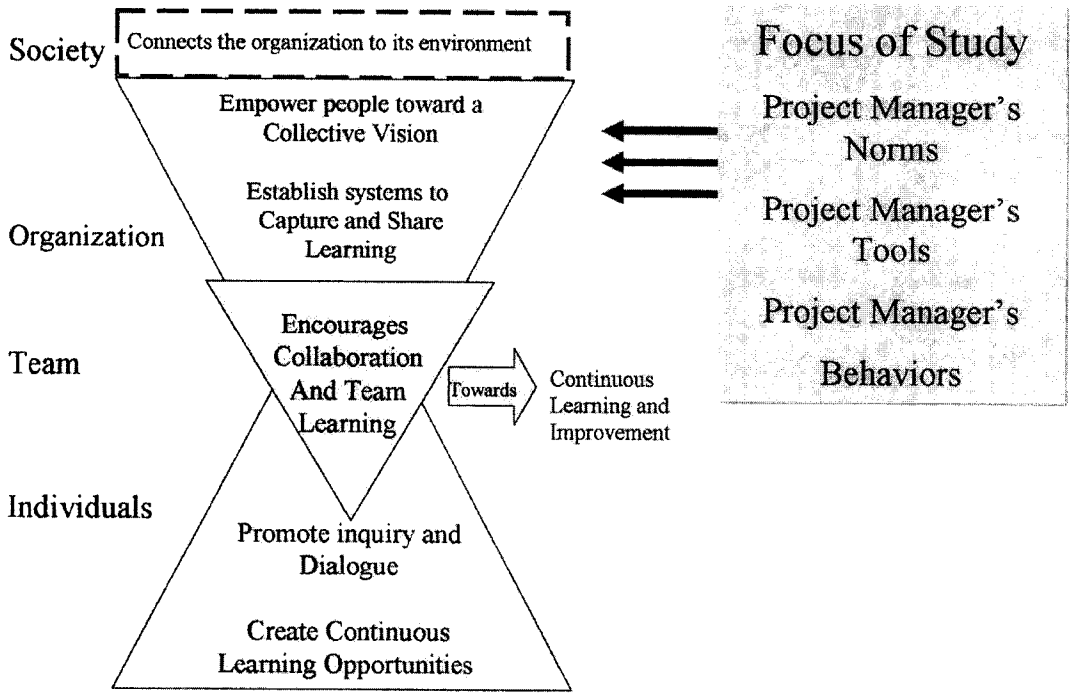
- "Structures and systems are created to ensure that knowledge is captured" (Watkins & Marsick, 1993, p. 10) and shared for use in the "organization's memory" (Daft & Huber, 1987; Walsh & Ungson, 1991).

- Learning is transformative in some way, although it is likely that some new learning will also be adaptive (Glynn, Theresa, & Milliken, 1994; Levitt & March, 1988; Watkins & Marsick, 1993).
- Organizational systems and policies are structured to support, facilitate, and reward learning for individuals, teams, and the organization (DiBella & Nevis, 1998; Watkins & Marsick, 1993).

Watkins and Marsick (1993, p. 10) developed the model shown in Figure 4 to display their findings.

Watkins and Marsick's (1993) model provides an integration of some of the learning theories reviewed in this paper. Using this model, it is possible to consider a project manager's role, as seen through norms, behaviors, and tools, as a connection between individual, team, and organizational learning on the left side, with empowerment in the top and inquiring and dialogue in the bottom section. The project manager is given projects from upper management and external customers in response to environmental factors. Then, drawing upon experience and systems provided by the organization, the project manager interprets the request into action items for the organization to take. This action can be seen through project managers' behaviors and tools. The center diamond of the model in Figure 4 shows the fundamental role of the project manager function involved in collaboration and team learning to meet the customers' deliverables, as well as to create learning and improvement.

Figure 4. Learning organizations action imperatives.



Note. From *Sculpting the Learning Organization*, by K. E. Watkins and V. J. Marsick, 1993, San Francisco: Jossey-Bass, p. 10.

Handy (1995) provided another model for organizational learning. He described it as a turning wheel composed of four quadrants: questions, ideas, tests, and reflection. This concept is remarkably similar to the Shewhart (1938)/Deming PDCA (Plan, Do, Check, Act) cycle. A similar approach was applied by Kotnour (2000) in his study of learning practices used in the project environment. Kotnour (2000) used Juran's PDSA (Plan, Do, Study, Act) cycle to represent the learning process in a project environment. He outlined it in the following manner (p. 2).

1. "In the "plan" step, the project team determines the nature of the problem and constructs a plan. The plan is a set of expectations with a set of steps with expected results".
2. "In the "do" step, the project team implements the plan. Implementation produces a set of results such as cost, schedule, or technical performance". These results are used to understand project status and to move the project forward.
3. "In the "study" step, the project team reflects on the associated plans and the results to determine the good and bad instances. The output of the "study" step is a lesson learned".
4. "The "act" step is the closing of the loop to show the decision to continue with or change the process of improvement." (p. 2)

Kotnour (2000) suggested inter-project learning cycles, intra-product learning cycles, and the creation of lessons learned to increase the organizational learning capacity in a project team.

Garvin (1998) summarized organizational learning as involving three stages:

1. The *cognitive stage*, in which organizational members are exposed to new ideas, expand their knowledge, and begin to think differently. This is similar to the project manager being informed about the new tools and processes that can be utilized to manage the project team more effectively. This study identified this as a Level I of deployment.

2. The *behavioral stage*, at which point employees begin to internalize new insights and alter their behavior. This can be seen where the project manager is utilizing a Gantt chart, planning projects, and using work breakdown structures, as an example of project management tools. Behaviors the project manager might utilize is encouraging initiative and information seeking skills within the project team. Encouraging team members to build relationships, fostering collaboration, mentoring and leadership skills within the project team..

3. The *performance improvement stage*, constituting measurable improvement in organizational results that emanate from stages 1 and 2, above. Applied to this study, this stage is defined as Level III of project management deployment. Processes are repeatable, and project risks are managed. Examples of this would be where the project manager is seen as an integral part of a corporate wide project management strategy. In addition, the project manager would negotiate and balance all factors and issues relating to the project, the project team, and project stakeholders. Finally, the project manager would utilize technology and software tools to assess the cost and quality performance of projects, in addition to schedule performance.

Garvin (1993) defined the *learning organization* as "an organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights" (p. 80). While this is practical, it lacks some conceptual depth and academic rigor. King (2001) viewed Garvin's (1993) model as insufficient because it does not encompass the notion of organizational results. The objective of an organizational learning strategy is to facilitate learning through organizational processes,

such as a project management discipline. Various group and organizational competencies and capacities can be developed, refined, and enhanced to enable organizations to adapt to changing circumstances and demands.

Preskill and Torres (1999) suggested that organizational learning represents the organization's commitment to using all of its members' capabilities. Their organizational model used "evaluative inquiry as a means for the organization to (a) develop a community of inquirers, (b) harness the knowledge capital of its members, and (c) address problematic issues that face the organization" (p. 43). They saw evaluative inquiry as a catalyst for learning and action on organizational issues.

Others relate organizational learning to strategic renewal. Crossan, Lane, and White (1999) described organizational learning as a principal means of achieving the strategic renewal of an enterprise. Their learning model has four premises (p. 523).

1. "Organizational learning involves a tension between assimilating new learning (exploration) and using what has been learned (exploitation)".
2. "Organizational learning is multilevel: individual, group, and organization" (p. 523)
3. "Social and psychological processes link the three levels of organizational learning: intuiting, interpreting, integrating, and institutionalizing (the four Is)".
4. "Cognition affects action (and vice versa)" (p. 523).

Proposition: The "four Is" of Intuiting, Interpreting, Integrating and Institutionalizing are "related in feed-forward and feedback processes across the levels" (p. 523).

Crossan, Lane, and White's (1999) model is in Figure 5.

Figure 5. Learning/renewal in organizations: Four processes through three levels.

Level	Process	Inputs / Outcomes
Individual	Intuiting	Experiences Images Metaphors
	Interpreting	Language Cognitive map Conversations/dialogue
Group	Integrating	Shared understandings Mutual adjustments Interactive systems
Organization	Institutionalizing	Routines Diagnostic systems Rules and procedures

Note. From *An Organizational Learning Framework: From Intuition to Institution,* by M. M. Crossan, H. W. Lane, and R. E. White, 1999, *The Academy of Management Review 24*(3), p. 523.

According to Crossan, Lane, and White (1999), these three learning levels define the structures through which organizational learning takes place. The project management processes form the "glue that binds the structure together" (p. 525). This is significant to this research by contributing to an understanding of the level of analysis selected for study. All three levels of analysis play integral parts to the overall structure of a project. While the project manager role is at the individual level, that role must be

integrated through the project team (group level) through shared understanding, and interactive systems, such as "end-to-end" solutions or supply chain management. If other teams learn from the project team, then an organizational level of learning occurs (Crossan, Lane, & White, 1999).

The Scope of Organizational Learning

The scope of organizational learning is constrained by several factors: a high level of environmental uncertainty, costly potential errors, a high level of professionalism, and strong leadership commitment to learning (Popper & Lipshitz, 2000). Popper & Lipshitz (2000) hypothesized that unless some of these factors are present, efforts to globalize and institutionalize organizational learning are likely to fail. Nevertheless, there has been some progress. Hult, Nichols, Giunipero, and Hurley (2000) showed positive effects of organizational learning on customer orientation and relationship commitment in a global supply chain. Cross and Baird (2000) concluded that online communities of practice and other forums are better levers in promoting organizational learning than reliance on technology alone.

Watkins and Marsick (1993) idealized the future of the learning organization as depicted in Table 1.

This emergent notion of learning as the process of becoming a competent participant in a social and organizational process suggests that the traditional emphases on the individual, the formal team, or the institutionalized organization as the key unit of analysis are confining and inappropriate. There seems to be a move toward examining dynamics: a learning network, more than the learning organization (Tempest, 1999).

Easterby-Smith et al. (2000) suggested that the time is ripe to address the inherent conflicts between shareholders' goals, economic pressure, institutionalized professional interests, and political agendas. It is for this reason that Schwandt (1995, 1997; Schwandt & Marquardt, 2000) posited a dynamic model.

Table 1

Future of Organizational Learning

From	To
Individual Level of Analysis	**Individual Level of Analysis**
Learning that is canned, sporadic, and faddish	Learning that is continuous, strategically tied to future organizational needs
Learning that is not coherently integrated or sequential	Learning that is developmental
Learned helplessness	Personal mastery, learning to challenge assumptions and to inquire
Team Level of Analysis	**Team Level of Analysis**
Learning that is focused on task accomplishment with no attention to process	Learning that is focused on group development and on building collaborative skills
Rewards for individuals, not teams	Rewards for teams, whole divisions
Compartmentalization	Cross-functional, self-directed work teams
Organizational Level of Analysis	**Organizational Level of Analysis**
Learning that is superficial and unconnected to previous skills, truncated learning	Learning that builds over time on previous skill attainment
Learning through structural reorganizations without regard to learning barriers created; structural rigidity	Creation of flexible structures to enhance learning for everyone
Societal Level of Analysis	**Societal Level of Analysis**
Unawareness of impact on society of policies, tunnel vision	Acknowledgement of interdependence and work to improve society generally
Attempts to control societal influence	Constant scanning and projecting of future trends while working to build a desirable future.

Note. From *Sculpting the Learning Organization*, by K. E. Watkins and V. J. Marsick, 1993, San Francisco: Jossey-Bass, p. 12.

Dynamic Organizational Learning Model

Schwandt's (1995, 1997; Schwandt & Marquardt, 2000) Organizational Learning Model (OLM) is the framework for this study. Schwandt's model has been used to analyze dynamic actions related to organizational learning in several studies (Casey, 1994; Croswell, 1996; Gorelick, 2000; Hinds, 1994), to name a few. This model is derived from Parsons' General Theory of Action (1951) and considers both cognition (learning) and action (performance). It is the duality of learning and performance systems (Schwandt, 1995) that provides for flexibility and growth at all levels: individual, group, and organization. Schwandt's dynamic system model of organizational learning recognizes the individual's role while highlighting the nature of the collective and the interrelationship of individual and collective learning.

Using Parsons' framework, the Organizational Learning Model (OLM) (Schwandt, 1995, 1997; Schwandt & Marquardt, 2000) describes the organization as an open dynamic system that creates knowledge. Schwandt (1995, 1997; Schwandt & Marquardt, 2000) suggested that organizations are social systems that change as a result of learning and performance. This is the essence of Parsons' (1951) social action theory. There are four elements to social action: (1) actor/subject—an individual, group, or collective; (2) situation—the physical and social objects to which the actor relates; (3) symbols—the means through which the actor relates to different situations and assigns meaning to them; (4) rules, norms, and values—elements that guide the orientation of action and the actor's relations with the environment. (Schwandt 1994, 1995, 1997; Schwandt & Marquardt, 2000). These four elements are integral to both Parsons' (1951)

General Theory of Social Action and Schwandt's (1994, 1995, 1997; Schwandt & Marquardt, 2000) Organizational Learning Model.

Parsons's General Theory of Social Action

Parsons (1951) offered a construct for the analysis of social systems and organization. He viewed social systems as open systems engaged in complicated processes of interchange with their environments. In each system are four functions (see Figure 6).

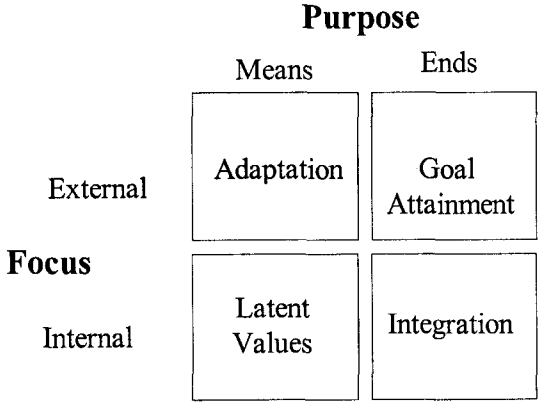
1. *Adaptation to the external environment.* A system interacts with its environment and may import energy or information.

2. *Goal attainment.* A system expresses itself into its environment by achieving goals and producing results.

3. *The function of integration.* Adaptation and goal attainment are mediated by integration with values.

4. *Latent values.* A system contains histories, identities, and cultures that serve to maintain patterns in the system as it adapts to the environment and achieves goals.

Figure 6. Parsons's four functional prerequisites.



Note. From *Working Papers in the Theory of Action*, by T. Parsons, R. F. Bales, and E. A. Shils, 1953, New York: Free Press, p. 182.

According to Parsons, Bales, and Shils (1953), all systems—individual, group, organizational, and societal—can be analyzed in relation to the aforementioned four functional prerequisites: adaptation, goal attainment, integration, and latent values. Parsons (1951) also identified three types of action: actions focused on performance, actions focused on learning, and actions combining the two. While Parsons (1968) hypothesized that social change occurs through performance and learning, his research was limited in proving the learning aspects of the action theory. Using this framework, Schwandt's research (1994, 1996, 1999; Schwandt & Marquardt, 2000) showed that actions could be separated into two organizational functions: learning and performance. Schwandt (1995, 1996, 1997; Schwandt & Marquardt, 2000) further developed Parsons' notions about the learning functions.

Schwandt's Adaptation of Parsons's Theory

Schwandt's (1995) model further developed the learning aspect of change in Parsons' (1951) General Theory of Social Action. Schwandt viewed organizational behavior as more than performance. Schwandt's model emphasizes the relationships and integration of each of the four functions, which allows the organization to increase its learning capacity (Schwandt & Gundlach, 1992).

The four functions of Schwandt's learning system (Figure 7) parallel those of Parsons (1968).

1. The *Environmental Interface* subsystem (Parsons: adaptation learning) is focused on information intake and output. It requires "manipulating" the characteristics of the learning system's external environment (Schwandt, 1995). It requires the mechanisms to secure, filter, and share information.

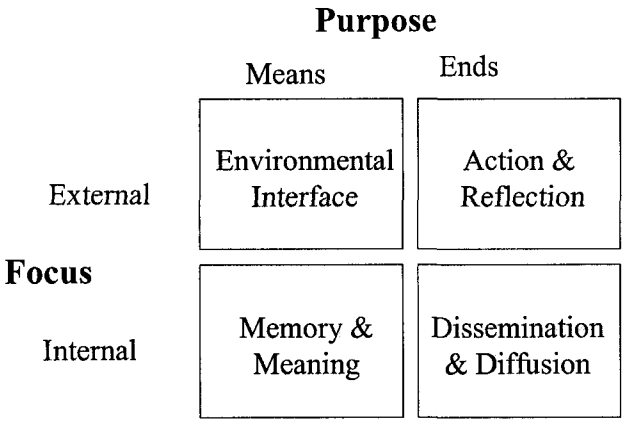
2. The *Action/Reflection* subsystem (Parsons: goal attainment) creates valued new information that satisfies the need or goals of the learning system. This can be seen in research, critical thinking, decision-making, and problem-solving processes (Schwandt, 1995).

3. The *Dissemination and Diffusion* subsystem (Parsons: integration learning) transfers information and knowledge within the organization, thereby integrating the learning system. This function is shown through organizational roles, leadership processes, structural manipulations, and communications that enhance the movement of information and knowledge (Schwandt, 1995). For example, a project manager performs that role through informal or formal communication of the organization. In addition, the project manager disseminates knowledge through project management tools and behaviors that encourage the sharing and learning processes. The project manager's role is to perform the learning functions of the Schwandt model (1994, 1995, 1997; Schwandt & Marquardt, 2000) as measured by the Organizational Learning Survey (Johnson, 2000); this helps the team to integrate, adapt, and attain goals with pattern maintenance seen in project memory.

4. The *Meaning and Memory* subsystem (Parsons: latency learning) is the fundamental source of tension that gives rise to learning and action. It stores the

sensemaking controls and is manifested in policy and procedures, symbols, values, beliefs and artifacts, and the cultural components of the organization that gives meaning and provides memory and experience for interpretation (Walsh & Ungson, 1991; Daft & Huber, 1987).

Figure 7. Schwandt's learning subsystems.



Note. From "Learning as an Organization: A Journey into Chaos," by D. Schwandt, 1995, in *Learning Organizations*, Portland, OR: Productivity Press, p. 370.

Like Parsons' (1951) functional prerequisites, Schwandt's (1995) four learning subsystems are interdependent. The arrows in Figure 8 show the relationship between the effects of the subsystems. Parsons (1968) called these "media of interchange." Likewise, Schwandt & Marquardt (2000) defined these as *media of exchange* or of interchange (p. 67). In the Dissemination and Diffusion subsystem, for example, one sees the functions of the project manager in organizing the work, providing leadership, and creating the movement of knowledge that supports the learning and deployment of project goals. These processes and procedures are often performed through invisible networks of the

project manager's relationships, tools, and managerial processes to support the performance and learning goals of the project team. Four general media of exchange are defined.

1. *New information* is the output of the Environmental Interface (adaptation learning) subsystem. This subsystem's function is adaptation, through which new information comes into and leaves the system. The system must continuously adapt to allow new information to enter. The learning system accesses new information from the external environment and from within the organization: for example, receiving the customer's "care-abouts," customer bids, or new business (Schwandt & Marquardt, 2000, p. 68).

2. Goal-referenced knowledge is the output of the Action/Reflection subsystem. In this subsystem are two sets of goals: (1) goals associated with action for the organization's performance system, and (2) goals associated with the organization's learning system (Schwandt, 1997). Both of these goals, performance and learning, contribute to the organization's ability to survive. This function transforms information into valued knowledge: for example, sharing lessons learned, benchmarking activities, and reflecting on lessons learned. Schwandt made a distinction between performance and learning and provided models for each. For purposes of the present study, the focus is on the learning system and production of knowledge (Schwandt & Marquardt, 2000, p.70).

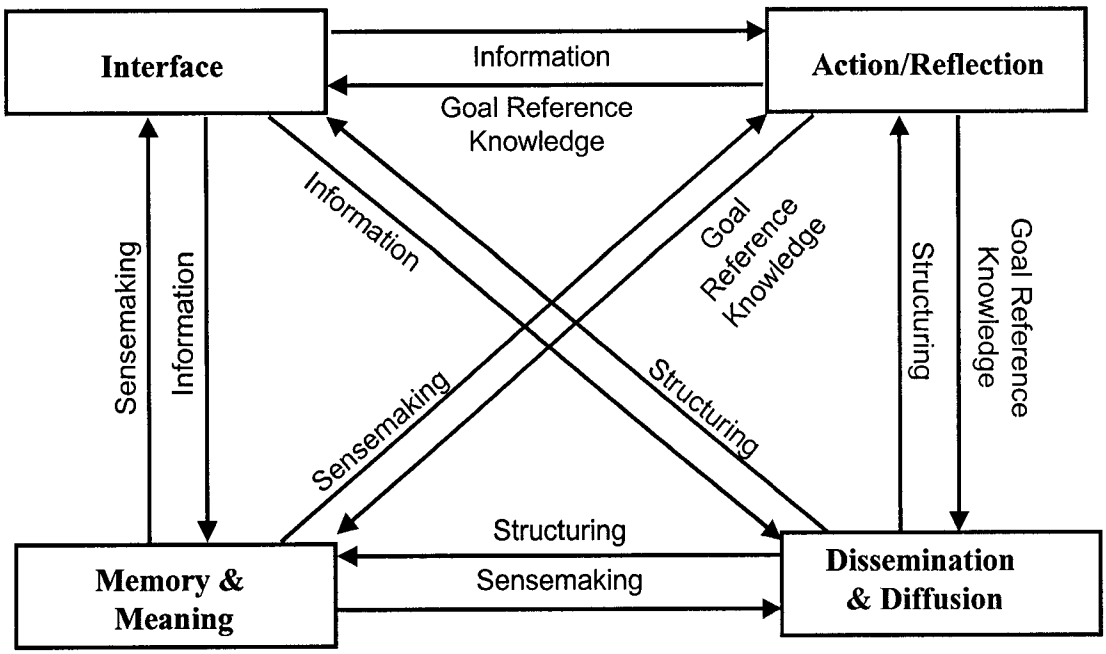
3. *Structuring* is an output of the Dissemination/Diffusion subsystem. The dynamic structuring system allows the other three subsystems to integrate their functions. Structuring provides connection within the total system and facilitates the learning of the

collective (Schwandt, 1997). The integration of organizational structures, information technology, roles, policies, procedures, methods, and processes are all aspects of dynamic structuration (Schwandt & Marquardt, 2000, p. 71). The project manager's role in Dissemination and Diffusion (integration learning) facilitates structuration and is the focus of this study.

4. *Sensemaking* is the output of the Meaning and Memory subsystem. Sensemaking carries out the function of pattern maintenance, which is evident in symbols, language, values, and histories stored in organizational memory (Schwandt & Marquardt, 2000, p. 72).

Language, symbols, schemata, and scripts are produced in organizational memory and meaning for interpretation and organizational learning (Schwandt, 1995, p. 373).

Figure 8. Schwandt's Organizational Learning Model.



Note. From "Learning as an Organization: A Journey into Chaos," by D. Schwandt, 1995, in *Learning Organizations*, Portland, OR: Productivity Press, p. 372.

The Dissemination and Diffusion (integration learning) function provides structure for adaptation, meaning making, and action (learning). The project manager's role in this aspect of learning and in performance of this function is the dynamical focus and the second construct of the present study.

The Project Manager's Role

The second construct of this study is the role of the project manager. This is reviewed from the perspectives of two lines of literature: structuration and role theory. With regards to role theory, as project managers' structure their actions and experiences. The project manager draws from what they know about the rules and resources that have constituted their actions so far. There is flexibility in the system due to the dynamic and non-linear nature of the organization, and exacting results do not always occur. This is also due to the organization's management as a natural and open system (Scott, 1992). The same set of conditions does not appear each time. Every situation takes a different form and shape, adding complexity (Gleick, 1987). Accordingly, structuration is pertinent to understanding the project manager's role.

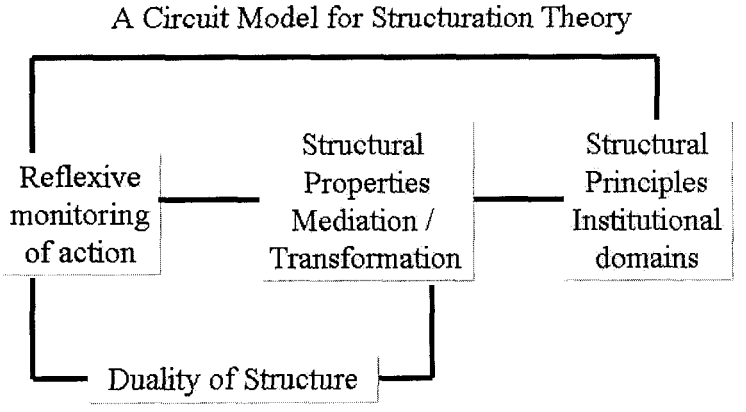
The project manager's role lies primarily within the integration function of Parsons' (1953) theory and within the Dissemination and Diffusion (integration learning) function of Schwandt's learning model (1995, 1997; Schwandt & Marquardt, 2000). A project manager is both a product and a part of this integrating functional prerequisite because the role requires connection to all the other functions. Therefore, the project

manager produces and is produced by the organizing structures and norms of the organization.

Structuration Theory

All social and organizational life is a series of interacting and dynamic or conflicting structures. Giddens (1984) suggested that people interact with structures and that; in this interaction, changes and negotiations take place. This is shown in his model of structuration theory, shown in Figure 9.

Figure 9. Dimensions of the duality of structure.



Note. From *The Constitution of Society: Outline of the Theory of Structuration*, by A. Giddens, 1984, Cambridge: Polity Press, p. 214.

This model suggests that actions are affected by both reaction and the flows and barriers of social intercourse in a constant altering dynamic environment. Giddens (1984) provided three concepts that should be considered in thinking about structuration (p. 214): (1) social integration—how people interact on a person-to-person basis; (2) structural integration—how people interact as parts of structures across space and

time; and (3) actions—including unacknowledged conditions and unintended consequences.

Application of Structuration Theory

Ranson et al. (1980) used Giddens' (1984) theory to argue that structures are continually reproduced and recreated by organizational members so that the structures embody meaning. For example, the interaction of people and technology structure and restructure the data entry function employed in information systems, transforming them into different organizing structures over time.

For example, keypunchers in the 1960s recorded computer instructions and data onto 80-column punch cards using a keypunch machine. Theirs was the first station in the tabulating process. Then the cards were put into a card verifier. Because the cost of operating the mainframe computer was so high, the information was verified and differences were resolved before the cards were submitted for computer processing. A card-sorting machine was then used to create subtotals. The cards were sorted, column-by-column, into alphanumeric sequences. This was the final stage of the three-stage tabulating process. The job was tedious and boring, with little chance for advancement. As businesses grew, tabulation processes became a bottleneck and were moved to their own data-processing centers. With the development of the personal computer and improved technology, the keypunch job changed and required more skilled workers, who had not only typing skills but also computer skills. Today, the job is called a "data entry operator." Such operators are required to handle all coding or verification procedures. In addition, they need to know code types and numbers, source document types, and data

entry procedures of various applications. Thus, as the technology became easy to use, structuring changed the keypunch job to a data entry position that requires more skill.

Each industry has multiple examples of structuration. Architects have moved from hand-drawn building plans to complex three-dimensional computer models. In the medical field, Barley's (1990) study on the introduction of new radiology equipment (CT scanners) in two hospital settings, with different cultures and results, also illustrated structuration theory.

These examples highlight the intervening variable of technology. However, according to Giddens (1984), organizational structure is also demonstrated by the behavior of the employees in an organization. For example, when employees adhere to hierarchical norms and rules of authority, structure exists. It exists only in conjunction with the people who act out its reality. For Giddens (1984), structure is a virtual existence, and "the totality of acts by the people reproduces or transforms the structure" (Orlikowski, 1988, p. 50). Employees do not enact structure in a vacuum; they build upon structural properties created by previous human action that, in turn, defines and shapes individual actions to a new evolving structure. Rose (1998) went on to note that

> [as] human actors communicate they draw on interpretative schemes to help make sense of interactions; at the same time those interactions reproduce and modify those interpretative schemes which are embedded in social structure as meaning or signification. Similarly the facility to allocate resources is enacted in the wielding of power, and produces and reproduces social structures of domination,

and moral codes (norms) help determine what can be sanctioned in human interaction, which iteratively produces structures of legitimation. (p. 4)

An example of structuration applied in this study considers the project manager and how that role is responsible for effective use of people involved with the project, as measured by the resource management process of the PMI Process (1996, 2000).

Table 2

Structural Analysis Example: Project Human Resource Management

	Meaning	**Power Structure**	**Norms**
Context	Project manager is responsible for effective use of people involved in the project. Project team members and stakeholders can be passive recipients.	Project manager is quite autonomous despite nominal hierarchical, even matrix mgmt. project structure. Project team members have no power.	Project manager plans, executes, controls, and closes the project. Work assignment is under pressure with deadlines increasing upon the team members.
PM Role	Project manager utilizes delegating, motivating, and mentoring behaviors as ways to deal with project team members.	Project manager can force team development, conflict management, and motivating behavioral skills to manage the team. Often difficult to get the project team to play its role and resolve conflict if members don't desire.	Project manager reinforces the status quo. Team members suspect potential benefits of management practices, but no one really knows how this will work for them.
Action	**Communication**	**Use of Power**	**Sanctions**
	One-way communication: from the project manager to the project team.	Project manager protects own interest. However, may also use authority to get project team to utilize new management practices.	One-way sanctions against the project manager undermined by multiple projects and multiple team members that the project manager is managing.

Note. Format of Table From *The Constitution of Society: Outline of the Theory of Structuration*, by A. Giddens, 1984, Cambridge: Polity Press, p. 29 with application of

PMI (1996, 2000) designed by the researcher to demonstrate integration of Giddens' structuration (1984) and PMI (1996, 2000) methodology.

In summary, roles are evidence of structuration theory. The rules, goals, and beliefs create the opportunity to play the role and adapt it to a given situation. The structure provides the mechanism of the role to be enacted. This holds true for the project manager's role. In performing the role, the project manager relies upon personal experiences, training and education, and culture of the organization that requires a project manager to perform in a given manner. Structure influences the project manager's role. Thus, "structuring can assume multiple contextual forms of varying complexity within the organization" (Hinds, 1995, p. 39). The contextual role of the project manager is further understood through the application of role theory.

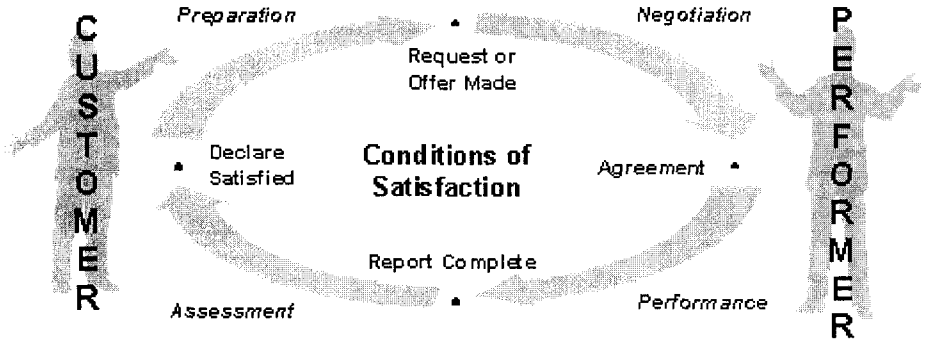
Role Theory

Role definition and expectations are fundamental to the interpretation and understanding of a person's organizational position and function. Foster and Flynn (1984) defined roles as task descriptors, structure, and performance. Handy (1993) segmented role theory into issues involving three concepts: (1) role sets, (2) role definitions and expectations, and (3) conflict and role ambiguity (p. 92). Handy (1993) defined a *role set* as "the people with whom the focal person interacts" (p. 92).

Jacques (1990) suggested that "roles are not separate social entities but part of role relationships" (p. 24). This relationship between roles is seen as an integral part of the definition of the role itself. Relationships provide "the setting, the social context,

including both boundaries and direction within which those in the relationship will constrain or limit their idiosyncratic behaviors so that a mutually adaptive interaction may occur. In general, a role may be defined as a knot in a social net of role relationships" (Jacques, 1990, p. 25). The project manager's role is in a dynamic balance of meeting customer expectations, project deliverables, management's expectations, and project team members' needs. Figure 10 depicts the project manager's role relationships with the customer.

Figure 10. Interdependencies of roles.



Note. From *Organizational Structuration: Interaction and Interrelation*, by G. B. Harris and S. T. Steven, 1998, paper presented to the 14th EGOS Colloquium, p. 12.

Biddle (1979) defined roles as occurring in a context and limited by contextual specifications: "some roles are defined contextually; others are limited in their applicability by contextual boundaries" (p. 58). An appropriate behavior in a certain context may not be appropriate in another.

Current interpretations of role theory recognize its importance in explaining patterns of social interaction and integration, its influence on self and identity, and its usefulness as an integrative model of behavior. Biddle (1979) argued that the social exchange that occurs between two or more people demonstrates certain patterns that are determined to a large extent by the role expectation and actual roles that each adopts. Expectations may be overtly stated with demands for and assessments of specific behaviors that are written formally, or they may take the form of covertly held prescriptive norms, descriptive beliefs, and priorities.

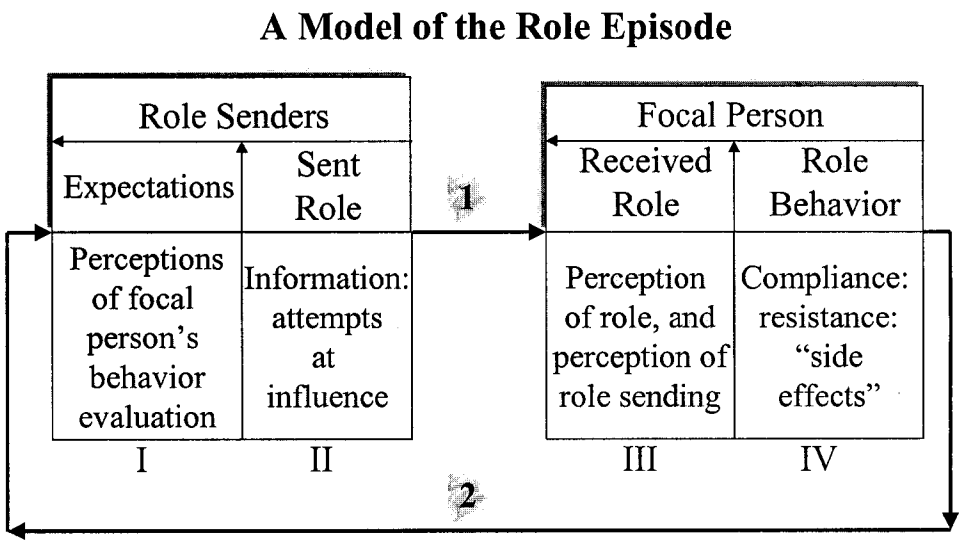
Harris and Steven (1998) defined a role as the constellation of (often reciprocal) commitments and expectations that are held by and about an agent; they explained that those roles are created, maintained, modified, and dissolved through conversational interaction. An agent, acting in a role, is enabled and constrained by authority and dependencies on allocations of resources and rewards, as well as by a complex experiential background of social, legal, institutional, and professional commitments and expectations (Harris & Steven, 1998).

Ashforth (2001) suggested that role identities are role-based personas complete with goals, values, beliefs, norms, interaction styles, and time horizons. He further noted that the more these features are tightly coupled and the more widely they are understood, the stronger the identity is said to be.

Brown (1986), Champoux (1996), and Katz and Kahn (1964) all have seen the term "role" as a central unit of analysis in sociology and social psychology. Broderick's (1999) research explained that current interpretations of role theory have retained an

interdisciplinary aspect, recognizing its importance in "explaining patterns of social interaction and integration, its influence on self and identity, and its usefulness as an integrative model of behavior" (p. 118). Gabriel, Fineman, and Sims (2000) described role as what can be visualized for oneself as a member of a "role set"—a number of significant people who influence how one should behave. Katz and Kahn (1966) provided a model of role identity and performance.

Figure 11. A model of the role episode.



Note. From *The Social Psychology of Organizations*, by D. Katz and R. L. Kahn, 1966, New York: John Wiley, p. 182.

Role expectations are evaluative standards applied to the behaviors of any person within an organization or position. *Sent role* consists of communication stemming from role expectations and is sent by the members of a role set in an attempt to influence the

focal person. *Received role* is the focal person's perception of the role-sending addressed to him, including those that the person "sends" to him- or herself. Finally, *role behavior* is the response of the focal person to the information and influences received.

> These four concepts can be thought as creating a sequence or role episode. The first two, "role expectation" and "sent role," have to do with motivation, cognition, and behavior of the members of the role set [the project manager performs]; the latter two, "received role" and "behavior," have to do with cognition, motivation and behavior of the focal person [the project team performs]. (Katz & Kahn, 1966, p. 182)

Boxes I and III of the model in Figure 11 represent processes of perception, cognition, and motivation internal to the person. Boxes II and IV represent behaviors, acts undertaken in expression of cognitive and motivational processes viewed as role sending. Arrow 1 represents the process of role-sending, and arrow 2 represents a feedback loop.

In summary, the focal person's perception of the messages sent by the role set is the received role, and role behavior is what the "focal person does in response (a) to the messages received and (b) the internal perception of the role" (Rodham, 2000, p. 72). Parsons, Bales, and Shils (1953) suggested that roles are needed for interactions to be stable. For roles and actions to have meaning, they must share rules. For Parsons, Bales, and Shils (1953), the role is the normative component that governs the participation of the individual in a given collective, the integrative function of a cybernetic hierarchy. Accordingly, the project manager's role not only integrates team functions but also links

individual, team, and organizational learning and performance. This linkage is needed for project managers to perform their job functions. In addition, Cavaleri, & Fearon (2000) suggested that the project manager's role set must interact with at least three primary groups of role senders: superiors, customers, and other members of the customer-interfacing team. Holt (2000) identified these customer-interfacing team members as typically representing different functions in the organization.

Application of Role Theory

The project manager has responsibility and should have authority for the project, contract direction, and control (Termini, 1999). The project responsibility is also shared with project sponsors and often with functional managers within the organization. Project managers are responsible for each contract's end item (i.e., knowing what needs doing, by whom, when, and the required resources by cost element and/or cost code). Cioffi (2002) described project managers as exercising judgment both in using tools and working with people in what he termed "management spirit" (e.g., sharing information, integrity) and "mechanics" (e.g., work breakdown structure, earned-value analysis) (p. 4).

Complexity of the Project Manager Role

Project managers are the essential element for project success (Brown & Eisenhardt, 1995; McDonough, 1993). Current understanding of the role of the project manager has developed over the past 50 years in response to the growing use of project structures in high technology (e.g., NASA, nuclear submarines) and information technology. Kerzner (1984) described the ideal project manager as someone who "probably would have doctorates in engineering, business and psychology, and

experience with 10 companies in a variety of project office positions, and would be about 25 years old" (p. 162). Kerzner's comment demonstrates the complexity of the scope and responsibility of the project manager.

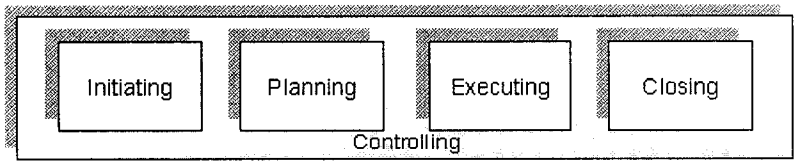
Puccinelli (1999) described a good project manager as a communicator, a manager, and an innovator who is technically competent and well respected in the organization. Furthermore, a project manager must be an organized administrator who works well under pressure—but most of all, he or she must be a leader.

Operationalizing the Role through the PMBOK Process

For purposes of this study, the Project Management Body of Knowledge (PMBOK) (1996, 2000) is used to operationalize the role of the project manager. A good portion of literature has been written about the complexity of the role of the project manager (Kerzner, 1984; Puccinelli, 1999; Termini, 1999)—therefore, the structure surrounding the project manager's role must be reviewed for an understanding of the structure and processes that must be accomplished prior to understanding the project manager's norms, behaviors, and tools. Drawing upon the professional database of project management, a brief overview of the PMBOK (1996, 2000) highlights the complexity of the role.

While no two projects are the same, all projects should progress through five key activities: *initiation, planning, execution, and closing* a project (PMI, 2000, p. 28).

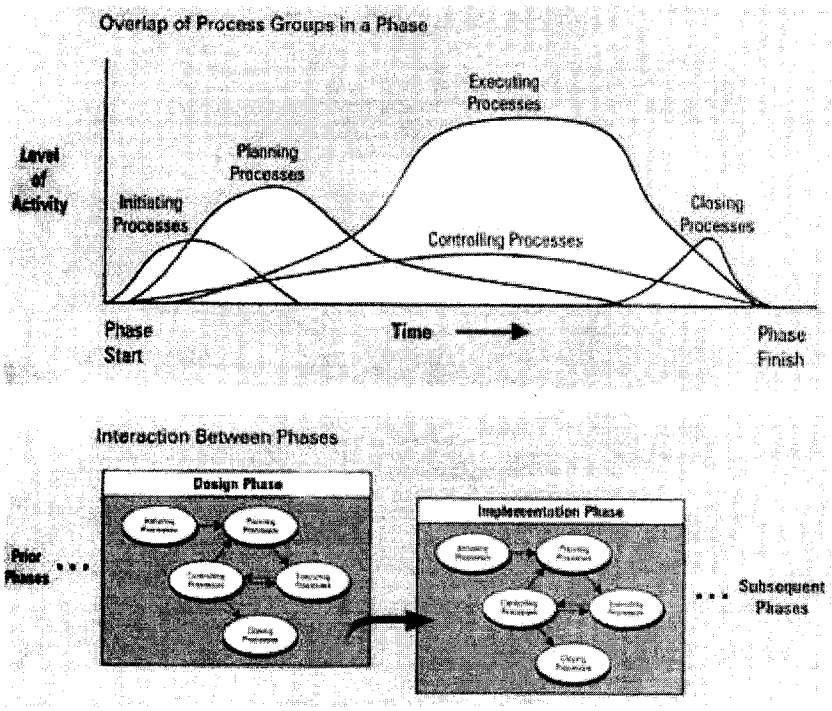
Figure 12. PMBOK project management lifecycle processes.



Note. From PMI (2000). A Guide to Project Management Body of Knowledge. Upper Darby, PA, Project Management Institute (USA), p. 28.

The *controlling* function occurs throughout the project to meet the triple constraints of the project.

Figure 13. PMBOK overlap of a process group.



Note. From *PMBOK Guide*, by the Project Management Institute (PMI) Standards Committee, 1996, Upper Darby, PA: Project Management Institute, p. 29.

The major process steps of the project manager are listed below.

Initiating Processes—"Recognizing that a project or phase should begin and committing to do so" (PMI, 1996, p. 28). Project sponsors are identify potential resources and team members. At the conclusion of project Initiation, a decision is made either to halt the project or to proceed to project Planning (PMI, 1996).

Planning Processes—"Devising and maintaining a workable scheme to accomplish the business need that the project was undertaken to address" (PMI, 1996, p. 28). As shown in Figure 13, project planning builds on the work accomplished in project initiation. Project deliverables are added such as change control, acceptance management and project transition. The initial list of project risks is augmented and detailed risk mitigation plans are developed. Upon completion, a decision will be made to commit the resources necessary for project execution (PMI, 1996, 2000).

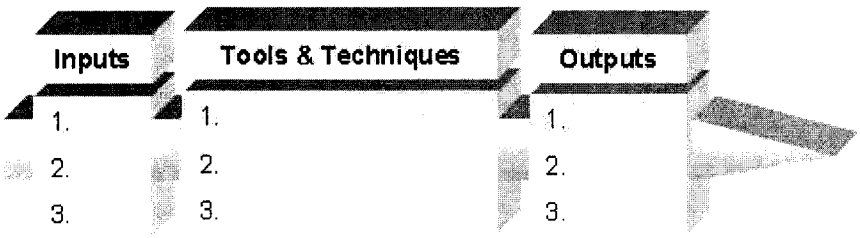
Executing Processes—"Coordinating people and other resources to carry out the plan" (PMI, 1996, p. 28). The primary task of the project manager is to enable the project team to execute the project plan.

Controlling Processes—"Ensuring that project objectives are met by monitoring and measuring progress and taking corrective action when necessary" (PMI, 1996, p. 28). The project manager uses the project plan components for the implementation. The facilitating processes are scope change control, schedule control, risk response control, cost control and quality control (PMI, 1996, 2000).

Closing Processes—"Formalizing acceptance of the project or phase and bringing it to an orderly end" (PMI, 1996, p. 28). The project team closes out the project and solicits feedback from customers, Project Team members, and other stakeholders. Lesson learned databases and best practices are documented to ensure the learning cycle of the project team.

In addition to the project processes, there are nine "facilitating management processes" the project manager must utilize across the five processes of a project (PMI, 1996, p. 31). Each process of the project has specific processes, inputs, tools and techniques and output to accomplish the tasks of the project as illustrated in Figure 13. Figure 14 is drawn from the PMI references (1996, 2000) and is a critical part of each process.

Figure 14. PMBOK Process Infrastructure



Note. From *PMBOK Guide*, by the Project Management Institute (PMI) Standards Committee, 1996, Upper Darby, PA: Project Management Institute, p. 29.

Integration analysis.

"Integration Management includes the process required to ensure various elements of the project are properly coordinated" (PMI, 1996, p. 39). The input of this step uses the output of other planning processes and historical information; new

knowledge, such as constraints and assumptions, and organizational policies provide a coherent document for project execution and control. The output of this analysis is a project plan with supporting details. Project plan *execution* and an integration change *control* system to manage change as it occurs are also critical elements of integration analysis with their own outputs (PMI, 1996, p. 41).

Scope analysis.

"Project Scope includes the processes required to ensure the project includes all the required, and only the work required, to complete the project successfully" (PMI, 1996, p. 47). The primary activity performed in this process is the defining of the project and particularly what is not the project. Project *initiation* occurs as shown in Figure 12 (PMI, 1996, p. 48). The outputs of this process are a work breakdown structure (WBS), project charter, and project manager identified to manage the process. Scope change control processes are in place to manage the scope change, corrective action, and adjusted baseline. Next, scope planning, scope definition, scope verification, and scope change control are processes occurring within scope management. Key drivers of the project *initiation* process are the market demand, business need, customer requests, and new technological advances.

Time analysis.

"Project Time Management includes the processes required to ensure timely completion of the project" (PMI, 1996, p. 59). Key processes at this phase are activity definition, activity sequencing, activity duration estimating, schedule development, and schedule control. The inputs to this process include resource requirements, resource

capabilities, identified tasks, calendars, leads and lags, and a risk management plan. The outputs of this process are activity duration estimates, activity list updates, project schedule, and a time baseline (PMI, 2000, p. 70). Project *planning* occurs as shown in Figure 12 (PMI, 1996, 2000).

Cost analysis.

"Project Cost Management includes the processes required to ensure that the project is completed within project" (PMI, 1996, p. 73). Major processes include resource planning required to perform WBS line items, the cost of those resources, cost budgeting, and cost control. The outputs of this process are resource requirements, cost estimates, cost baseline, earned value management, and other performance measures (PMI, 1996, 2000).

Quality analysis.

"Project Quality Management includes the processes required to ensure that the project will satisfy the needs for which it was undertaken" (PMI, 1996, p. 83). This includes all the activities to determine the quality policy, quality assurance, and quality control (PMI, 2000). The inputs of this process are a quality policy, scope statement, standards and regulations, operational definition, and work results (PMI, 1996, 2000). The outputs of this major process are quality management plans, checklists, acceptance decisions, and quality improvement ideas (PMI, 1996, 2000). Quality analysis is performed in the *execution* and *controlling* processes of the project shown in Figure 12.

Human resources analysis.

"A subset of project management...includes the processes required to make the most effective use of the people involved with the project. It consists of organizational planning, staff acquisition, and team development" (PMI, 1996, p. 167). The key processes are organizational planning, staff acquisition, and team development. Inputs to this process are staffing requirements and enhancement of the ability of stakeholders (such as sponsors, customers, and individual contributors) to participate as part of a whole system focusing on the customer's needs. The outputs of this process are role and responsibility assignments, organizational charts, project team directories, and input to performance appraisals (PMI, 1996, p. 94). Human resource analysis is performed at the *planning* and *execution* processes of the project shown in Figure 12. Management styles such as matrix, autocratic, laissez-faire, and democratic styles are employed within the project teams.

Communications.

"Project Communication Management includes the processes required to ensure timely and appropriate generation, collection, dissemination, storage and ultimate disposition of project information. It is the link of critical skills, people, and ideas necessary to be successful" (PMI, 1996, p. 103). Major processes are communication planning to determine the needs of the stakeholders, information distribution by making sure the information is available in a timely manner, performance reporting of how the project is being achieved, and administrative closure facilitating the closure of the project and getting the sponsor or customer to sign off (PMI, 1996, 2000). Inputs to this process

are communication technology, project plans, and performance measures to name a few. Outputs of this process are project records, project presentations, performance reports, change requests, and project archives (PMI, 1996, 2000). Communication analysis is performed in the *planning*, the distribution of information in the *execution* phase, performance reporting in the *controlling* phase, and administrative closure in the *closing* of the project, as shown in Figure 12.

Risk analysis.

"Project Risk Management includes the processes concerned with identifying, analyzing, and responding to project risk" (PMI, 1996, p. 111). Major processes are risk identification, risk quantification, risk response development, and risk response control (PMI, 1996, 2000). Inputs to project risk management are product description, historical information, stakeholder risk tolerances, and sources of risk, cost estimates, and activity duration estimations. This is performed during the *planning* phase of the project. The outputs of this process are risk symptoms and potential risk events that require monitoring and control performed in the *controlling* phase of the project (PMI, 1996, 2000).

Procurement.

The final major process is project procurement management, which "includes the processes required to acquire goods and services from outside the performing organization" (PMI, 1996, p. 123). Key processes that are procurement planning, solicitation planning, solicitation, source selection, contract administration, and contract

closeout. Procurement processes are performed through the *planning*, *execution*, and *closing* of the project, as shown in Figure 12.

Project Manager Role Summary

The role of the project manager in *executing* the processes of a project includes crossing organizational boundaries, customer interface, partnering with vendors and suppliers, and the internal organizational dynamics of executing the project. Role theory provides a basis for studying the project manager and the interactive features of that role, as a service provider to the customer with a focus on performance and the ability to promote the interpersonal dimension of providing quality service (PMI, 1996, 2000). Brown and Eisenhardt (1995) suggested a focus on role consistency and a framework for dealing with the uncertainty and evolution of long-term service relationships that can occur during a project's life cycle and the development of the project team. In project management language, this is called *partnering*. Partnering focuses on "how" people are going to collaboratively do business together, and not just "what" they are doing (Busch, 2003).

Project Manager Competencies

The project manager's competency plays an instrumental role in the project processes. St. Germain (1997), director of the Center of Project Excellence at Harvard, provided a model of project manager competencies (p. 34), provided in Figure 15.

Figure 15 further illustrates the complexity of the project manager role. These seventeen competencies show the diverse nature of the project manager's role and the opportunity for role conflict and ambiguity.

Figure 15. Project manager competencies.

Competency	Entry Level	Mid Level	Senior Level
Leadership		Good	Mastery
Developing Staff		Good	Mastery
Motivation Skills		Good	Mastery
Foster Creativity		Good	Mastery
Conflict Resolution		Good	Mastery
Networking		Good	Mastery
Project Mgmt Tools	Some	Excellent	Mastery
Change Management	Some	Excellent	Mastery
General Bus Skills	Some	Excellent	Mastery
Negotiating	Some	Excellent	Mastery
Communicating	Some	Excellent	Mastery
Relationship Mgmt	Some	Excellent	Mastery
Active Listening	Some	Excellent	Mastery
Analysis & Research	Some	Excellent	Mastery
Presentation Skills	Some	Excellent	Mastery
Teamwork	Some	Excellent	Mastery
Diversity & Ethics	Some	Excellent	Mastery

Note. From "Humanizing Project Management: A Revolution in Progress," by R. St. Germain, 1997, *Information Strategy,* (13), p. 34.

Role conflict.

Singh and Rhoads's (1991) work defined the boundary-spanning (or agent) role in business-to-business organization as those people who operate at the periphery of an organization, such as the project manager. Organ (1971) argued that these roles are strategically important as "linking pins" because it is through their behavior that the organization adapts (or fails to adapt) to changes in the environment.

Troyer, Mueller, and Osinsky (2000) suggested that the "complexity of the role places the project manager in a unique position of answering to multiple bosses,

including organizational functional managers and customers" (p. 406). These multiple bosses may contribute to role conflict. This is another aspect of structuration, where the project dynamics interact with the organizational hierarchy and multiple bosses. This is one of the challenges of social theory. The structures can become outdated or cross organizational boundaries, thus giving rise to potential role conflict. Giddens (1979) described it as one of the "contradictions or dysfunctions of the structural principles of system organizations" (p. 131). In addition, the structure of the project manager not only involves discrete acts but also "must relate to a continuous flow of conduct" (Giddens, 1979, p. 55) that can disconnect the perceived role from the sent role (Biddle, 1979). Biddle (1979) saw roles as occurring in a context and limited by contextual specifications: "some roles are defined contextually; others are limited in their applicability by contextual boundaries" (p. 58). An appropriate behavior in a certain context may not be appropriate in another. The interaction between the structures and behaviors continually produces new "communicative encounters" (Giddens, 1979, p. 83) that must be resolved. Cunningham and Turnbull (1982) called this personal contact the means by which inter-company relationships are established and maintained.

Lord's (1989) research looked at the role of the project manager among defense contractors and engineers in the United Kingdom. Project managers were found to occupy four basic roles: team leader, strategic leader, client interface, and project champion. Contrary to the impression given in the project management literature, Lord (1989) suggested that the direction of a distinct project team was largely limited to directing subordinates, who actually managed functional teams semi-autonomously.

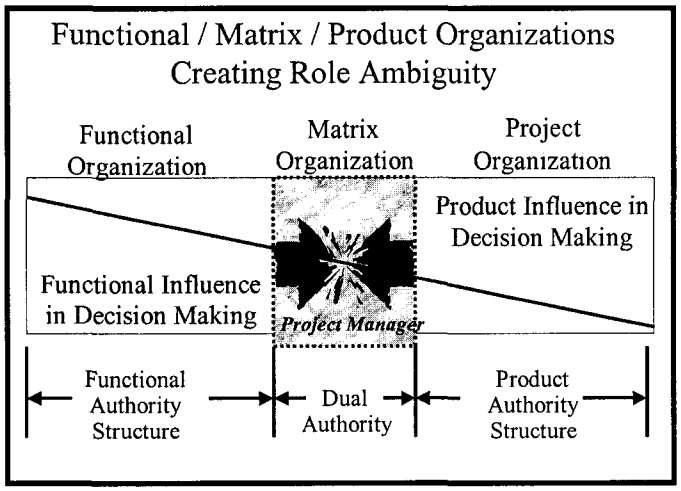
Project managers were at least as concerned with formulating strategy, management reporting, and negotiating with project stakeholders—a role akin to general management, albeit on a contract-specific scale. Lord's research also demonstrated that when roles are not clearly assigned, cost escalations occur, and the scope of the project can expand out of control. Role conflicts of the project manager become more acute with the increasing pace of competition and resource constraints.

Project managers can experience both externally driven conflicts and internally driven conflicts. Short product life cycles increase the pressure to meet customer demands (Floyd & Lane, 2000). Further, the project manager may not have clear authority, especially in matrix organizations, or authority may be impinged upon by internal organizational authority structures. Ford and Randolph (1992) summarized the most common authority conflicts as those between functional and project managers over project priorities, administrative procedures, technical perfection versus performance trade-offs, personnel resources, cost estimates, scheduling, and personalities. Over time, a project manager risks becoming increasingly isolated from a technical foundation. This isolation can lead to a loss of technical skills that initially identified that person as a logical choice for gaining the necessary credibility with top management, functional managers, and team members in order to lead a project team effectively (Ford & Randolph, 1992).

Figure 16 illustrates how the project manager is often plagued with multiple reporting structures (matrices) and with internal and external influences on the performance of the role. The shaded region shows where the functional management

decision-making processes influence half of the job, while the project side of the job must answer to the product management. Role ambiguity occurs when clear boundaries are not well established; customers require more authority than internal management has given, and different viewpoints of the role converge from the different management structures (Ford & Randolph, 1992).

Figure 16. Project manager's dual authority.



Note. From "Toward a Core Topology of Service Organizations," by P. K. Mills and N. Margulies, 1980, *Academy of Management Review, 5*(2), p. 259.

Role ambiguity.

Beard's (1999) research on the antecedents of role ambiguity indicated that individuals who must interact extensively with others (such as a project manager dealing with top management, the customer, and project team) and who perform "boundary-spanning roles" are susceptible to role ambiguity. Both customer and project managers are equally susceptible to the negative organizational and personal consequences

associated with role ambiguity. Using an ad agency example, Mills and Margulies (1980) provided a rationale for expecting relationships between client-role ambiguity and client satisfaction. The ad agency, as a complex "task interactive" service organization, requires extensive client participation in the production of the ad agency service. This collaboration generates role ambiguity not unlike that of a project manager interacting with a customer. Also, Holt (2000) explored the role of global account manager and how, like the project manager, someone in that role must manage global business-to-business relationships while augmenting the complexity of the internal and external networks, which are often boundary roles that the project manager must manage. Troyer, Mueller, and Osinsky (2000) concurred with the idea that conflict can arise because the customer work (i.e., project tasks) involves contact with both the organization and the customer. This is evident in closing a transaction, offering post-transaction problem solving, or securing technical support throughout a project. Heiss (1990) noted that difficulties arise not only from competing expectations (i.e., role conflict) but also from lack of adequate resources and time to perform or to enact the role required by the customer.

March and Olsen (1976) supported this point in their studies of external demands on organizational participants. Project management decision processes depend on people, problems, environment, and customer and organizational pressures, all demanding attention. In the traditional work structures, two organizing principles govern: (1) authority should equal responsibility, and (2) every subordinate should be assigned a single boss. In projects, however, matrix management is used, which violates both of

these principles (Lewis, Welsh, Dehler, & Green, 2002), creating problems for organizations and individual members alike (Barker, Tjosvold, & Andrews, 1988).

Project Manager's Variables

This study draws from organizational learning literature, project management research, empirical studies, structuration, and role theory as well as a variety of industrial applications of the project manager's role. Consequently, the complexity of the issues creates a large variety of interacting elements with a wide range of variables. For purposes of this exploratory study, the focus is on three discrete variables that occur throughout the project literature: (1) *norms* associated with the project manager's role; (2) *behaviors* of communication, coordination, collaboration, and leadership, and (3) *tools* utilized by the project manager to communicate learning within the project team.

Norms

There are various project management approaches, each with their own set of norms. Busch and Milosevic (1999) suggested a spectrum of project management approaches that affect the role of the project manager. At one end of the spectrum is the "ad hoc" approach: temporary, improvisational policies and procedures to deal with specific projects (Busch & Milosevic, 1999). In each new project, following the ad hoc approach, the project manager must hastily reinvent the wheel by setting up the policies and procedures that are concerned with only that one specific project. This management approach is impromptu and spontaneous. When "ad-hocracy" takes root in a company in preference to standardization, the company may fall behind its competitors (Hammer & Champy, 1993) due to ineffectiveness and waste. The roles of norms in "ad-hocracy"

derive from these phenomena: fear from the authority issuing the norm, a sense of duty, or constraints on behavior (Verhagen, 2001).

As a firm develops standards for project management and moves along Busch and Milosevic's (1996) spectrum, projects increasingly follow specific guidelines and procedures. At the more structured end of the spectrum, the project manager may enroll in certification programs as those offered through PMI [Project Management Institute] that provides training to create metrics, understand the organizational cultures, and improve management methods while providing professional certifications. At this end of the spectrum, the project manager works in an environment where there is organizational strategic alignment of each project. Project managers are part of the overall company's strategy, employing corporation-wide project management processes throughout the organization.

As companies become more mature in strategic placement of project management (Hansen & von Oetinger, 2001), they view it as an enterprise system. Here, the project manager is seen as an integrator of project management systems implemented enterprise-wide to generate the next level of knowledge management. Hansen and von Oetinger (2001) cited British Petroleum as an example of an enterprise system where the project manager's role is to continually fine-tune the tension between the manager's horizontal and vertical roles to aid learning and performance.

In summary, reasons for accepting project manager's norms are as follows (Verhagen, 2001):

- Rules are obeyed since they are agreed upon.

- Proper social norms are obeyed since others expect one to obey.
- Moral norms are obeyed because of one's conscience.
- Prudential norms are obeyed because it is the rational thing to do.

Furthermore, Verhagen (2001) noted that the motivational power of all types of project manager's norms depends on the norms' being a subject's reason for action. In other words, the project manager's norms are internalized and are part of being accepted as a project manager.

Behaviors

The second variable in this study is the project manager's behavior. The literature provides an extensive list of functions, behaviors that characterize the successful project manager (Hauschildt, Keim, & Medcof, 2000):

Function 1: "Organizing under conflict"—The abilities to delegate and manage time are linked with conflict tolerance and ability to handle criticism (p. 27).

Function 2: "Experience"—The function includes items directly mentioning experience or years of employment, with knowledge of procedures (p. 27).

Function 3: "Decision making"—This function involves judgment and thinking, including systematic and analytic thinking (p. 27).

Function 4: "Productive creativity"—These items include both idea generation and the ability to carry out those ideas (p. 27).

Function 5: "Organizing with cooperation"—The ability to plan and organize is included here, along with the ability to include others in a positive way through learning, sensitivity, and team orientation (p. 27).

Function 6: "Cooperative leadership"—The ability to motivate others is associated with the ability to cooperate and communicate with others (p. 27).

Function 7: "Integrative thinking"—The ability to think analytically is associated with the ability to attend to the ideas of others and to integrate disparate ideas (p. 27).

The complexity of these functions shows the compounding variables affecting the learning and performance of the project manager. These functions can be directly correlated to the behaviors tested in the project manager section of the Organizational Learning Survey (Johnson, 2000) used in this study.

Biggs (1999) suggested nine behaviors that may improve the success rate of the development project manager:

1. *"Listen carefully"*—Clear input is needed from both management and technical staff. Effective listening can be a difficult skill to acquire (p. 70).

2. *"Communicate clearly"*—Whether discussing strategy with management or discussing application logic, clear and concise communication is a must. Projects often go astray due to miscommunication (p. 70).

3. *"Ask questions"*—Make certain the that project team members understand what others are saying and that they understand the instructions or status updates (p. 70).

4. *"Establish trust"*—The project leader has to gain the trust of many groups in the organization: management, developers, customers, and stakeholders (p. 71).

5. *"Follow-up"*—Successful project managers are highly organized and detail-oriented, and they follow up promptly with the critical elements of the project (p. 71).

6. *"Skill duality"*—Good project leaders need to understand both the business—strategically and tactically—and the technology being used in the project (p. 71).

7. *"Coaching the team"*—Project leaders also have to be great coaches. Motivating others, ensuring accountability, providing productive feedback, and effectively influencing team members are important skills (p. 71).

8. *"Deal effectively with changes"*—As business goals change, the project leader must adjust quickly to their impact and incorporate them into the project plans. A keen eye toward business strategy is also important (p. 71).

9. *"Adjust to technology changes"*—Equally important, project managers need to be certain of the technical choices being made throughout the project cycle (p. 71).

Harrison (1985), Kerzner (1984), and Meredith and Mantel (1995) saw the ideal project manager as having flexibility and adaptability as key characteristics. Other behaviors are leadership, confidence, persuasiveness, effectiveness as a communicator, and ability to integrate—someone with a large scope of personal talents who can balance the technical solutions with time, costs, and human functions. Crossman's (1996) empirical study of the characteristics of successful NASA project managers attempted to relate the success levels of managers, or how the organization rewarded project managers, to the extent to which those managers were participative, inclusive, controlling, and open (interpersonally close) with others.

Four Critical Skills and Behaviors

Throughout the literature on behaviors, four skills recur and are critical in performing the role of project manager: communication, coordination, collaboration, and leadership.

Communication.

Communication across positions and units formed by different job functions is essential to the coordination of project teams. Surveys conducted by the University of Texas at Arlington, in the project management department reported that the highest-ranked skill is good communication (Holder, 2001).

Hatch (1997) described various types of communication. "Vertical communication" is associated with the hierarchy and is part of the social structure. "Lateral communication" within the organization is patterned through repetition. It forms "liaison roles, committees, task forces, and project teams" (p. 167). Mader and Mader (1993) suggested that communication competence depends on the message's being appropriate, effective, logically consistent, "providing sufficient information, and not in violation of the social norms of the people interacting" (p. 398).

PMI (1996, 2000) has a key process step focused on communication. The many dimensions such as written communication, media utilization, presentation techniques, and meeting-management techniques are critical to the project manager. According to PMI, four major processes are covered in communication:

1. "*Communication Planning*"—Determining the information and communication needs of the stakeholders, who needs what information, when will they need it, and how it will be given to them. (PMI, 1996, p. 103).

2." Information Distribution"—Making needed information available to project stakeholders in a timely manner (PMI, 1996, p. 103).

3. "Performance Reporting"—Collecting and disseminating performance information. This includes status reporting, progress measurements and forecasting (PMI, 1996, p. 103).

4." Administrative Closure"—Generating, gathering, and disseminating information to formulate phase or project completion (PMI, 1996, p. 103).

Project communication management methods also include feedback loops, barriers to communication, choice of media to deliver the message, writing, and presentation techniques as well as meeting-management skills. In addition, the project manager must respond to the immediacy of information needed by various stakeholders during the project. Other variables may be dependent on the length of the project and on whether technology will be the same during the entire stage of the project (PMI, 1996, 2000).

Coordination.

Coordination is the backbone of all activities the project manager performs. The project manager depends on skills of coordination to ensure that project team members know their responsibilities and that management, stakeholders, and customers are kept up to date. Malone's (1998) coordination theory presented principles for coordinating the

activities of separate individuals in a project team. In Savage's work (1981) understanding Parsons' theories, "Parsons called it kinship, a form of social organization needed for adaptation" (Savage, 1981, p. 215). Malone (1998) defined *coordination* as the additional information processing performed when multiple, connected actors pursue goals that a single actor pursuing the same goals would not perform. He differentiated between coordination tasks (information-processing tasks performed by more than one actor) and production tasks (those performed to achieve goals). This is particularly critical to the project team, where the project manager sets the project goals, while the individual contributors actually perform the task and achieve the goals of the project.

Collaboration.

The project management literature often describes the need for the project manager to work across organizational boundaries through collaboration. Collaborative project management empowers teams to deliver on time and on budget. Schrage (1990) defined collaboration as an act of shared creation or shared discovery. He explicitly asserted that increased communication cannot substitute for increased collaboration. The role of collaborative creative learning is to provide the "how" and "what" learning objectives to the project team (Schwandt & Marquardt, 2000). Schrage's (1990) research supported the idea that collaboration—not merely the efficient exchange of more and more timely information—is the greater source of created value in an organization. Gorelick (2000) defined collaboration as "interacting to create a shared new or greater understanding about a process, a product or an event" (p. 89) that a team would not have previously possessed or could not have possessed on its own.

The medium of collaboration is people. Real innovation comes from the mix of a social matrix. The cross-functional nature of project teams requires collaboration skills for the accomplishment of the shared goals of the project team. Individual project team members also have to collaborate within different organizations to complete their tasks and deliver in accordance with the project's overall goal.

Leadership.

Leadership, for this exploratory study, is defined as "traits, behavior, influence over people, interaction patterns, role relationships, occupation of administrative position, and perception by others regarding legitimacy of influence" (Yukl, 1989, p. 2). The most common leadership theories include power and influence, trait, behavioral, and situational. Hinds' (1995) research focused on the importance of leadership behaviors to any organization. Kouzes and Posner (1987) described leadership as challenging the process, inspiring a shared vision, enabling others to act, modeling the way, and encouraging the heart. For this study, leadership is viewed as the role of the project manager, even though in a matrix organization that role may be negotiated. In addition, Yukl (1989) described this process as using the power "to influence...attitudes and behaviors of one or more people" (p. 14), such as when a project manager influences others to perform the work to accomplish the project deliverables. Supporting Yukl, the International Project Management Association (1999) defined leadership as

> the act that creates a social system in which both the leader and the led person fulfill a task or solve a problem with a minimum of financial, time, emotional, social inefficiencies or try to do so. It also involved influencing the attitudes and

behavior of individuals or groups to reach certain objectives. The project manager does this through organizing, planning, controlling, and directing resources. Leadership for the project manager is getting others to follow. (p. 45)

Survey Comparisons of the Project Manager's Behaviors

The behaviors of project managers are identified in the Project Management Body of Knowledge (PMBOK, 1996), which cites leading, communicating, negotiating, problem solving, and influencing as being key attributes of project manager behavior. Goodwin (1993) suggested that negotiating skill is the most critical. Anderson and Tucker (1994) recommended strong human relations, leadership, and technical and administrative expertise. Table 3 provides a cross-section of project manager's behaviors.

Table 3

A Cross-Section of Survey Elements of Project Manager Behaviors

ICB: International PMA (1999)	**Australian PMI (2000)**	**University of Sydney (2001)**	**The Project Manager's Toolkit (1988) DeJaager**	**U.S. PMI Association (2000)**
Ability to communicate	Communication	Communication Management	Communication	Communication
Initiative, engagement, enthusiasm, ability to motivate	Teamwork			Helping and Human Service
Ability to get in contact		Quality Management	Client Relations	Impact and influence
Sensibility, self control, ability of value appreciation, readiness for responsibility, integrity	Personnel Management	Human Resource Management	Clarity of Project manager role	Personal Effectiveness Cognitive
Conflict Solving, argumentative culture, fairness	Conflict Management		Stability of Plans & Specifications	
Ability of funding solutions,	Negotiation Skills	Integration and System's	Quality of Project Plans	Achievement and Action

ICB: International PMA (1999)	Australian PMI (2000)	University of Sydney (2001)	The Project Manager's Toolkit (1988) DeJaager	U.S. PMi Association (2000)
holistic thinking		Management	and Schedules	
Leadership Abilities	Leadership		Commitment /Leadership Management Support	Managerial Abilities
		Risk Management Time Mgmt Cost Mgmt		

Note. Adapted from International Project Management Association (1999), Australian Project Management Institute (2000), DeJaager (1988), and Project Management Institute (2001).

Table 3, drawn from a global perspective, demonstrates the behaviors illustrated in this literature review. The PMI survey is quite extensive, covering many questions beyond the scope of this study. From this cross-section, however, several behaviors could be selected for the present study of how those behaviors may contribute to project team learning.

Tools

The tools of the project manager are alphabet soup: GANTT, CPM, ADM, PDM, PERT, and GERT (Cioffi, 2001). GANTT charts began to be used around 1917 in World War I military programs. Designed for display of production control, they were frequently referred to as "bar charts." After World War II, the need for a better system helped lead to general systems theory, a second generation of digital computers, and large, technically demanding programs. Cioffi's (2001) historical review of project management tools described how DuPont set up groups to study new management

techniques in the 1950s, while the Navy, in parallel, developed the Program, Evaluation, and Review Technique (PERT) charts. PERT charts that were used on weapon programs, space projects, and submarines influenced project management in 1960s. Later, the military developed the Graphical Evaluation and Review Technique (GERT).

The early 1970s showed a broader acceptance of tools for project management due to the integration of costs, scheduling, and resource loading. But the project manager was often overloaded with reams of paper. From the 1970s to 1980s, engineering schools added network techniques and computer applications. Major improvements in computer capability led to the development of better tools (Cioffi, 2001).

The 1980s to 1990s led the shift from mainframe computers to personal computers. Engineers became personal computer (PC) users, and PC software was marketed. Project management tools continued to gain acceptance in many industries. Better technology, better software, and a computer-literate workforce, with computers on desks and at the worksites, continue to expand the use of tools in project management today.

Software allows key decisions to be made in a timely way, enabling a comparison of plans (the planning stage) and evaluation of the progress (after the fact). Computer software tools store, manipulate, and generate reports based on project management principles. In the beginning stages of software utilization, the software served mainly as a scheduling tool.

A key player in project management process was the Project Management Institute providing a process from ad hoc, chaotic processes to mature, disciplined

projects. The use of project management tools is seen as one of the processes. The Project Management Institute (1996) has five stages of development:

1. *"Initial"*. The process is characterized as ad hoc, and occasionally even chaotic. Few processes are defined, and success depends on individual effort and heroics.

2. *"Repeatable"*. Basic project management processes are established to track cost, schedule, and functionality. The necessary process discipline is in place to repeat earlier successes on project with similar applications.

3. *"Defined"*. The process for both management and engineering activities is documented, standardized, and integrated into a standard process for the organization. All projects use an approved, tailored version of the organization's standard process for developing and maintaining the project.

4. *"Managed"*. Detailed measures of the process and product quality are collected. Both the software process and products are quantitatively understood and controlled.

5. *"Optimizing"*. Continuous process improvement is enabled by quantitative feedback from the process and from piloting innovation ideas and technologies.

These five levels are only determined only after preparation, maturity of process, and extensive audits performed by skilled outside auditors. Tools are part of the means to accomplish the goals, whether teams use ad hoc processes or move toward methodologies conducted in an enterprise system.

Tools are important. To recap, in the nine process steps *(Integration Analysis, Scope Analysis, Time Analysis, Cost Analysis, Quality Analysis, Human resource*

analysis, Communications, Risk Analysis and Procurement) of PMI (1996, 2000), discussed in the Operationalizing the Role through the PMBOK Process in the literature review, each process has tools and techniques to perform that process. Tools provide a mechanism for the project manager to plan, execute, and close the project. Further supporting the need for tools, Kwak's (1997) research demonstrated that organizational and financial impacts could result from the implementation of project management tools, practices, and processes. Haddad (1999) conducted research on software projects and showed that hidden costs are incurred, are significant, and are not managed. She suggested that by incorporating hidden costs into the software economics of project management, analysis could improve the decision-making process.

In summary, the PMI literature highlights the need for tools in each of the nine project management knowledge areas. Whether the project is in the *initiation, planning, execution, controlling, or closing phase*, tools play a critical role for the project manager. The level of maturity and methodology varies between project managers and within the organization. This study has selected only three examples of tools to consider: (1) GANTT charts for managing the project schedule; (2) critical path analysis to understand how delays in some tasks will delay others; (3) network diagramming to display the relationships between project tasks.

Summary of the Literature Pertaining to Project Manager's Role

The role of the project manager has been framed around Giddens' structuration theory as well as role theory. Accordingly, the project manager both structures and is structured by project processes highlighted through the PMI process flow (1996, 2000).

The project manager's role operates in the Dissemination and Diffusion (integration learning) function of Schwandt's Organizational Learning Model (Schwandt, 1995, 1997; Schwandt & Marquardt, 2000). This role can be measured through the norms, behaviors, and tools and their relation to learning as measured by the Organizational Learning Survey (Johnson, 2000), described in the next chapter.

CHAPTER 3

METHODOLOGY

This chapter discusses research design, instrumentation, data collection, and the methodology used to determine the relationship between the role of the project manager and the collective learning of the project team. The study examines structuring variables—namely, the project manager's norms, behaviors, and tools—to understand their relationship to project team learning.

Design Overview

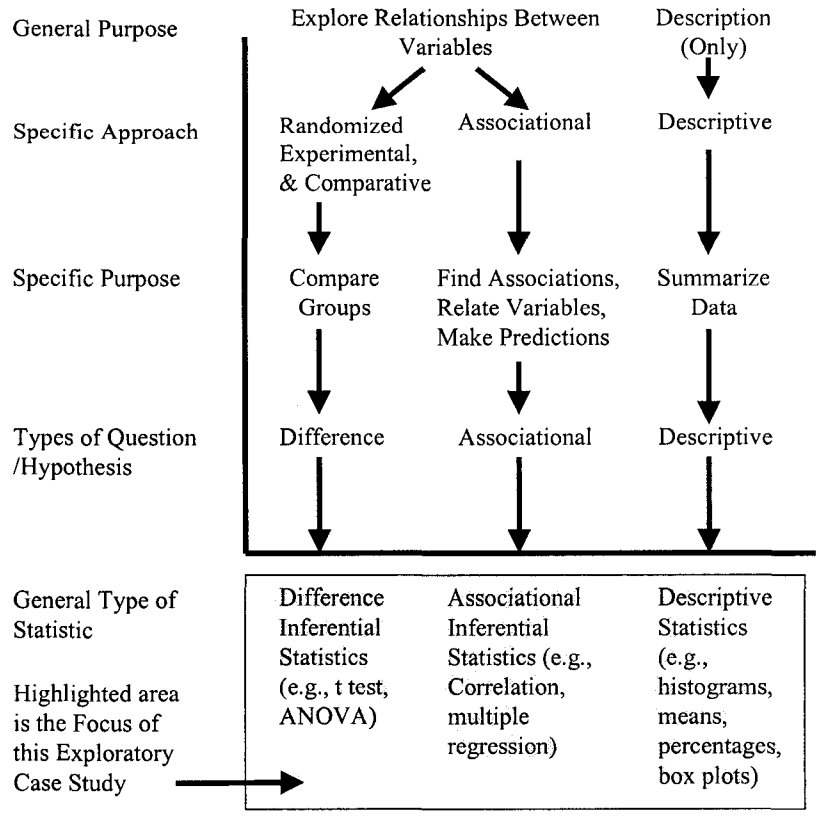
This quantitative exploratory study examined the relationships between learning and the role of the project manager in three competency levels (PMI, 2001): (I) informed, (II) involved, and (III) competent. While these levels of competency are derived from extensive external audits determining an organization's competency levels, this exploratory study utilizes the sociological framework of PMI's competency levels as a way to reflect on the various events, norms, behaviors, and tools required of the project manager to perform at a given level of competency. This is not to claim that the organization under study here is operating at a particular level of maturity.

For this study, the project manager's role includes three measurable variables: norms, behaviors, and tools. Each variable is examined for its relationship to the Schwandt Organizational Learning Model (1995, 1996, 1997; Schwandt & Marquardt, 2000), represented by the model's four functional subsystems—Environmental Interface (adaptation learning), Action/Reflection (goal learning), Dissemination and Diffusion (integration learning), and Meaning/Memory (latency learning)—as measured by the Organizational Learning Survey (Schwandt & Johnson, 1998; Johnson, 2000). In other words, the three aspects of the role are examined for their relationship to Schwandt's four aspects of learning.

Understanding the relationship between role and learning employs descriptive and inferential statistics. Use of associational inferential statistics provides procedures for making generalizations about a population by studying a sample from that population (Hinkle et al., 1994). By making statistical inferences about an organization, using the Organizational Learning Survey (Johnson, 2000), the researcher hoped to understand the degree of variation in those aspects of the project manager's role as measured in norms, behaviors, and tools with respect to learning in the project team.

Morgan and Griego (1998) provided a schematic diagram, presented in Figure 17, that showed the purpose, approach, and type of research question corresponding to the type of statistic used.

Figure 17. Schematic design of statistics for the study.



Note. Adapted from *Easy Use and Interpretation of SPSS for Windows: Answering Research Questions with Statistics*, by G. A. Morgan and O. V. Griego, 1998, Mahwah, NJ: Lawrence Erlbaum, p. 9.

Fraenkel and Wallen (1996) suggested that the description of the phenomenon is the starting point for all research endeavors. Descriptive research is used because it aims to gather data without any manipulation of the research context. In other words, descriptive research is low on the "control or manipulation of research context" scale. In addition, the data collection procedures used in descriptive research may be very explicit. This study gathered descriptive statistics about the sample. This study also employed two

sections of the Organizational Learning Survey (Johnson, 2000) in order to yield data concerning project team learning. In addition, a set of questions was developed for this study to gather data on the project manager's norms, behaviors, and tools.

Sampling

Purposive sampling involves a nonrandom sampling technique, where knowledge of a population is used to select a sample for a given purpose (Frankel & Wallen, 2000). This type of sampling is appropriate in studies of limited scope or in situations that preclude random selection, such as when specific attributes or characteristics are required for the study. In this study, the roles of project managers were fundamental to the investigation. Consequently, a sample providing such participants was purposefully selected.

Purposive sampling makes some assumptions about validity. Patton (1990) determined that specific purposive sampling indicates that "if it happens there, it will happen anywhere" (p. 174); or, vice versa, "if it does not happen there, it will not happen anywhere" (p. 174).

Surveys are frequently used in social science research to describe attitudes, beliefs, opinions, and other types of information (McMillan & Schumacher, 1989). Usually the research is designed so that information about a large number of people (a population) can be obtained from the responses of a smaller group of subjects (a sample) (Kerlinger, 1986). Surveys can describe the frequency of demographic characteristics or competencies held, explore relationships between functions, or elicit the reasons for

particular practices (McMillan & Schumacher, 1989). All of these attributes of surveys were germane to this study.

A major component of the survey approach in this study was the use of the Organizational Learning Survey (OLS) (Johnson, 2000), which operationalized the Organizational Learning Model (Schwandt, 1995, 1996, 1997; Schwandt & Marquardt, 2000). For purposes of this study, project managers and their project teams completed the Organizational Learning Survey (OLS). Table 4 provides the research questions posed by this study and the variables as measured by the Organizational Learning Survey (OLS).

Table 4

A Comparison of Research Questions and Measures

Research Questions	Independent Variables	Dependent Variables
Q1: Is there a relationship between the role of the project manager and organizational learning within the project team?	Project manager's role as expressed through norms, behaviors, and tools.	A measure of a combination of the four learning functions from the Schwandt model reflected in the Organizational Learning Survey.
Q2: Is there a relationship between the role of the project manager and the Dissemination and Diffusion of information within the project team?	Project manager's role, as expressed through norms, behaviors, and tools.	Dissemination and Diffusion (integration learning) subsystem of the model as measured by the OLS.

Unit of Analysis

The unit of analysis for this study is the individual. The individual level of analysis is appropriate for studying the role of the project manager, particularly how that role may affect the variation in learning within the project team as seen through the project manager's norms, behaviors, and tools, because individuals on projects are actors

in the team's learning system. The individual project manager can affect the integration of information within the project team and among the individual team members, which can lead to learning.

The literature has suggested there are multiple levels of maturity in the implementation of the project manager's role. This study utilized three levels of maturity within each independent variable (norms, behaviors, and tools). Level-I maturity is defined as project managers' having awareness of the norms, behaviors, and tools of a project manager. At this level, managers may employ ad hoc processes where they draw upon their own experiences. Mintzberg (1973) legitimized personal experience as a way of learning: "No other learning environment—classroom, executive development program, peer feedback session—can surpass the job itself, provided the manager knows how to learn from their own experience" (p. 193). Level-II maturity is defined as project managers' being involved on a daily basis with the norms, behaviors, and tools of a project manager. At Level-II maturity, the project manager employs project management protocols that are repeatable from project to project. Level-III maturity is defined as demonstrating mastery in project management norms, behaviors, and tools. At this level, project managers employ best practices and risk management functions that assist the enterprise in achieving strategic objectives.

Before project managers at any of these levels could be contacted to participate in this study, however, permission was needed to study human subjects.

Human Study Approval

Federal regulations require that all research involving human subjects or analysis of data gathered from human subjects, regardless of funding status, be reviewed prior to the implementation of any research activity. The Office of Human Research (OHR) operates within the Office of Health Research, Compliance, and Technology Transfer and is the George Washington University's agency for compliance with federal regulations regarding the protection of human research subjects.

The George Washington University website (www.gwu.edu) provides the policies and procedures. The Office of Human Research and its Institutional Review Boards operate under Multiple Project Assurance numbers (M-1125-01XB-Medical) and (M1125-02XM-Non-Medical), which expire in January 2005. The assurances are licensed with the Department of Health and Human Services and are signed by an official with the Office for Protection from Research Risks (OPRR). These assurances certify that all human research will be conducted in accordance with federal regulations.

The George Washington University approved this study. Confidentiality of the participants' identities and maintenance of their anonymity are paramount considerations for this study and are necessary to ensure compliance with requirements of the Human Subjects Board. Only the primary researcher and the committee chairperson know the identities of the participants. All participants were required to sign a Participant's Consent Letter. The necessary forms are in Appendices D, E, and F.

Research Site

To answer the two research questions, this study required an organizational setting where project work is ubiquitous and the project manager's role is regularly practiced. The chosen company (to be called "GS"), which deals in consumer electronics and is based in the south-central United States, is such a company.

Site Selection

Permission was received to conduct the Organizational Learning Survey at GS, one of the largest retailers of consumer electronic products and services in the United States, with 7,100 stores and dealer/franchise outlets nationwide. Ninety-four percent of all Americans either live or work within five minutes of a GS store or dealer. Nearly 1 million customers visit a GS each day, and 99% of Americans visit one of the stores at least once every three years.

The company's vision is guided by four key goals: (1) to be the most admired growth company in America, (2) to lead the industry in shareholder return, (3) to be outstanding corporate citizens from coast to coast, and (4) to be the best company to work for in America. Its key strengths are as follows:

1. Distribution—an unparalleled network of more than 7,100 stores and dealers.

2. People—a highly trained sales force.

3. Products and services—a unique product and service selection, including many products that cannot be found at other retailers.

To meet these objectives, GS depends on strategic alignment of the project management department with the corporate goals of the company. The project

management department is responsible for managing information technology systems (IT) projects that affect the corporation and local customers in the south-central region.

Sample Size and Description

Approximately 80 people support project teams within the IT regional office. Of those 80 people, 30 people are project managers in title, and the remainder works in various projects as individual contributors. Often, employees must support multiple teams and project managers.

Threats to Survey Data

In a study based on a purposive sample of project managers, the validity of the data and assurance of representation of the population can be jeopardized. Some members might not respond to a survey. This is referred to as *non-response* (Fraenkel & Wallen, 1996) and may be due to a number of reasons, such as lack of interest in the topic, forgetfulness, unwillingness to be surveyed, or hesitancy to divulge pertinent information regarding the company. Often, non-disclosure statements are required, but this will not ensure people's participation (Fraenkel & Wallen, 1996).

Another aspect of non-response is item non-response. Participants may not know an answer, or a question may seem irrelevant—so they will skip a question, skewing the number of responses and a comparison of responses. In this study, item non-response was deleted, creating an adjusted *n* for each item of the survey.

Format of Data Analysis

Data analyses employed in this study were demographic data collection, correlation data comparison, independent *t* tests, normality of data test, normal

distribution charts, Cronbach alpha, and multiple regressions. Each format is described below.

Demographics

This study collected demographic information on the participants.

1. Question 63 identified the participant as a project manager or individual contributor.

2. Question 64 addressed the number of project teams that a respondent is currently supporting.

3. Question 65 identified with which process—initiation, planning, executing, and closing a project—the respondent is involved. (These stages of project management were delineated by the Project Management Institute [2000], University of Sydney Project Management [2002], and the European PMI [1999]).

4. Question 66 asked about the job location of the respondent. (Employees often work in remote locations as well as telecommute.)

Correlation Data

Correlation coefficients (comparing means of one group with the means of another group) were utilized in this study. Correlations can range from -1.00 to +1.00. The sign of the relationship indicates the kind of relationship. Positive correlations and negative relationships were both reported in this study. The further away from zero (0) and the closer to one (1), the greater the relationship of the two items. Since multiple variables were used in the study, the adjusted *R*-squared value was used to determine the strength of the relationship to the dependent variable.

Common statistical tests used with correlational data in this study were *t* tests for two groups (project manager and individual contributor), which showed correlation between learning functions and the project manager's norms, tools, and behaviors as viewed by the two groups. *F* tests were used to detect interactions between the two groups. In addition, the test of significance of the correlation coefficient was used (Fraenkel & Wallen, 1996).

Independent T *Tests*

The independent *t* test was used in the study because it measures situations in which two separate and independent groups are the subjects. The purpose of the *t* test is to determine whether difference in two means is likely to be due to chance or to some other cause, such as treatment. The two groups in this study are the project manager and the individual contributor. Although they were from the same company, their responses were separated for analysis.

Normality of Data

Prior to being run through regression analyses, the data were tested for approximate normal distribution. This analysis is important before drawing conclusions from the data. Scatterplots and normal probability plots (QQ plots) were employed, as suggested by Newton and Rudestam (1999). Fraenkel and Wallen (1996) described scatterplots as showing not only what relationship exists between variables, but also to what degree. Redundant scatterplots can depict a strong or high degree of relationship between the two variables, depending on how near the plotted points are to a linear relationship (Fraenkel & Wallen, 1996).

The following figures (Figures 18 through 22) show the approximate normality of distribution of the overall learning score to the project manager's norms, behaviors, and tools. The data were also run without the single outlier, and the distribution did not change. Other scatterplots and QQ plots can be found in Appendices G and H, which report complete analysis. The plots verified that approximate normal distribution was represented in the data; therefore, valid conclusions could be drawn.

Figure 18. Scatterplots: Overall learning score to project manager's norms.

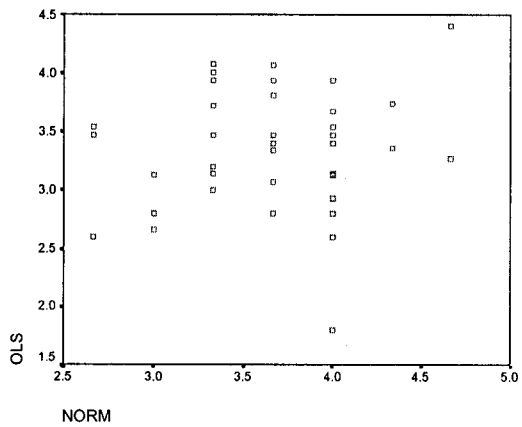


Figure 19. Scatterplots: Overall learning score to project manager's behaviors.

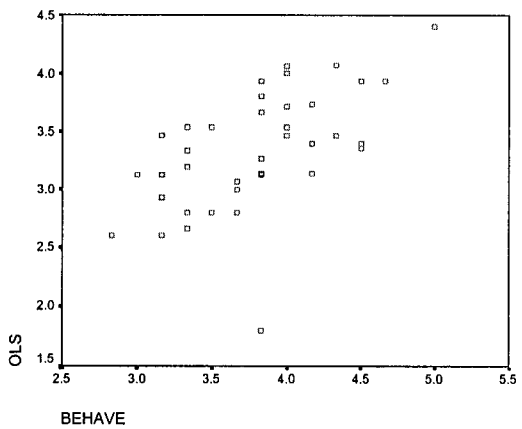
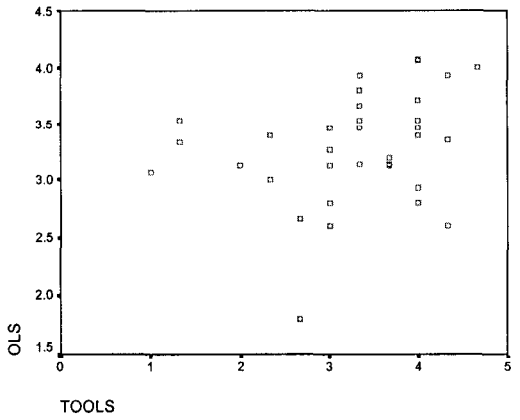


Figure 20. Scatterplots: Overall learning score to project manager's tools.



In addition to the scatterplots, normal probability plots (QQ Plots) were run. As shown below in the QQ plots, the data indicate the approximate normal probability distribution.

Normality Distribution Plots

QQ plots were performed on the OLS (overall learning score) and the OPM (overall project manager's score), indicating a reasonable approximation to normality. OLS questions were drawn from the learning survey. OPM comprised the project manager's questions grouped into a total score. Figure 21 shows the QQ plot data for OLS.

Figure 21. QQ plots: Overall organizational learning score normality distribution.

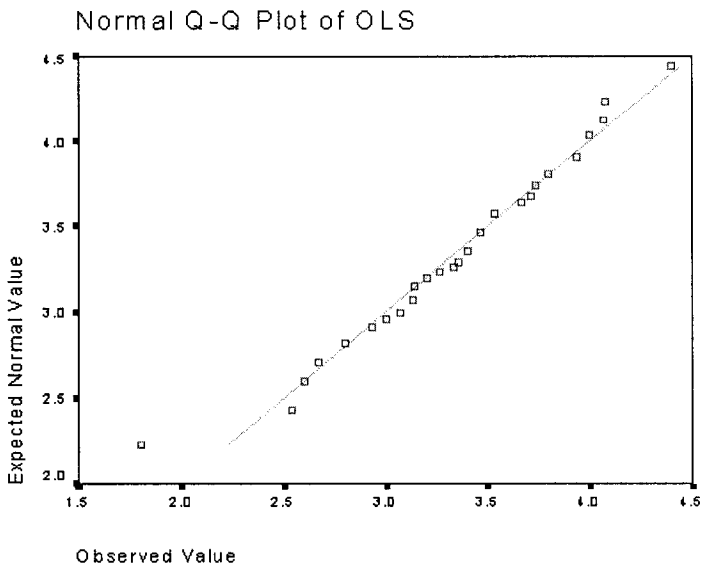
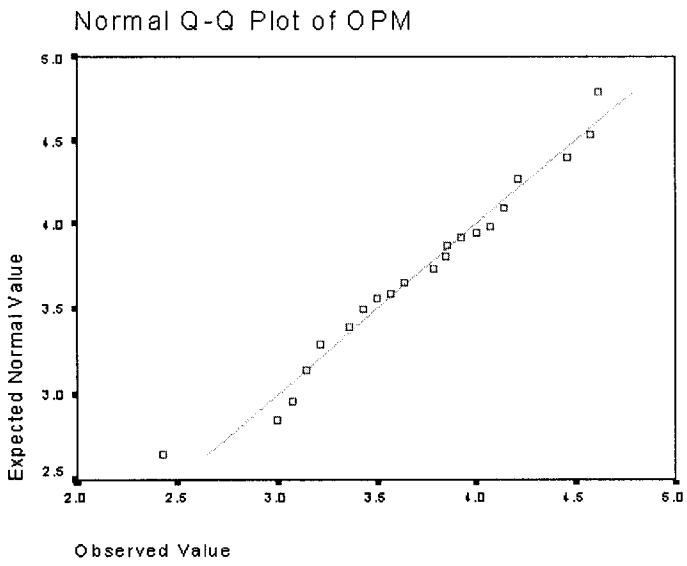


Figure 22. QQ plots: Overall project manager's question.



The QQ plots show that the dependent variable (organizational learning) and independent variable (OPM) are consistent with being normally distributed. To construct a QQ plot, the data are ordered from smallest to largest data points and then are paired

with the corresponding percentile from the normal distribution with the same mean and standard deviation. These pairs are then plotted. If the resulting graph is approximately linear, then the data is consistent with being normally distributed.

Cronbach Alpha

Cronbach alpha measures how well a set of items (or variables) measures a single one-dimensional construct. When data have a multidimensional structure, Cronbach alpha will usually be low. Technically speaking, Cronbach alpha is not a statistical test; it is a coefficient of reliability (or consistency). Cronbach alpha can be written as a function of the number of test items and the average intercorrelation among the items (Fraenkel & Wallen, 1996).

Cronbach is where N is equal to the number of items, and r-bar is the average inter-item correlation among the items. This formula determines that if the number of items is increased, it will increase Cronbach alpha. Additionally, if the average inter-item correlation is low, Cronbach alpha will be low. As the average inter-item correlation increases, Cronbach alpha increases as well (Fraenkel & Wallen, 1996). If the inter-item correlations are high, then there is evidence that the items are measuring the same underlying construct. This is really what is meant when one says they have "high" or "good" reliability—referring to how well the items measure a single one-dimensional latent construct.

SPSS (Statistical Package for the Social Sciences) designates the following reliability and interpretation (Morgan & Griego, 1998, p. 130):

.90 and above	Excellent reliability
.80-.90	Very good reliability
.70-.80	Good, but probably a few items could be improved
.60-.70	Somewhat low
.50-.60	Suggests the need for revision of measured scale
.50 or below	Questionable reliability

(The data can be found in the first table in Appendix H.)

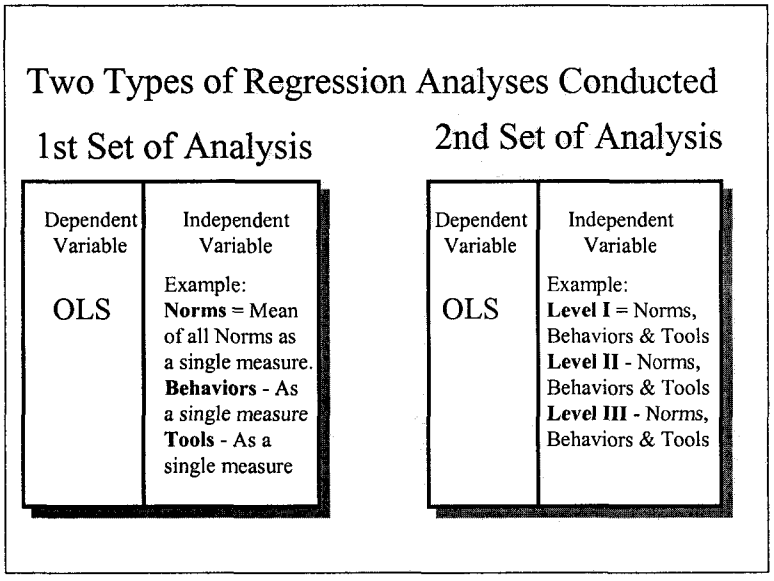
Multiple Regression

Multiple regressions were used to highlight the relative contribution and relationship between two variables: organizational learning and the role of the project manager. The statistical analysis was done using SPSS software. Correlation and regression methods show relationships of multiple independent variables. Data were reported using *R*-squared and adjusted *R*-squared when multiple variables were used.

The flow of the analysis followed a methodological pattern. To answer the first question, the population sample was regressed with the project manager's scores as the independent variables to the OLS. This output is represented as the first set of analysis described in Figure 23. The second type of analysis looked at Levels I, II, and III of project manager competencies within this sample group. Subsequent analysis separated the population into the project manager and individual contributors in the same regression analysis to determine if there were significant factors for the project manager or for individual contributors.

The next step analyzed each quadrant of the Organizational Learning Survey (Johnson, 2000) separately by project manager and by individual contributors. The individual quadrants of the learning survey were used as the dependent variable. The independent variables are the project manager's overall scores, norms, behaviors, and tools. In addition, each sample group was examined by looking at Level-I, Level-II, and Level-III project management maturity. Degree of variation and significance are discussed in each finding section. The next subsection discusses the scales used for each measure and the two types of regression analysis utilized in the study.

Figure 23. Types of multiple regressions analyses utilized in study.



The most significant tables highlighting the findings were incorporated into the body of this study in Chapter 4. Due to the extensive amount of analysis, most of the tables can be found in Appendices G and H.

Scales

The first set of scales was created for analyzing the project manager's questions and the Organizational Learning Survey (OLS). Taking the mean of the variables composing the scale created the values of each scale for each participant's response. A description of those scales used in this study follows.

Project Manager's Scales

A scale was developed for the overall project manager (OPM) questions including the norms, behaviors, and tools. This scale included responses to Questions 47 through 58. Subsequent scales were developed for each of the components of OPM—norms, behaviors, and tools.

Norms.

Project manager's norms included Questions 47, 48, and 49 and consisted of three levels of maturity. The overall project manager's norms scale, Level I, consisted of Question 47. Level II project manager's norms consisted of Question 48. Level III project manager's norms consisted of Question 49.

Question 47 asked the extent to which (on a scale of 1 to 5) the project manager develops his or her own style and tools for managing the project because each project is unique and different. Question 48 asked the extent to which (on a scale of 1 to 5) the project manager follows specific guidelines and procedures for managing the project. (i.e., is there support through metrics, the organizational culture, and management methods to manage the project?) Question 49 asked the extent to which (on a scale of 1

to 5) the project manager is seen as an integral part of a corporation-wide project management strategy.

Behaviors.

Project manager's behaviors included Questions 50 through 55. Question 50 asked the extent to which (on a scale of 1 to 5) the project manager clarifies project scope, roles and expectations, tasks, and data requirements. Question 51 asked the extent to which (on a scale of 1 to 5) the project manager's behavior reflects the climate and culture of the organization and recognizes organizational constraints. Question 52 asked the extent to which (on a scale of 1 to 5) the project manager encourages initiative and information-seeking skills by the project team members to act according to their shared values and beliefs. Question 53 asked the extent to which (on a scale of 1 to 5) the project manager understands and uses the formal and informal structure of the organization to influence support and build relationships to achieve project goals and objectives. Question 54 asked the extent to which (on a scale of 1 to 5) the project manager fosters collaboration, mentoring, and leadership skills within the project team. Question 55 asked the extent to which (on a scale of 1 to 5) the project manager negotiates and balances all functions and issues relating to the project, the project team, and the project stakeholders.

Tools.

Project manager's tools were examined in Questions 56, 57, and 58. The overall tools scale consisted of Questions 56 through 58. Level-I tools were measured in Question 56. Level-II tools were measured in Question 57. Level-III tools were measured in Question 58.

Question 56 asked the extent to which (on a scale of 1 to 5) the project manager uses GANTT charts to manage the project. Question 57 asked the extent to which (on a scale of 1 to 5) the project manager plans, manages, and performs analysis on the project with computer software (e.g., Critical Path Analysis, Scheduling, and Network Diagramming). Question 58 asked the extent to which (on a scale of 1 to 5) the project manager uses the technology and software tools to assess the cost and quality performance of projects, in addition to scheduling performance.

Levels of project manager's deployment scales.

Level-I variables.

Project manager's Level-I variables were examined by Questions 47, 50, 51, and 56, which covered Level-I project management deployment activities. As part of Level I, Question 47 was named as independent variable PM Level I N. PM Level I N looked at the extent to which (on a scale of 1 to 5) the project manager develops his or her style and tools for managing the project because each project is different and unique. As part of Level I, Questions 50 and 51 were named as independent variables PM Level I B1 and PM Level I B2, respectively. PM Level I B1 looked at the extent to which (on a scale of 1 to 5) the project manager clarifies scope, roles, expectations, tasks, and data requirements. PM Level I B2 looks at the extent to which the project manager's behavior reflects the climate and culture of the organization and recognizes the organizational constraints. Finally, in Level I, Question 56 was named independent variable PM Level l T. PM Level I T looked at the extent to which (on a scale of 1 to 5) the project manager uses GANTT charts to manage the project.

Level-II variables.

Project manager's Level-II variables were examined by Questions 48, 52, 53, and 57, which covered Level-II project management deployment activities. As part of Level II, Question 48 was named as independent variable PM Level II N. PM Level II N looked at the extent to which (on a scale of 1 to 5) the project manager follows specific guidelines and procedures for managing the project. The second part of this question concerned whether there is support through metrics, the organizational culture, and management methods to manage the project. Next, PM Level II examined Question 52 and 53 as independent variables PM Level II B1 and PM Level II B2, respectively. PM Level II B1 looked at the extent to which (on a scale of 1 to 5) the project manager encourages initiative and information-seeking skills by the project team members to act according to shared values and beliefs. PM Level II B2 looked at the extent to which (on a scale of 1 to 5) the project manager understands and uses the formal and informal structure of the organization to influence support and build relationships to achieve project goals and objectives. Finally, Question 57 was named independent variable PM Level II T. PM Level II T looked at the extent to which (on a scale of 1 to 5) the project manager plans, manages, and performs analysis on the project with computer software.

Level-III variables.

Project manager's Level-III variables included Questions 49, 54, 55, and 58, which covered Level-III project management deployment activities. In Level III, Question 49 was named as independent variable PM Level III N. PM Level III N looked at the extent to which (on a scale of 1 to 5) the project manager is seen as an integral part

of a corporation-wide project management strategy. In addition, the Level III multiple regressions looked at Question 54 and 55 as independent variables PM Level III B1 and PM Level III B2, respectively. PM Level III B1 looked at the extent to which (on a scale of 1 to 5) the project manager fosters collaboration, mentoring, and leadership skills within the project team. PM Level III B2 looked at the extent to which (on a scale of 1 to 5) the project manager negotiates and balances all factors and issues relating to the project, the project team, and the project stakeholders. The final element of PM Level III was Question 58, independent variable PM Level III T. PM Level III T looked at the extent to which (on a scale of 1 to 5) the project manager employs technology and software tools to assess the cost and quality performance of projects, in addition to scheduling performance.

Overview of the Organizational Learning Survey

The Organizational Learning Survey instrument was developed by The George Washington University's Center for the Study of Learning (Johnson, 2000) as a mechanism to provide diagnostic feedback to organizations, to establish a baseline for comparison over time, and to serve as a developmental tool to enable organizations to build their long-term adaptive capacity. The survey is based on more than 10 years of research and theory development at The George Washington University. The survey operationalizes Schwandt's Organizational Learning Model (Schwandt 1995, 1996, 1997; Schwandt & Marquardt, 2000).

Theoretical Background of the Organizational Learning Survey

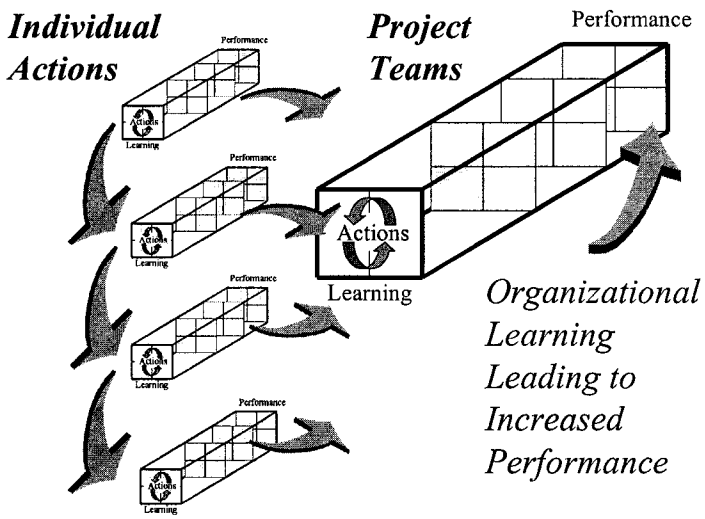
The Organizational Learning Survey is theoretically grounded in the work of Talcott Parsons' social action theory (1951, 1953) and David Schwandt's organizational learning theory (Schwandt, 1995, 1996, 1997; Schwandt & Marquardt, 2000). The survey is based in a systems perspective of change and effectiveness, assumes that change within an organization occurs through collective actions, and assumes that these actions comprise learning and performance processes (Schwandt & Marquardt, 2000).

Schwandt's (1995, 1996, 1997; Schwandt & Marquardt, 2000) theories are based on the belief that organizational effectiveness is dependent on the organization's values. Two organizing systems, performance and learning are interdependent and linked through four functions. These functions focus on an organization's ability to (1) take in information and adapt in accordance with a changing environment, (2) learn and attain its goals, (3) disseminate information and integrate action within the organization, and (4) remember, maintain, and reinforce the organization's culture, values, management philosophy, and basic assumptions.

Figure 24 demonstrates the learning cycle of the individual and its relation to the project team, as premised by the Organizational Learning Survey. The learning cycle starts with the individual. The individual reflects on his or her actions and then shares the learning with the project team members. The project team members reflect their learning and share with other project team members, thus leading to improved team learning and increased performance. Each time the individual reflects and then shares with others, the

project team benefits. These learning cycles are demonstrated in Figure 24, studied in Gorelick's (2000) research.

Figure 24. Learning cycles for individuals and project teams.



Note. From *Toward an Understanding of Organizational Learning and Collaborative Technology: A Study of Structuration and Sensemaking in a Virtual Project Team*, by C. K. Gorelick, 2000, unpublished doctoral dissertation, George Washington University, Washington, DC, p. 104.

Validity and Reliability of Survey

Johnson (2000) used confirmatory factor analysis and structural equation modeling methodologies to test the validity and reliability of the Organizational Learning Survey for explaining and measuring the four organizational learning functions (Schwandt, 1995). Confirmatory factor analysis indicates that each of the four constructs may well fit their respective hypothesized models. In addition, Johnson (2000) found that

Schwandt's (1995) Organizational Learning Model has an adequate fit with the survey components. When additional hypothesized specifications were imposed, the data-model fit rose to a more than satisfactory level (Johnson, 2000). The survey's construct validity was developed through a rigorous piloting process in which the OLS was administered to three organizations: a manufacturing plant, a service organization, and a U.S. government agency. People taking the survey for the development of the instrument included organizational members from all levels within the organization.

Scales for the Organizational Learning Survey

An Overall Learning Score (OLS) was created from Schwandt's Organizational Learning Survey (Johnson, 2000; Schwandt & Marquardt, 2000). The OLS scale covered Questions 5, 8, 11, 14, 16, 19-21, 23, 33-34, 38-39, and 43-44. The OLS was made up of the four functions of Schwandt's Organizational Learning Model.

Environmental Interface (adaptation learning) scale.

The first function of the organizational learning model is Environmental Interface (adaptation learning). The scale is defined as measuring the extent to which new information comes into the learning system (e.g., customer feedback, market analysis, industry-wide best practices). The Environmental Interface (adaptation learning) scale consisted of Questions 5, 8, 11, and 14.

Question 5 asked the extent to which (on a scale of 1 to 5) the members of the project team share external information (information from outside the project team). Question 8 asked the extent to which (on a scale of 1 to 5) the project team predicts the changes occurring in the company. Question 11 asked the extent to which (on a scale of 1

to 5) the project team continuously tracks how competitors improve their products, services, and operations. Question 14 asked the extent to which (on a scale of 1 to 5) the project team deliberately reflects upon and evaluates information external to the team.

These questions are relevant to the project team. Schwandt and Marquardt (2000) suggested that three challenges must be addressed if this subsystem is weak. The first challenge is "inappropriate screening" (p. 232): "perceptions concerning the environment and/or the boundary-penetrating actions of the organizations either ignore or dilute the development of a sufficient variety of new information" (p. 232). The second challenge is "insufficient number, variety, and level of interacts for scanning environmental sectors reduce the quality of new information" (p. 232). The final challenge is the "lack of understanding of the role of management cognition and the Environmental Interface and how their cognitive schema can influence scanning outcomes" (p. 232).

Action/Reflection (goal learning) scale.

The second function of the organizational learning model is Action/Reflection (goal learning). The scale measures the result of decision-making processes, evaluations, and knowledge structures produced by learning (Schwandt, 1995). The Action/Reflection scale consisted of Questions 20, 21, and 44.

Question 20 asked the extent to which (on a scale of 1 to 5) the project team sets goals for researching and developing new processes and services. Question 21 asked the extent to which (on a scale of 1 to 5) members of the project team effectively uses the organizational structures (e.g., chain of command, personal networks) when sharing ideas

and innovations. Question 44 asked the extent to which (on a scale of 1 to 5) the project team has clear goals for individual and team development.

Schwandt and Marquardt (2000) suggested that if there were misalignment at this subsystem, three challenges would be experienced:

> *Lack of Organizational Reflection (p. 233).* "If organizations do not reflect on their actions, new information automatically becomes the goal referenced knowledge. A "pass through" of information without any valuing characterizes this situation. This results in organization confusion and frustration because every piece of information become most important" (Schwandt & Marquardt, 2000, p. 233).
>
> *Resistance to the Dual Nature of Knowledge (p. 233).* "Organizations will reject the social construction of knowledge, or the need to transform tacit knowledge to explicit knowledge. This situation is characterized by devaluing dialogue and diversity in their deliberations" (Schwandt & Marquardt, 2000, p. 233).

Lack of Readiness (p. 233). "Organizations do not prepare themselves for inquiry into their assumptions. Cultural assumptions are not even identified. The organization must develop new information about itself before it begins the reflection process" (Schwandt & Marquardt, 2000, p. 233).

Thus, these questions apply to the project team learning system.

Meaning and Memory (latency learning) scale.

The third function of organizational learning (Schwandt, 1995) is Meaning and Memory (latency learning). The Meaning and Memory scale was defined as sensemaking that incorporates values and basic assumptions. Accordingly, this learning system function includes language, symbols, schemata, and scripts employed within the organization (Schwandt, 1995). The Meaning and Memory (latency learning) scale consisted of Questions 23, 33, 38, and 43. Question 23 asked the extent to which (on a scale of 1 to 5) the project team uses ideas and suggestions from its team members. Question 33 asked the extent to which (on a scale of 1 to 5) the project team believes that continuous change is necessary. Question 38 asked the extent to which (on a scale of 1 to 5) the people on the project team believe that evaluating what customers say is critical to reaching team goals. Question 43 asked the extent to which (on a scale of 1 to 5) the project team had a strong culture of shared values that supported individual and team development.

These questions are relevant to the project team. According to Schwandt and Marquardt (2000), if there is a misalignment or weakness in this subsystem the following can occur:

> *Lack of Alignment in Multiple Organizational Memory* (p. 234). "The organization can have multiple memories that are influenced by very different subcultures. This difference is not bad in and of itself, but if it is not aware of the difference, then the creation of knowledge can be frustrating" (Schwandt & Marquardt, 2000, p. 234).

*Lack of Cultural profile (*p. 235). "The organization must surface its basic assumptions so that it may understand the impact it is having on its sensemaking processes" (Schwandt & Marquardt, 2000, p. 235).

Thinking you can fix only one subsystem at a time (p. 235). "The organization learning system is a nonlinear social system framework. This means that everything is connected to everything else. Thus organizations have to implement multiple changes simultaneously to effect change"(Schwandt & Marquardt, 2000, p. 235).

Dissemination and Diffusion (integration learning) scale.

The Dissemination and Diffusion (integration learning) scale was fundamental to answering the second question of this study. The Dissemination and Diffusion (integration learning) scale was defined as normative organizational processes governing the learning system. These include roles, leadership, policies, and group norms (Schwandt, 1995). The Dissemination and Diffusion scale consisted of Questions 16, 19, 34, and 39. Questions 16 asked the extent to which (on a scale of 1 to 5) the project management department provides opportunities for team members to develop their knowledge, skills, and capabilities. Question 19 asked the extent to which (on a scale of 1 to 5) the project team leader supports quick and accurate communication among all team members. Question 34 asked the extent to which (on a scale of 1 to 5) there are established ways to share new operational processes and procedures throughout the project team. Question 39 asked the extent to which (on a scale of 1 to 5) the project team

has established work groups, networks, and other collaborative arrangements to help the team.

Traditionally and currently in project management, Question 16 (providing opportunities for the project members to develop their knowledge, skills, and capabilities), Question 34 (establishing ways to share new operational processes and procedures), and Question 39 (establishing work groups, networks, and other collaborative arrangements to help the team) do not refer to specific roles performed by the project team. While these may not be part of the current team activities, however, these activities were explored as part of changing structural role of the project team (Giddens, 1994) to meet to demands in the workplace. In addition, Yukl (1989) suggested that the project leader can use his or her power to "influence over attitudes and behaviors" (p. 14) that may create an environment that encourages development of personal networks and collaboration with other project teams—as the researcher likewise observed in a project review meeting at the company. These questions are part of the activities within the Dissemination and Diffusion (integration learning) function and were explored in this study.

These questions are relevant to the project team because, if this subsystem is not functioning, the following challenges can occur, according to Schwandt and Marquardt (2000):

> *Lack of information movement (p. 234).* "The norms of the organization and its members do not reflect the sharing of information. The reward systems are

reinforcing the non-collaboration within the organization and the lack of openness to external information" (Schwandt & Marquardt, 2000, p. 234).

Inappropriate alignment of roles (p. 234). "The roles of the members of the organization may be defined more as controlling and directing than as facilitating and enabling. This is especially true with respect to managerial and leadership roles" (Schwandt & Marquardt, 2000, p. 234).

Lack of understandable policy regarding information (p. 234). "Organizations must formulate the meaning of information and its use so as to avoid the competition between Information Management Systems and the social dynamics of the organization. This meaning has to be articulated to all members of the organization" (Schwandt & Marquardt, 2000, p. 234).

Preliminary Test of Project Manager's Norms, Behaviors, and Tools

For purposes of this study, questions concerning the project manager's role were added to Johnson's (2000) Organizational Learning Survey. This researcher met with various project managers and university faculty to test the questions for clarity and understanding. Dr. Gregory Frazier, of the University of Texas at Arlington, Texas, professor of project management and director of MBA programs, was quite helpful in conducting a preliminary test on the questions. After his testing, several changes were made to add an equal set of questions for each of the three variables: norms, behaviors, and tools. Some dissertation committee members served as "expert advisors" on the subject of project management, having extensive background and experience with project

management. The questions were refined to elicit specific data pertinent to each level. These levels are depicted in Table 5.

Table 5

Maturity of Project Management Deployment

NORMS	**PROJECT MANAGER'S NORMS**
Level I	Project manager develops style and tools for managing the project because each project is different and unique.
Level II	Project manager follows specific guidelines and procedures for managing a project. There is support though metrics, organizational culture, and management methods to manage the project.
Level III	Project manager is seen as an integral part of a corporation-wide project management strategy.
BEHAVIORS	**PROJECT MANAGER'S BEHAVIORS**
Level I	Project manager clarifies project scope, roles, expectations, tasks, and data requirements
Level I	Project manager's behavior reflects the climate and culture of the organization and recognizes the organizational constraints.
Level II	Project manager encourages initiative and information-seeking skills within the project team members to act according to shared values and beliefs
Level II	Project manager understands and uses formal and informal structure of the organization to influence support and build relationships to achieve project goals and objectives.
Level III	Project manager fosters collaboration, mentoring, and leadership skills within the project team.
Level III	Project manager negotiates and balances all factors and issues relating to the project, the project team, and the project stakeholder.

TOOLS	PROJECT MANAGER'S TOOLS
Level I	Project manager uses GANTT charts to manage the project.
Level II	Project manager plans, manages, and performs analysis on the project with computer software. (E.g. Critical Path Analysis, Network Diagramming.)
Level III	Project manager utilizes the technology and software tools to assess the cost and quality performance of projects, in addition to the schedule performance.
PERFORMANCE	**MATURITY OF PROJECT TEAM**
	My current project team is on Budget Goals.
	My current project team is on Schedule Goals.
	My current project team is on Scope Goals.

Table 6 highlights the sources from the literature for use of each question in this study's survey.

Table 6

Levels of Project Management Drawn from the Literature

	MATURITY OF PROJECT MANAGEMENT DEPLOYMENT	SOURCE
NORMS		
Q47 Level I	Project manager develops style and tools for managing the project because each project is different and unique.	Adapted from Busch and Milosevic (1999), Craig (2001).
Q48 Level II	Project manager follows specific guidelines and procedures for managing a project. There is support though metrics, the organizational culture, and management methods to manage the project.	Adapted from U.S. Project Management Institute Survey (2001), DeJaager Project Manager Survey (1988).
Q49 Level III	Project manager is seen as an integral part of a corporation-wide project management strategy.	Adapted from Gorelick (2000), Hansen & von Oetinger (2001).
BEHAVIORS		
Q50 Level I	Project manager clarifies project scope, roles, expectations, tasks, and data requirements.	Adapted from Kerzner (1984), Harrison (1985), Termini (1999).
Q51 Level I	Project manager's behavior reflects the climate and culture of the organization and recognizes the organizational constraints.	Adapted U.S. Project Management Institute Survey (2001).
Q52 Level II	Project manager encourages initiative and information-seeking skills within the project team members to act accordingly to their shared values and beliefs.	Adapted from Craig (2001), Gundlach (1994), Gorelick (2000), European PMI Project Management Survey (2001), Hauschildt, Keim, & Medcof (2002).
Q53 Level II	Project manager understands and uses the formal and informal structure of the organization to influence support and build relationships to achieve project goals and objectives.	Adapted from DeJaager's Project Manager Survey (1988), U.S. PMI Project Management Survey (2001), Watkins & Marsick (1993).
Q54 Level III	Project manager fosters collaboration, mentoring, and leadership skills within the project team.	Adapted from U.S. PMI (2002), Crossman (1996), Schrage (1990), and Yukl

	MATURITY OF PROJECT MANAGEMENT DEPLOYMENT	SOURCE
		(1984).
Q55 Level III	Project manager negotiates and balances all factors and issues relating to the project, the project team, and the project stakeholder.	Adapted from Goodwin (1993), Gorelick (2000), Mills & Margulies (1980), Troyer, Mueller, & Osinsky (2000).
TOOLS		
Q56 Level I	Project manager uses GANTT charts to manage the project.	Adapted from Cioffi (2001), Kerzner (1984), Termini (1999).
Q57 Level II	Project manager plans, manages, and performs analysis on the project with computer software. (E.g. Critical Path Analysis, Network Diagramming.)	Adapted from Cioffi (2001), and U.S. Project Management Institute (2001).
Q58 Level III	Project manager utilizes the technology and software tools to assess the cost and quality performance of projects, in addition to the schedule performance.	Adapted from Cioffi (2001), Project Management Institute, University of Sydney (2000).
PERFORMANCE	**Maturity of Project Team**	**Source**
Q59	My current project team is on its Schedule Goals.	Generated for this study by Committee
Q60	My current project team is on its Budget Goals.	Generated for this study by Committee
Q61	My current project team is on its Scope Goals.	Generated for this study by Committee

Data Collection

The survey was administered to the project management department. Emails were sent to the point of contact with the website location. This e-mail was forwarded to the project management department. A follow-up visit was made by the researcher to discuss the survey and to gain more participation. The participants who were identified had complete anonymity in taking the survey. All communication was made through the project director.

Summary of Methodology

This exploratory study utilized Schwandt's (1995) Organizational Learning Model and Johnson's (2000) Organizational Learning Survey to determine the relationship between the role of the project manager and the collective learning of the project team by examining (1) norms, behaviors, and tools of the project manager and (2) levels of project management deployment within the project team that may connect to the project team's learning. The next chapter discusses the findings of this study.

CHAPTER 4

FINDINGS

This chapter presents major findings of this study examining the dynamics of organizational learning and the structuring variables of the project manager's role (norms, behaviors, and tools) in the project team. This study utilized Schwandt's Organizational Learning Model (Schwandt, 1995, 1996, 1999; Schwandt & Marquardt, 2000) and the Organizational Learning Survey (OLS) (Johnson, 2000). The primary research questions were as follows: Is there a relationship between the role of the project manager (norms, behaviors, and tools) and organizational learning actions within the project team? Does the role of the project manager account for the variation in the actions of dissemination and diffusion (integration learning) of information and knowledge within the project team?

The complete demographics of the study are presented in Appendix G. Two subgroups, project managers (PM) (n=22) and individual contributors (IC) (n=20), were studied. The *project manager* is defined as managing the scope, schedule, budget, risks, resources, and the priorities set by the customer. Cioffi (2001) defined the project manager as exercising judgment both in using tools and working with people in the

"spirit of integration" (p. 4). Termini (1999) saw the project manager as establishing measurable results through control techniques that keep a project on budget and on schedule. The project manager does this through norms, behaviors, and tools necessary to achieve the project goal. In contrast, the *individual contributor* is defined as an individual who supports the project team (sometimes multiple teams) and assists the project manager in meeting the project team deliverables.

The organization studied had a total of 80 people. Of these 80 people, 30 were classified as project managers and 50 individual contributors. The research sample had 22 project managers and 20 individual contributors. Therefore, the sample represented more than 70% of the project managers and 40% of the individual contributors. Sixty-six percent of the sample worked on one or two teams, while the remaining third of the sample supported more than two teams. Most project managers (66%) managed multiple projects. The survey results show that 69% of participants had five years of employment at the company. In addition, more than half of the sample had four-year degrees, and 22% had master's degrees.

To answer the research questions, the chapter is organized around the analysis of learning and its relationship to project manager norms, behaviors, and tools. The chapter is divided into four parts. Part I discusses the Organizational Learning Survey. Part II looks at the role of the project manager; Part III examines the levels of deployment of the project manager's norms, behaviors, and tools. The final section, Part IV, answers the two research questions.

Part I: The Organizational Learning Survey

The Organizational Learning Survey (OLS) assessed perceptions of learning and performance actions within the project team. Based on Parsons' theory of action (1951), as advanced by Schwandt (1995, 1996, 1997; Schwandt & Marquardt, 2000) and validated by Johnson (2000), the OLS assesses learning and performance actions in the four functions of Schwandt's Organizational Learning Model (1995, 1996, 1997; Schwandt & Marquardt, 2000). This study focuses on the four functions of the learning system: Environmental Interface (adaptation learning), Action/Reflection (goal learning), Dissemination and Diffusion (integration learning), and Meaning and Memory (latency learning). The survey provides two sets of data: learning and performance. For purposes of this study, only the data on learning and the project manager's role were used. Descriptive statistics for the aforementioned four learning functions of Schwandt's model (1995, 1996, 1997; Schwandt & Marquardt, 2000) as measured by the Organizational Learning Survey (Johnson, 2000) are provided in Appendix G.

Cronbach alpha shows how well a set of questions (or variables) measures a single one-dimensional latent construct. The values of Cronbach alpha (Appendix H—Table H1) show that the Overall Learning Score (OLS) was α=. 8307, Environmental Interface (adaptation learning) was α=. 6079; Action/Reflection (goal learning) was α=.6168; Dissemination and Diffusion (integration learning) was α=. 5938; and Meaning and Memory (latency learning) was α=. 6582. These results compare with the initial pilot study by Johnson (2000), where the value for Environmental Interface was α= .78; the

value for Action/Reflection was α= .64; the value for Dissemination and Diffusion was α=.81; and the value for Meaning and Memory was α=.74.

Although the Cronbach values are lower in this study than in Johnson's (2000), the scales are within the range of acceptable values. The following analysis—by learning function of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000) as measured by the Organizational Learning Survey (Johnson, 2000)—provides the results for both the project managers (PM) and the individual contributors (IC).

Environmental Interface (Adaptation Learning) Function

The scale for the Environmental Interface (adaptation learning) function of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000) for the project managers had an overall mean score of (2.70) with a standard deviation of (.631). (See Table 7.) Individual contributors had a mean score of (2.52) with a standard deviation of (.617). Both PM and IC scores were low for this function. Although they rated sharing information as relatively high (Q5), their perception of predicting change inside (Q8) and tracking competitors (Q11) were both rated low. What information they do have is reflected upon (Q14). In addition, the questions for the Environmental Interface function were verified against Johnson's (2000) survey questions applied to the Environmental Interface function and were the same in content.

Table 7

Mean and Standard Deviation of Environmental Interface (Adaptation Learning) Function, Project Manager (PM) and Individual Contributor (IC) Sample

Variables		Sample N	Mean	Standard Deviation
Environmental Interface Overall	PM IC	22 20	2.70 2.52	.631 .617
Question 5	PM IC	22 20	3.55 3.10	.963 .788
Question 8	PM IC	22 20	2.43 2.40	.978 1.046
Question 11	PM IC	22 20	2.14 1.65	.941 .933
Question 14	PM IC	22 20	3.14 2.95	.793 .999

Thus, the data from this study suggest an overall low rating for both the project manager and the individual contributor with respect to obtaining information from the teams' external environments.

Action/Reflection (Goal Learning) Function

The Action/Reflection (goal learning) function of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000), as measured by the Organizational Learning Survey (Johnson, 2000), is addressed by three questions (see Table 8). The overall Action/Reflection mean score for the project managers was 3.36, with a standard deviation of .719. ICs reported a lower mean score of 2.96, with a standard deviation of .740. The differences in the mean scores were not statistically significant.

In areas such as goals for researching and developing new processes and/or services (Q20), effective use of organizational structure (e.g., chain of command,

personal networks) for sharing ideas and innovation, and the extent to which the project team has clear goals for individual and team development, the PM scored higher than ICs. There is a significant difference (p=. 026) in the perceptions of the PM and ICs around the goals for researching and developing new processes and team development (Q44). There also appears to be weak agreement (due to the high standard deviation) as to the perceptions of developing new processes (Q20) for the IC.

Table 8

Mean and Standard Deviation of Action/Reflection (Goal Learning) Function Project Manager (PM) and Individual Contributor (IC) Sample

Variables		Sample N	Mean	Standard Deviation
Action Reflection Overall	PM IC	22 20	3.36 2.96	.719 .740
Question 20	PM IC	22 20	3.09 2.70	1.231 1.261
Question 21	PM IC	22 20	3.41 3.20	.734 .894
Question 44	PM IC	22 20	*3.59 *3.00	.734 .918

* *T* test indicates significance between the means at .05 levels.

Dissemination and Diffusion (Integration Learning) Function

The overall Dissemination and Diffusion (integration learning) mean score (see Table 9) by project manager was 3.78, with a standard deviation of .767. Individual contributors had a mean score of 3.71, with a standard deviation of .365. There was a large dispersion of PM scores around the issue of the project management department's providing of opportunities for team members to develop their knowledge, skills, and

capability. Project managers reported a mean score of 3.65 with a standard deviation of 1.309 for Q16. There appears to be less agreement that the project manager's role is to develop team members' knowledge, skills, and capability (Q16).

Table 9

Mean and Standard Deviation of Dissemination and Diffusion (Integration Learning) Function for Project Manager (PM) and Individual Contributor (IC) Sample

Variables		Sample N	Mean	Standard Deviation
Dissemination/ Diffusion Overall	PM IC	22 20	3.78 3.71	.767 .365
Q16	PM IC	22 20	3.65 3.85	1.309 .745
Q19	PM IC	22 20	4.00 3.75	.795 .716
Q34	PM IC	22 20	3.64 3.65	.902 .933
Q39	PM IC	22 20	3.86 3.58	.889 .828

Project managers rated high the importance of quick and accurate communication among all team members (Q19). However, individual contributors (IC) rated this item lower than the project managers (PM). Question 19 asked the extent to which (on a scale of 1 to 5) the project team leader supported quick and accurate communication among all team members.

Meaning and Memory (Latency Learning) Functions

Meaning and Memory (latency learning) overall learning functions of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt 2000) as measured by the Organizational Learning Survey (Johnson, 2000) showed project managers with a mean

score of 3.74, with a standard deviation of .663. Individual contributors had a mean score of 3.68, with a standard deviation of .561 (see Table 10).

Question 23 examined the extent to which the project team uses ideas and suggestions from its team members. Project managers had a mean score of *4.14, with a standard deviation of .727. Individual contributors had a mean score of *3.60, with a standard deviation of .940. This difference in the perceptions was significant (p=.045) between the PM and the IC. However, both means were high.

Table 10

Mean and Standard Deviation of Meaning and Memory (Latency Learning) Function for Project Manager (PM) and Individual Contributor (IC) Sample

Variables		Sample N	Mean	Standard Deviation
Meaning/Memory Overall	PM IC	22 20	3.74 3.68	.663 .561
Q23	PM IC	22 20	*4.14 *3.60	.727 .940
Q33	PM IC	22 20	3.27 3.40	1.316 .940
Q38	PM IC	22 20	3.91 4.10	.750 .718
Q43	PM IC	22 20	3.68 3.65	.780 .745

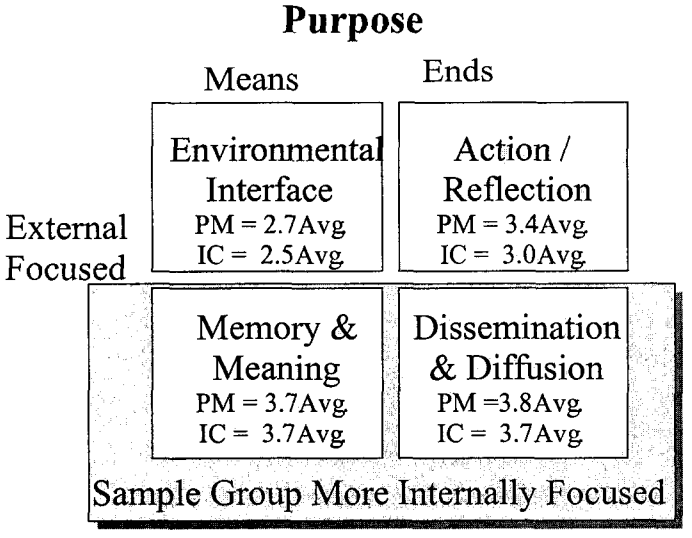
* *T* test indicates significance between the means.

Summary of Learning Survey

Examining the overall scores for each function in the context of the OLS model reveals the relative orientation of the project teams. Both the PMs and ICs show a more internal focus in their perspective on learning actions. Overall, it appears that more

emphasis is placed on the internal actions associated with Dissemination and Diffusion (integration learning) of information within the project team, with less emphasis placed on external functions associated with Environmental Interface (adaptation learning) and Action/Reflection (goal learning) functions as measured by the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000) and by the Organizational Learning Survey (Johnson, 2000). This sample group has a weak focus on accomplishing the ends (pushing the project to completion) and instead pays more attention to the contribution of the means of how they accomplish the project as being more significant to their process—indicating a more internal focus. This result shows a strong interaction and focus on the process of sharing the goals with others though organizational structures and hierarchy and the organizational culture, in order for the group to support internal sharing and communication of how well they have documented their journey, sharing their lessons learned for future project teams.

Figure 25. Mean scores of sample group.



PM = Project Manager Sample
IC = Individual Contributor Sample

Part II: The Project Manager's Role

The second construct of this study was the role of the project manager. Questions were developed and included with the OLS to provide data on project manager's norms, behaviors, and use of tools. Around each role dimension, the literature has suggested three levels of maturity (PMI, 2000): Level I—Informed; Level II—Involved; Level III—Competent.

While these levels of maturity are only identified after extensive and formalized audits performed by external auditors, these competency levels are utilized as a framework to identify the project manager's norms, behaviors, and tools reflected at the various levels of deployment. Within this framework, the literature has suggested

different activities according to the competency level. For this study, the activities of the project manager's norms, behaviors, and tools are measured as the independent variables. In accordance with the literature (PMI, 2000), Level-I maturity of norms, behaviors, and tools is defined as project managers' having awareness of the norms, behaviors, and tools of a project manager. At this level, managers may employ ad hoc processes in which they draw upon their own experiences. At Level-II maturity, the project manager employs project management protocols that are repeatable from project to project. Level-III maturity is defined as demonstrating mastery in project management norms, behaviors, and tools. At this level, project managers employ best practices and risk management that assists the enterprise in achieving strategic objectives.

The Cronbach alpha value for the Overall Project Management questions (OPM) was .7357: project manager's norms -.7176; project manager's behaviors .6819; and project manger's tools .7275. The Cronbach alpha measures the internal consistency of a set of items. In the case of project manager's norms, the inter-item correlation came into question. To examine the inter-item correlation, each of the components of the project manager's role is presented below.

Project Manager's Norms—Mean Scores

In developing the project manager's norms scale, three levels of normative behavior were outlined. These three levels of norm deployment did not correlate. For the overall sample (-.7176), if Q47 ("ad hoc—following one's experience") were removed, the alpha value would be .1774. The project manager's norms outlined in this study did

not yield a reliable scale because the progressions along a continuum of project management maturity did not show any correlation to each other.

Although the norms scale did not have sufficient Cronbach alpha or inter-item reliability to draw any conclusions with regards to this study, the mean scores and standard deviation were examined for questions regarding project manager norms (see Table 11).

The norm construct had three questions. Q47 looked at the extent to which project managers develop their own style and tools for managing a project because each project is different and unique. Project manager mean score was 3.36, with a standard deviation of 1.255. Individual contributors had a mean score of 3.15, with a standard deviation of 1.182.

Q48 examined the extent to which the project manager follows specific guidelines and procedures for managing the project. Part B of the question stipulated that, in addition, there is support through metrics, the organizational culture, and management methods to manage the project. The mean score for the project manager was 4.09, with a standard deviation of .526. The individual contributors had a mean score of 3.50, with a standard deviation of 1.192.

The final question, Q49, looked at the extent to which the project manager is seen as an integral part of a corporation-wide project management strategy. Project manager mean score was 3.77, with a standard deviation of 1.066. Individual contributors had a mean score of 4.15, with a standard deviation of .813.

Table 11

Mean and Standard Deviation of Project Manager's Norms for Project Manager (PM) and Individual Contributor (IC) Sample

Level of Deployment	Variables		Sample N	Mean	Standard Deviation
	PM Norms Overall	PM IC	22 20	3.74 3.60	.533 .453
Level I	Q47	PM IC	22 20	3.36 3.15	1.255 1.182
Level II	Q48	PM IC	22 20	4.09 3.50	.526 1.192
Level III	Q49	PM IC	22 20	3.77 4.15	1.066 .813

The data highlight a wide variation between the project managers' sample and the individual contributors sample around using rules, procedures, and metrics, as measured in Q48.

Project Manager's Behaviors—Mean Scores

Project manager's behaviors (see Table 12) had an overall mean score by project managers of 4.03, with a standard deviation of .451. Individual contributors had a mean score of 3.60, with a standard deviation of .459. Independent *t*-tests showed this difference to be significant at the p=. 05 level. Project manager's behaviors also consisted of three levels of deployment with two questions at each level of deployment (Q50-51 = Level I; Q52-53 = Level II; Q54-55 = Level 3). Independent *t*-tests showed project manager Level I (Q50-51) and Level III (Q54) as having significance between the PMs and the ICs at the p=. 05 level.

Table 12

Mean and Standard Deviation of Project Manager's Behaviors for Project Manager (PM) and Individual Contributor (IC) Sample

Levels of Deployment	Variables		Sample N	Mean	Standard Deviation
	PM Behaviors Overall	PM IC	22 20	*4.03 *3.60	.451 .459
Level I	Q50	PM IC	22 20	*4.14 *3.65	.710 .587
	Q51	PM IC	22 20	*4.00 *3.45	.535 .887
Level II	Q52	PM IC	22 20	3.95 3.70	.486 1.031
	Q53	PM IC	22 20	4.14 4.00	.560 .725
Level III	Q54	PM IC	22 20	*3.95 *3.25	.722 .851
	Q55	PM IC	22 20	4.05 3.60	.950 .598

**T* test indicates significance between the means.

The project manager's behaviors reflect high scores associated with actions surrounding the project manager's clarification of project scope, roles, expectations, tasks, and data requirement (Q50). High scores were associated with using the formal and informal structure of the organization to influence support and build relationships to achieve project goals and objectives (Q53). Finally, the project managers' perceptions of fostering collaboration, mentoring, and leadership skills within the project team were positive.

Project Manager's Tools—Mean Scores

Project manager's tools had an overall mean score by project managers of 3.40, with a standard deviation of .935. Individual contributors had a mean score of 3.20, with a standard deviation of .867. For purposes of this study, only a brief selection of tools of the project manager was selected for measurement. Project manager's tools (see Table 13) had three levels of deployment. The project managers and individual contributors scores were not significantly different.

The mean scores for questions about project manager's tools were low and had large standard deviations. This was true for both project managers and individual contributors, indicating less agreement concerning the contribution of tools to learning.

Table 13

Mean and Standard Deviation of Project Manager's Tools for Project Manager (PM) and Individual Contributor (IC) Sample

Levels of Deployment	Variables		Sample N	Mean	Standard Deviation
	PM Tools Overall	PM IC	22 20	3.40 3.20	.935 .867
Level I	Question 56	PM IC	22 20	3.14 3.15	1.195 1.268
Level II	Question 57	PM IC	22 20	3.50 3.20	1.100 1.240
Level III	Question 58	PM IC	22 20	3.52 3.25	1.078 .967

Part III: Organizational Learning Functions and the Project Manager's Role

Part III concerns the learning functions of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000) as measured by the Organizational Learning Survey (Johnson, 2000) regarding the project manager's role (norms, behaviors, and tools), as drawn from the literature (PMI, 1996, 2000). Each section provides the correlation analyses for the constructs and the project manager's questions that showed significance. Both project managers' and individual contributors' responses are provided.

Correlation analysis is used for two reasons. First, a major purpose of correlation analysis is to clarify understanding and identify relationships between variables. Second, according to Fraenkel and Wallen (1996), correlation analysis is used to make predictions. If there is significant relationship between two variables, some meaning can be drawn from those data. While correlation analysis compares the sample means of one group with the means of another group considered in this study, it does not establish

causes and effects in themselves. The explanation of variability as a contributing factor is strengthened when there is statistical significance shown at the .05 levels or with an asterisk next to the value being compared. Fraenkel and Wallen (1996) suggested that variables found "not to be related or only slightly related (i.e. when correlation below .20 are obtained) are then dropped from further consideration, while those found to be more highly related (i.e. when correlations beyond +. 40 or -.40 are obtained) often serve as the focus of additional research, using an experimental design, to see if the relationships are indeed causal" (p. 310). Correlations can range from -1.00 to +1.00. The sign of the relationship indicates the kind of relationships. In this study, project manager's norms, behaviors, and tools are correlated to the four learning functions of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000) as measured by the Organizational Learning Survey (Johnson, 2000) under study. The relationships are outlined in a series of figures that show both the combined score relationships and the group score (PM and IC) relative to the learning function. (Statistical analysis of questions versus the learning functions can be found in Appendix H.)

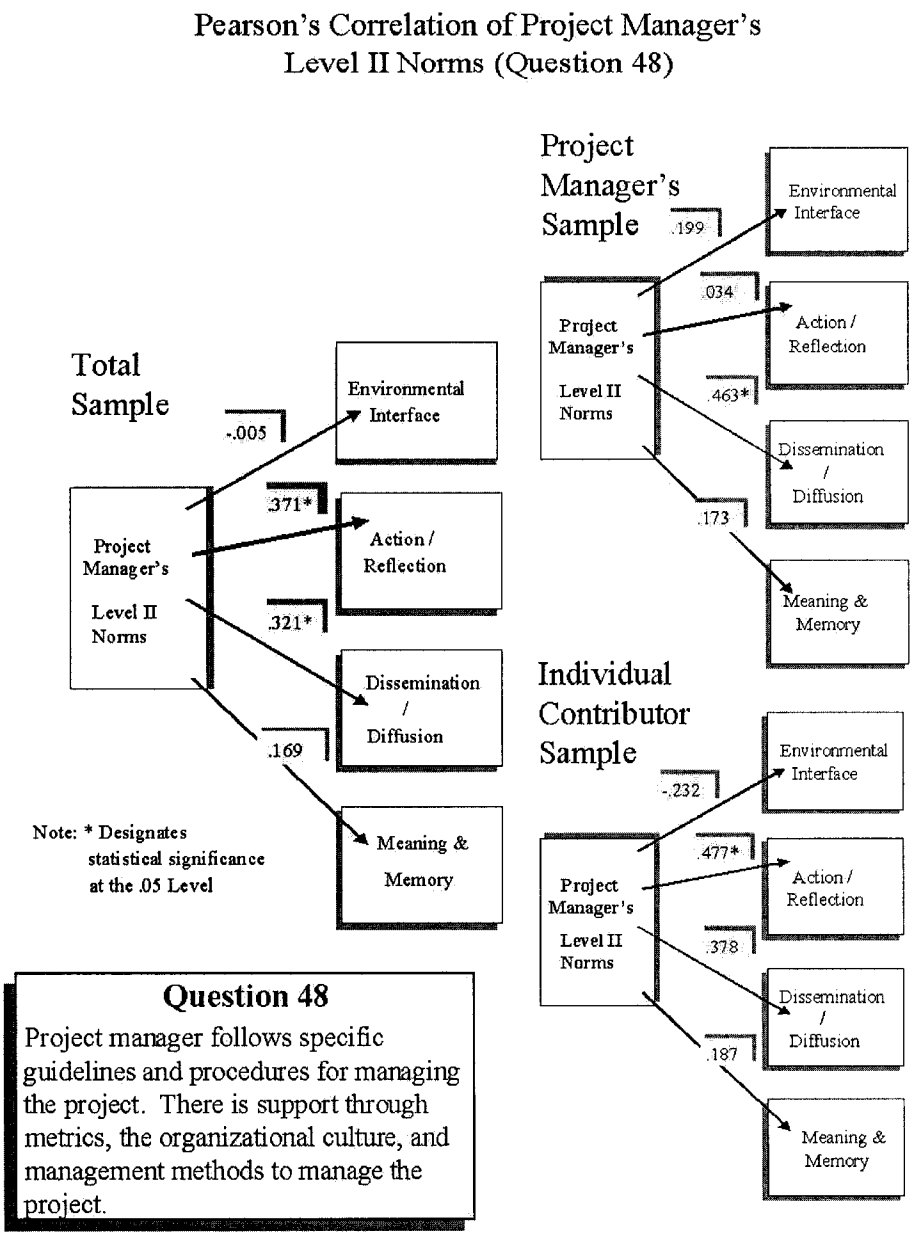
Project Manager's Norms and the Learning Functions

Due to the lack of internal correlation of the norm questions, no analysis can be completed at the cumulative level. However, analysis at the question level did provide some insights into the relationship of norms to the learning functions of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000), as measured by the Organizational Learning Survey (Johnson, 2000).

For the project manager sample, Dissemination and Diffusion (integration learning) was significantly correlated with Q48 (see Figure 26). The project manager relies on the following of specific guidelines and procedures for managing the project. By establishing ways to share new operational processes and procedures throughout the team, the project manager helps the team to collaborate to establish new processes and procedures.

For the individual contributors' sample, project manager's Level-II norms correlated significantly with Action/Reflection (goal learning) functions of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000), as measured by the Organizational Learning Survey (Johnson, 2000). The individual contributors saw the project manager's Level-II norms (Q48)—having specific guidelines and procedures for managing the project—as a way to effectively use the team and organizational structures when sharing ideas and learning. The guidelines and procedures may include weekly project reviews, weekly reports, or customer project reviews.

Figure 26. Pearson's correlation analysis of project manager's norms (Q48).



Project Manager's Behaviors and the Learning Functions

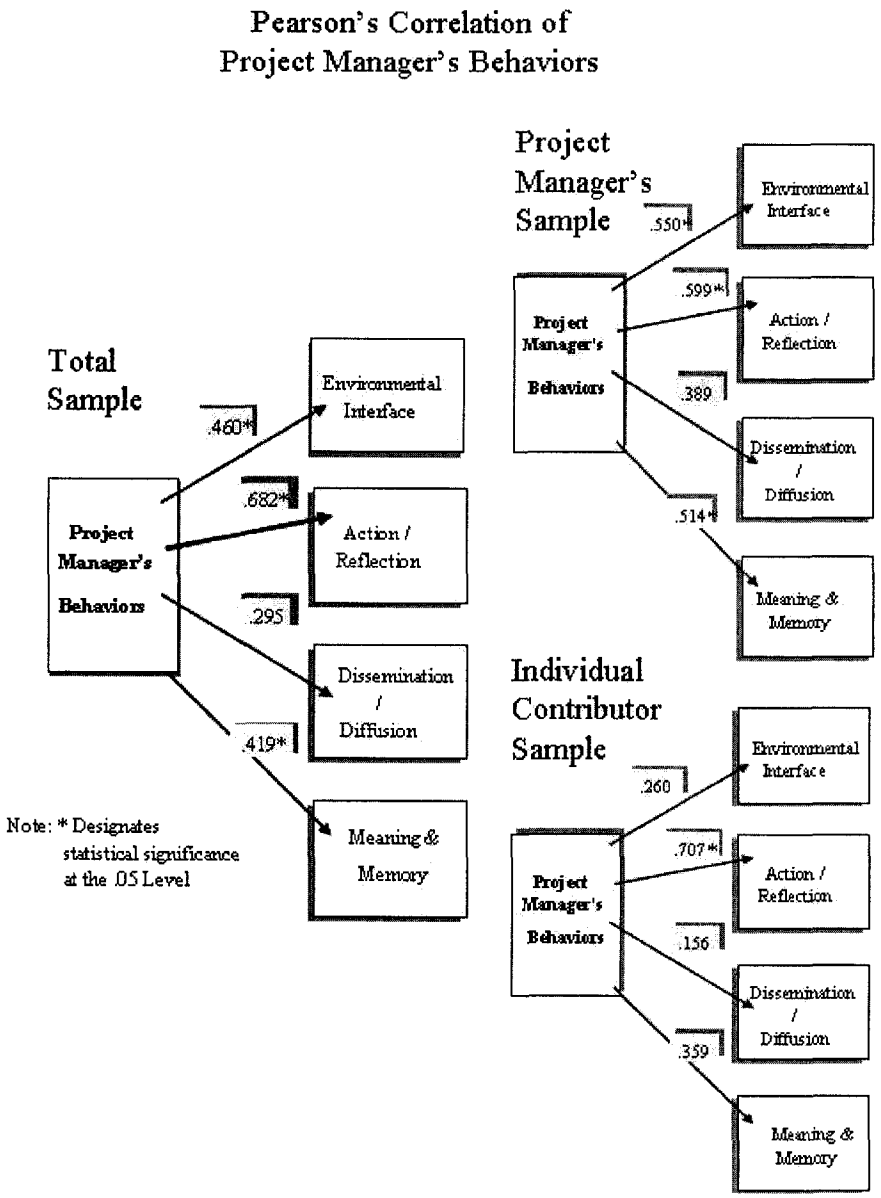
This section presents the results of the analysis of the project manager's behaviors and the learning functions of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000), as measured by the Organizational Learning Survey (Johnson, 2000). Figure 27 portrays the significant correlation of the combined scores (project managers and individual contributors) on the behavior questions regarding Schwandt model (1995, 1996, 1997, Schwandt & Marquardt, 2000).

The project manager's behaviors construct (Q50-55) is significantly correlated to Environmental Interface (adaptation learning), Action/Reflection (goal learning), and Meaning and Memory (latency learning) of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000), as measured by the Organizational Learning Survey (Johnson, 2000). When the project manager and the individual contributor samples were examined, the perceptions of the individual contributors concerning project manager's behaviors were only significantly correlated with the Action/Reflection (goal learning) function. However, the project managers' perceptions of behavior were significantly correlated with Environmental Interface (adaptation learning), Action/Reflection (goal learning), and Meaning and Memory (latency learning) functions. To provide a better understanding of this relationship, an analysis of the PMI process, correlated to the learning functions of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000), as measured by the Organizational Learning Survey (Johnson, 2000) and the PMI process flow (1996, 2000), follows.

The project manager's behaviors play a critical role in the overall process. The behaviors under study were grouped together as a single measure to show their relationship to project team learning. In particular, the project managers saw their behavior as significant to the Environmental Interface (adaptation learning), which is active in the *initiating* and *planning* processes of the project. (E.g., the project manager acts upon market analysis or a request for bid of new business.) In addition, the project manager's behaviors were significant to *executing* the project and *performing* Action/Reflection (goal learning) by keeping the project on scope, on time, and within budget. Finally, this sample of project managers reported behaviors significant to Meaning and Memory (latency learning), including taking the initiative to document project history and to formalize the completion and acceptance process of closing the project.

The individual contributors sample reported the project manager's behaviors were significant to the Action/Reflection (goal learning) function. The individual contributors saw the project manager's behaviors as significant to defining the objectives and developing decision-making and problem-solving processes (Schwandt, 1997), in order to coordinate the project team to accomplish the goals and objectives of the project.

Figure 27. Pearson's correlation of project manager's behaviors.



For the project managers, project manager's behaviors (Q50) (see Figure 28) were significantly correlated to the Environmental Interface (adaptation learning) function. As a new opportunity is identified, a project proposal is developed to solve a problem or

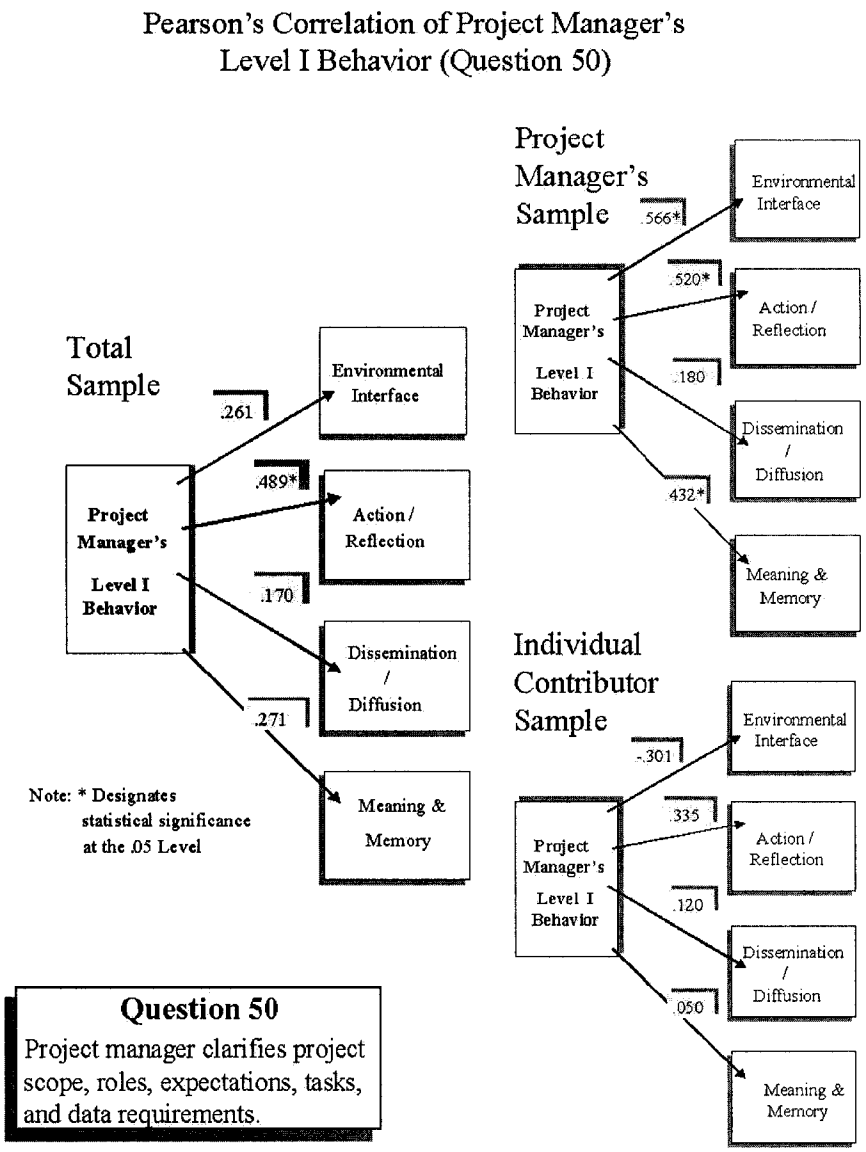
address a need. The activities of the project manager in project *initiation* and *planning* (PMI, 1996, 2000)—like the Environmental Interface (adaptation learning) function—works to identify the project scope, roles, expectations, tasks, and data requirements. The project manager works with project sponsors to identify resources and team members to accomplish the task.

In addition, while *executing* the project—Action/Reflection (goal learning)—the project manager executes the project scope, roles, expectations, tasks, and data requirements through routine day-to-day operations of the organizations and through monitoring of any actions that may have significant impact on the project team's adaptive capacities to meet the objectives of the project. .

Finally, as the project manager *closes* the project—like the Meaning and Memory (latency learning) function—the project manager reviews the project scope, roles, expectations, tasks, and data requirements and develops lessons learned, while formalizing completion and project acceptance criteria.

Level I Behavior (Q50) was not significantly correlated to the learning functions for the individual contributor's sample.

Figure 28. Pearson's correlation analysis of project manager's behaviors (Q50).



For the project managers (PM) and individual contributors (IC) samples, project manager's behaviors (Q52) (see Figure 29) correlate significantly to the Action/Reflection (goal learning) function of the Schwandt model (1995, 1996, 1997;

Schwandt & Marquardt, 2000), as measured by the Organizational Learning Survey (Johnson, 2000). When the project manager encourages initiative and information-seeking skills (*communications* management, in PMI) within the project team, the project team can set goals for accomplishing the project requirements. While the project team's primary focus is to complete a project, this study explored through the Schwandt Model (1995, 1996, 1997 and Schwandt & Marquardt, 2000) highlighted an importance of the project manager encouraging initiating among the project team members to assist in accomplishing the project goals. In addition, the project team is encouraged to share new ideas as part of the *execution* and *controlling* processes (PMI) to accomplish the project.

For the individual contributors sample, project manager's behaviors (Q53) (see Figure 29) correlated significantly to both *Action/Reflection* (goal learning) and *Dissemination and Diffusion* (integration learning) functions of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000), as measured by the Organizational Learning Survey (Johnson, 2000). The individual contributors sample indicates that the project manager's behaviors use the formal and informal structure of the organization to gain support for needed resources and materials while building relationships to achieve project goals. In addition, as measured through the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000) in the Action/Reflection (goal learning) functions (or *execution* and *controlling* of the project), it was important for the project team to have good decision-making and problem-solving processes (Schwandt, 1997) in place to accomplish the goals of the project. However, individual contributor scores were

negatively, though non-significantly, correlated with Environmental Interface (adaptation learning) function.

Figure 29. Pearson's correlation of project manager's behaviors (Q52).

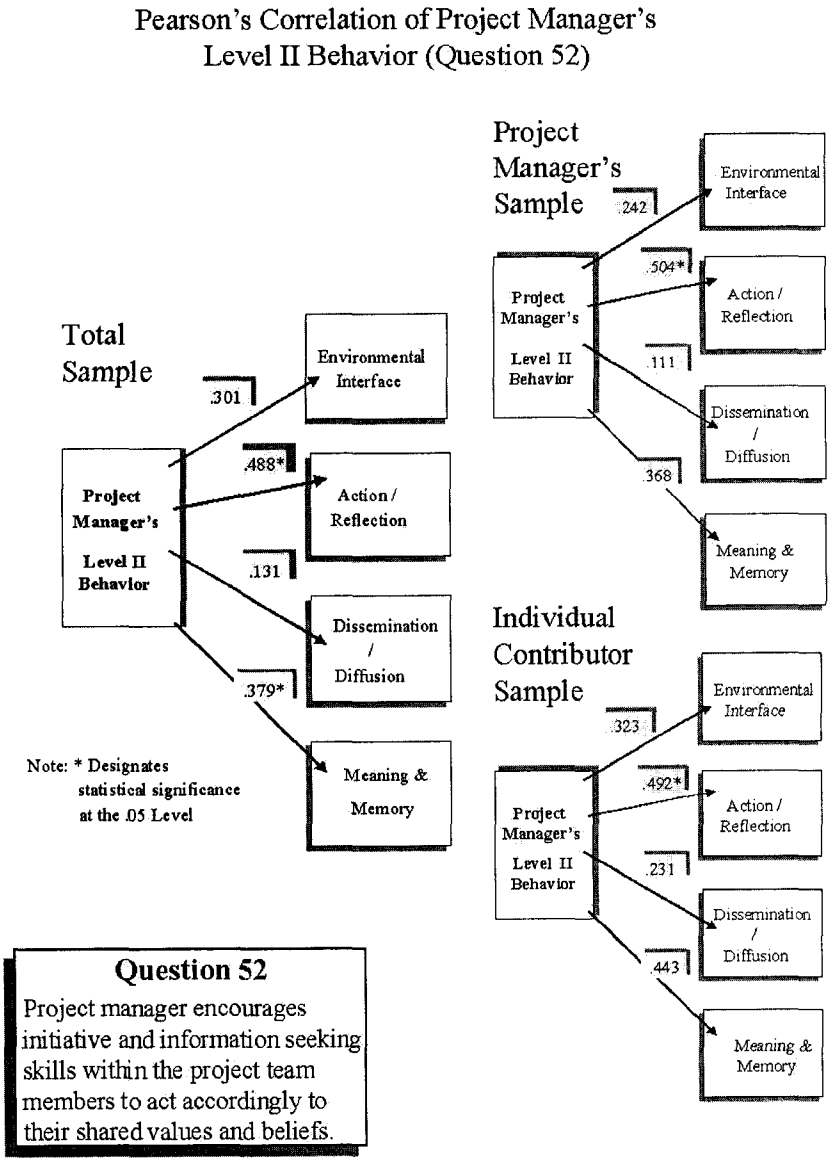
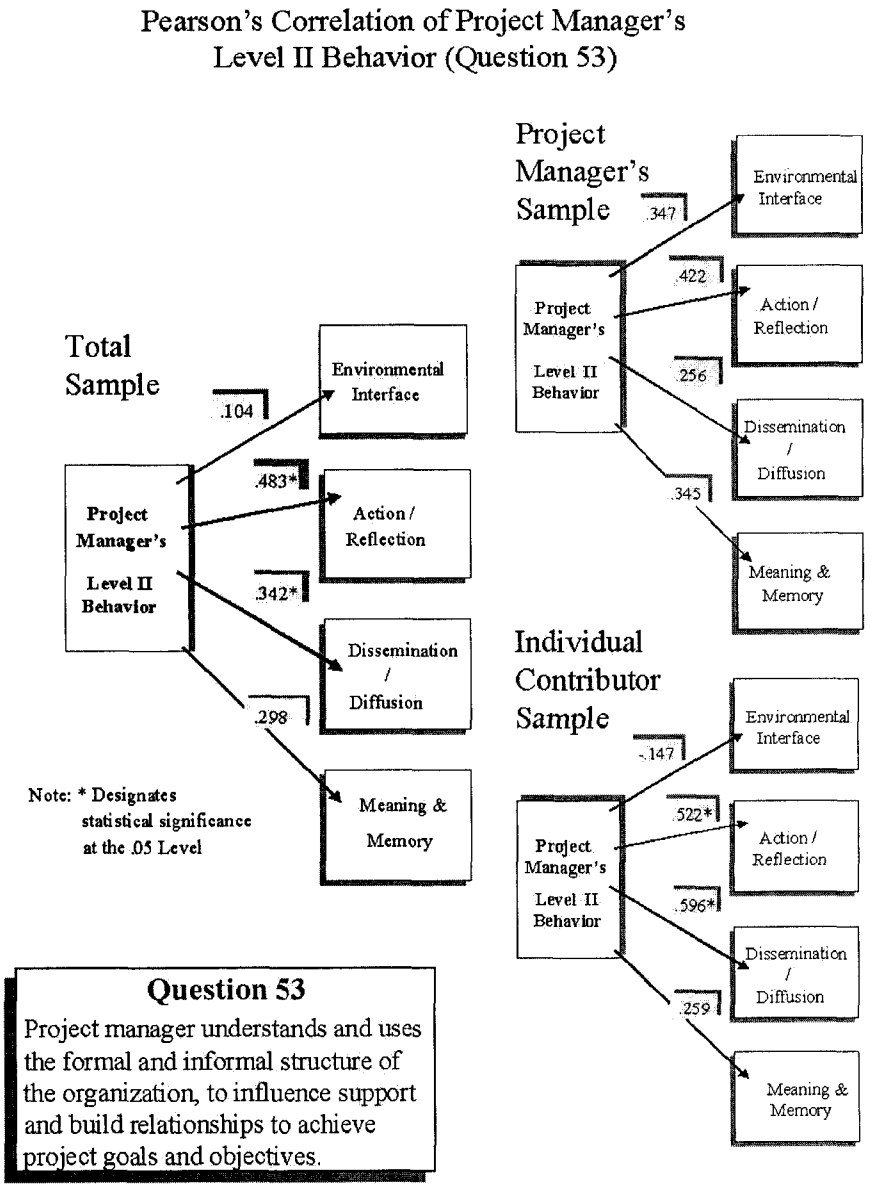


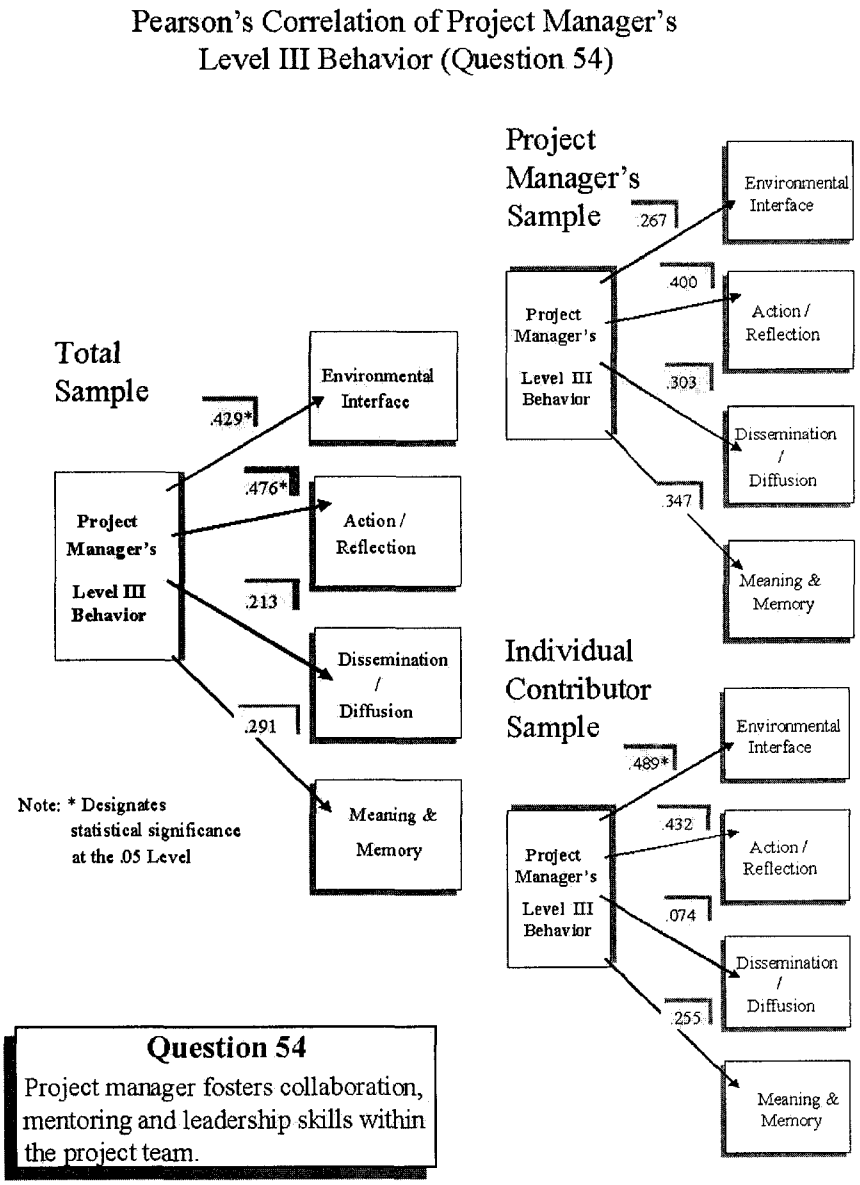
Figure 30. Pearson's correlation of project manager's behaviors (Q53).



Project manager's behaviors (Q54) (Figure 31) correlated significantly with the Environmental Interface (adaptation learning) function of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000), as measured by the Organizational Learning Survey (Johnson, 2000), for the individual contributors sample. The individual

contributors sample reported that the project manager fosters collaboration, mentoring, and leadership skills in sharing information within the project team. This correlation requires a strong process of *human resource* management (PMI, 1996, 2000).

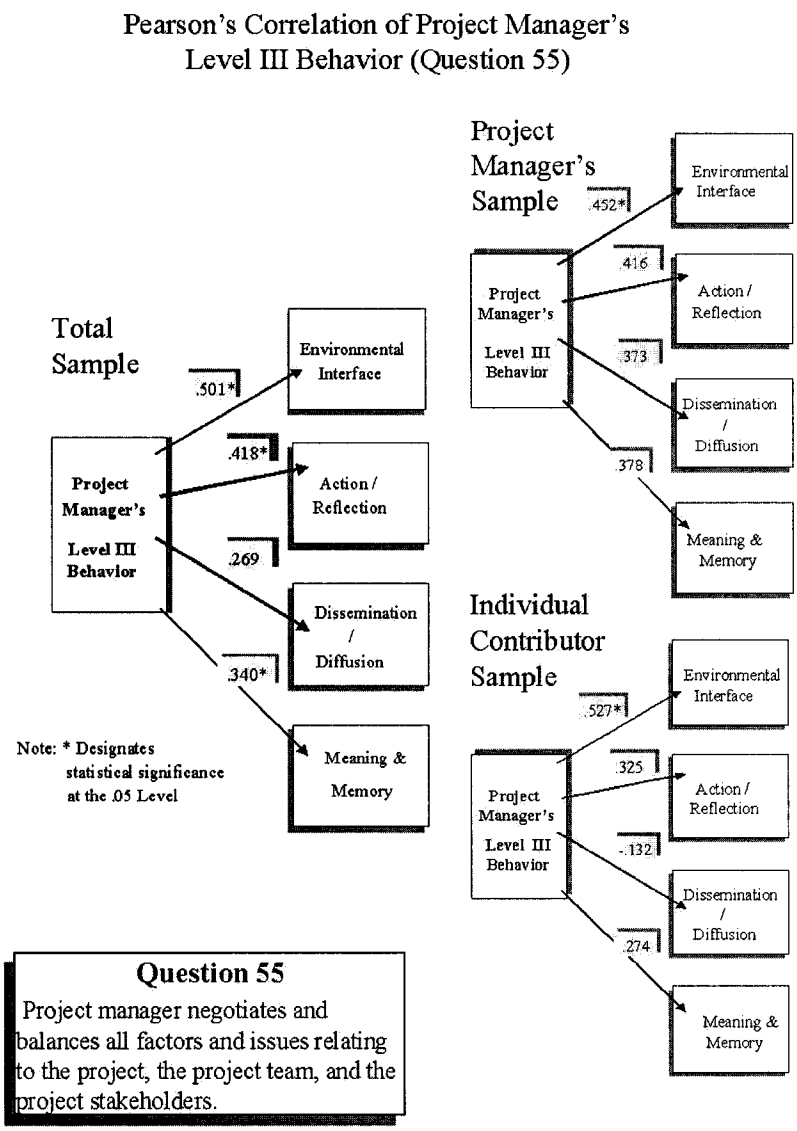
Figure 31. Pearson's correlation of project manager's behaviors (Q54).



Project manager behaviors (Q55) (see Figure 32) correlated significantly to Environmental Interface (adaptation learning) function for the individual contributors and project manager's sample. The behavior measured in Q55 concerns the extent to which the project manager negotiates and balances all factors issues relating to the project. Although the behavior measured in Question 55 not perceived as part of the project management structure, this study indicated that this sample group saw a significant correlation to the project manager's management of all factors of the project and ability to communicate this to the team so members could make necessary changes to accomplish the goals of the project. Refinement—part of the project *initiating* and *planning* processes, as shown in Figure 12—requires the project manager to make many revisions to identify the correct set of requirements for the customers. As part of the *initiating* and *planning* processes of the Environmental Interface (adaptation learning) function, the individual contributors reported the importance of the project manager's being "in the loop" to define and refine objectives and to identify how to achieve them through the project team.

This study also showed a significant correlation with activities in the Action/Reflection (goal learning) function. When treated independently, project managers and individual contributors samples did not show significant correlation to the Action/Reflection learning function, due to the divergence of opinions within each group.

Figure 32. Pearson's correlation of project manager's behaviors (Q55).



Project Manager Tools and the Learning Functions

This section presents the results of the analysis of the project manager's role dimensions of tools and the learning functions of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000), as measured by the Organizational Learning Survey (Johnson, 2000). Also, as shown in Figure 14, project manager's tools compose an

integrated part of each of the five steps of a project and the nine process steps of the PMI (1996, 2000). PMI tools range from project plans, GANTT charts used in scheduling, Critical Path Analysis used in schedule development, and unfinished portions of the project (PMI, 1996, 2000) to risk management and quality reports. While this study could not investigate all tools related to each process step, three basic categories of tools were selected: (1) GANTT charts used in scheduling the *planning* process (Q56); (2) use of software programs (indicating templates provided to perform critical path analysis, scheduling, and network diagramming related to scheduled performance) (Q57); and (3) use of the technology and software tools to assess the *cost* and *quality* performance of projects, in addition to scheduling performance (Q58).

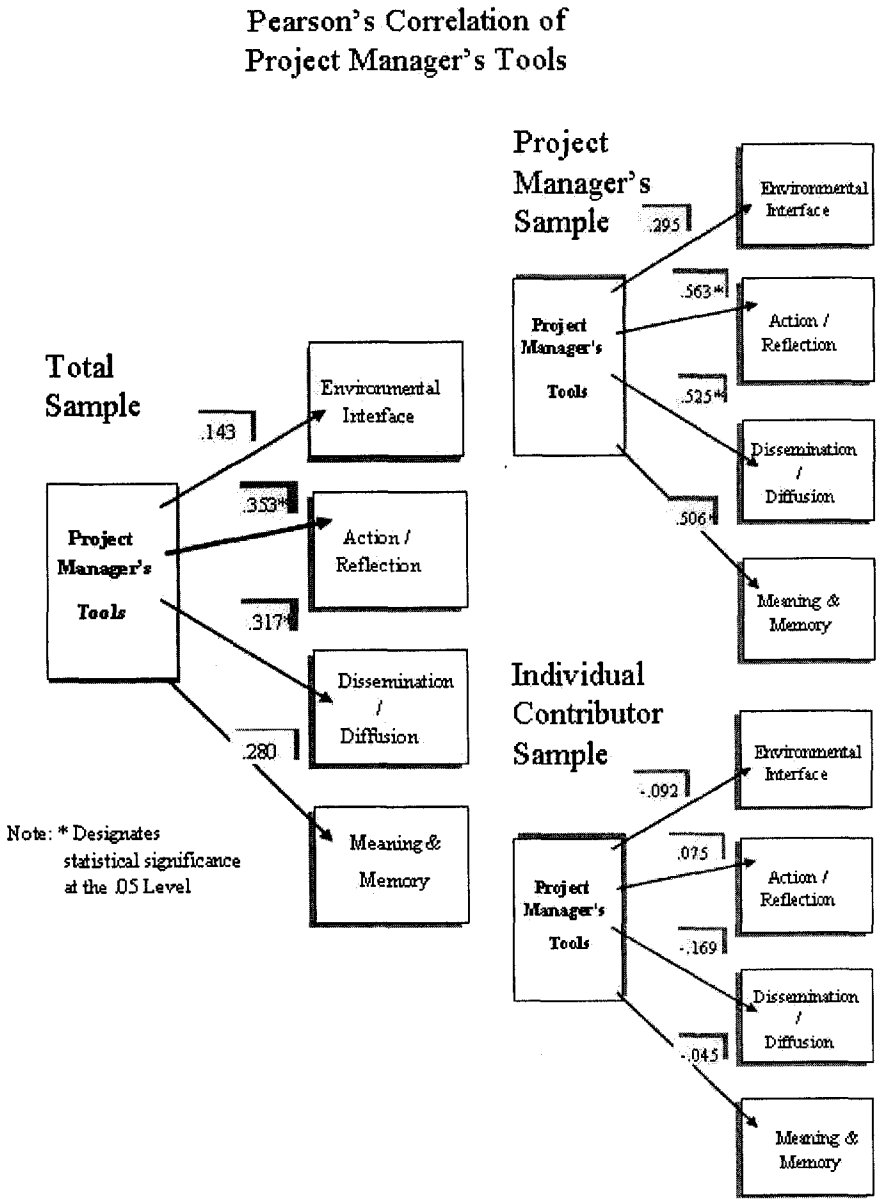
With this framework, this study utilized these three levels of project management tools to access the linkages to the organizational learning construct. All correlation and regression tables for project managers Tools are presented in Appendix H (Tables H2 to H29).

Figure 33 portrays significant correlations of the combined scores (project manager and individual contributor) of the tools questions as being significant to the Action/Reflection (goal learning), Dissemination and Diffusion (integration learning), and Meaning and Memory (latency learning) functions of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000). Project manager's tools provided a means for the individuals on the project team to have achievable goals reflected in the *execution* and *controlling* processes of the project as measured in the Action/Reflection (*goal learning*) function. In addition, project manager's tools were significant to the Dissemination and

Diffusion of information (same as *communication* management of PMI [1996, 2000]) to the project team, thus answering Q2 of the study. For the project manager sample, tools were a way to share new procedures and processes within the project team. Tools were also significant to the project manager in the creation of project history as part of project *closing* and the Meaning and Memory (latency learning) function of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000). Project manager's tools were not significant to the individual contributors sample.

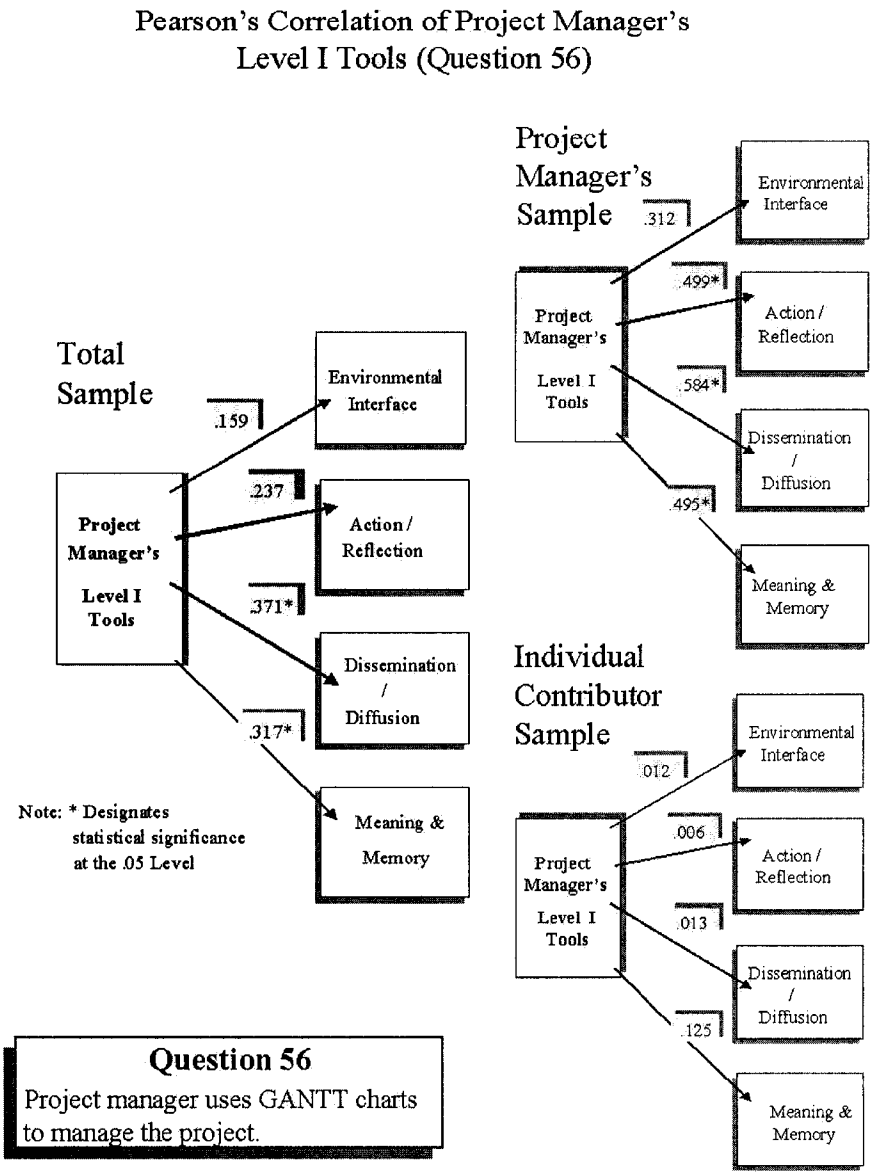
For the project managers' sample, tools (see Figure 33) correlated significantly to the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000), as measured by Action/Reflection (goal learning) (Q20, 21, 44), Dissemination and Diffusion (integration learning) (Q16, 19, 34, 39), and Meaning and Memory (latency learning) (Q23, 33, 38, 43) functions in the Organizational Learning Survey (Johnson, 2000). While GANTT charts are utilized to create the scheduling; this project manager sample sees the use of GANTT charts as a *planning & executing* tool (Q56) as a significant way to setup an infrastructure for the project team to research and develop new processes and/or services (Q20). While the project manager follows rules and procedures as part of the project methodology, the project team is encouraged to explore the permeable boundaries of the work to develop new processes to become more efficient on their job. Also, part of scheduling tasks and understanding the complexity of the many detailed tasks, tools provide a mechanism for the project team leader to foster accurate communication among all team members (Q19), also represented in the *communication* management process (PMI, 1996, 2000).

Figure 33. Pearson's correlation of overall project manager's tools (Q56)—combined scores.



In addition, the *Dissemination and Diffusion* (integration learning) function looks for established ways to share new operational processes and procedures throughout the project team (Q34). Even though GANTT charts are used for task scheduling, this sample group saw a statistical significance in employing tools such as GANTT as a mechanism to share new operational processes and procedures (Q34) within the project team. In addition, GANTT charts were seen as a significant contributor in creating project history and learning reflected in the *Meaning and Memory* (latency learning) function as measured by the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000) and the Organizational Learning Survey (Johnson, 2000). Although GANTT charts deal with planned start and expected finish dates for each detail activity (PMI, 1996) this group of project managers saw a strong link between (a) the schedule-related information and activity duration highlighted in the GANTT charts and also (b) the use of the GANTT charts as a source of project history (*Meaning and Memory* [latency learning]) of the project team. The project management community strives to have quality people trained to have quality project plans. By reviewing these documents and making improvements on the data within the project plans the tasks scheduled will be improved upon updating what worked from previous projects. This, however, was not the perception of the individual contributors sample. The individual contributors sample did not report any significance of GANTT charts to project team's learning functions.

Figure 34. Pearson's correlation of project manager tools (Q56)—project managers sample.



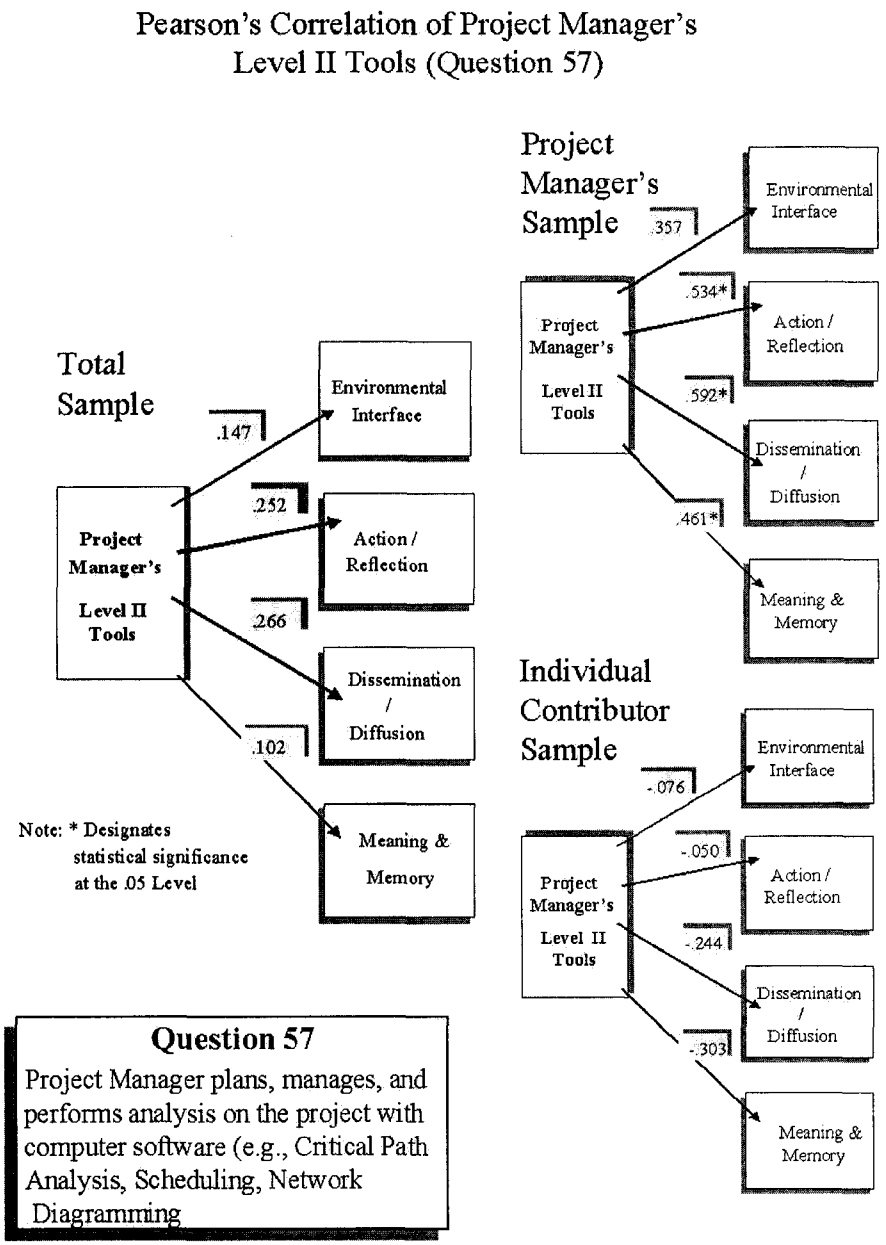
For the project managers sample, project manager tools (Q57) (see Table 14) correlated significantly to the Action/Reflection (goal learning), *Dissemination and*

Diffusion (integration learning), and *Meaning and Memory* (latency learning) functions of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000) reflected in the Organizational Learning Survey (Johnson, 2000). This project manager sample sees a strong connection between the use of software tools such as *Critical Path Analysis, Scheduling, Network Diagramming* (Q57) and setting goals for researching and developing new process and/or services as measured by the Organizational Learning Survey (Johnson, 2000).

For example, *Critical Path Analysis* software is used to provide the mathematical analysis for calculating the theoretical "early and late start and finish dates for all project activities without regard for any resource pool limitation" (PMI, 1996, p. 67). Through this analysis a "path" is created from critical elements that must happen at certain times within the project to meet the end goal. The project scheduling reflects the planned dates for performing activities within the project and the planned dates to meet critical deliverables of the project (PMI, 2000). Third, *Network Diagramming* provides a schematic display of the sequential and logical relationships that compose the project or often called a PERT chart. While these software tools do not directly perform the learning functions in the Organizational Learning Survey (Johnson, 2000), they provide the project manager with the tools necessary to give accurate communication among all team members (Q19) as part of the *Disseminate and Diffusion* learning function and part of the *communication* management process (PMI, 1996, 2000). Software tools provide a means to share new operational processes and procedures throughout the project team (Q34). In addition, software tools can be utilized to create *Meaning and Memory* (latency

learning) by developing a project history and using them to evaluate project goals, resources, and schedules. Project manager's tools had a negative correlation, although non-significant, to the individual contributors sample.

Figure 35. Pearson's correlation of project manager tools (Q57).



Relationship of Roles to Overall Learning Scores

To better understand the contribution of the project manager's role to learning, regression of the role factors (norms, behaviors, and tools) to the overall learning score (OLS) was performed. Table 14 highlights this exploratory process. When project managers' responses were considered as a sample, 41.9% of the variance of OLS score came from the independent variables of norms, behaviors, and tools. Specifically, the coefficient data showed behaviors (p=. 017) to be significant to the project team's learning score (see Table 16). Individual contributors scored project manager behaviors as significant contributors (p=. 019). The implications of these values are explored in Chapter Five.

For the project managers' sample, this means that project team learning, as measured by the Organizational Learning Survey (Johnson, 2000), is accomplished through the project manager's norms, behaviors, and tools. More specifically, the project manager behaviors were key contributors to the overall learning perceptions within the project team. For the individual contributors sample, while there was not an overall significance to the project manager norms, behaviors, and tools, this sample group saw the project manager behaviors as being significant to project team learning.

Table 14

Multiple Regression Summaries by Project Manager's Norms, Behaviors, and Tools for Project Managers and Individual Contributors

Learning Function	Project Managers	Individual Contributors
OLS—Overall Learning Score	Norms, Behaviors, and Tools = 41.9% *Behaviors Significant (p=. 017)*	No Significance Overall *Behaviors Significant (p=. 019)*

Because the norm dimension of the project manager's role had a low Cronbach alpha, the second regression analysis grouped deployment levels of the project management questions. Drawing upon project management literature (PMI, 1996, 2000), project management is often measured in levels of maturity. While levels of maturity require significant external testing to determine maturity and capability of project management deployment, this study utilized three levels of maturity as a guideline only to specific norms, tools, and behaviors featured at the various levels of maturity:

1. Level-I norms, behaviors, and tools: Level of expertise—being informed about project management, but not following the methodology.

2. Level-II norms, behaviors, and tools: Level of expertise—being involved with project management as a way to manage projects and processes.

3. Level-III norms, behaviors, and tools reflected some level of competency in the deployment of project management. Within this framework, the second set of regression analysis was analyzed. Levels of deployment were examined with specific relationships to the overall learning score, as highlighted in Table 15.

Table 15

Multiple Regression Summaries of Results for Project Management Deployment Levels I, II, and III for Project Managers and Individual Contributors

Learning Function	**Project Managers Adjusted R^2**	**Individual Contributors Adjusted R^2**
OLS—Overall Learning Score	PM Level I 31% • *PM Level I T Sig. (p=. 014)* PM Level III 31% • *PM Level III B2 Sig. (p=. 015)*	PM Level II 41% • *PM Level II N Sig. (p=. 040)* • *PM Level II B1 Sig. (p=. 007)* • *PM Level II T Sig. (p=. 045)*

While the role of the project manager is to track deliverables and to encourage the project team to meet these deliverables, this study explored the relationship of project manager's activities in relation to learning functions as measured by the Organizational Learning Survey (Johnson, 2000). These activities measured in the survey were often viewed as beyond the normal project manager's role of current activities. This demonstrated the permeable elements of the project team-learning environment.

Thirty-one percent of the variance in the OLS scores for the project manager sample was accounted for by project Level-I activities, with project manager Level-I tools being significant (p=. 014). Level-I tools (Q56) identify the extent to which the project manager utilizes GANTT charts, indicating that the *planning* process is important to the learning function. In addition, project manager Level-III activities with Level-III B2 behaviors were significant (p=.015). Level-III B2 (Q55) behavior measures the extent

to which the project manager negotiates and balances all factors and issues relating to the project, the project team, and the project stakeholders.

In a multiple regression analysis, 41% of the variance in the OLS score for the individual contributors was accounted by project manager's Level-II activities. In particular, Level-II norms contributed to OLS (p=. 040); Level-II B1 behaviors contributed to OLS (p=. 007); and Level-II tools contributed to OLS (p=. 045) for the individual contributor sample. The individual contributors saw the project managers' following specific guidelines and procedures for managing the project as being significant to the learning within the project team (Q48). In addition, the project team members saw the project managers as encouraging them to take initiative and to seek better skills while keeping an ethical environment (Q52). Third, the individual contributors viewed the use of project management tools and other computer software as significant contributors to the learning environment of the project team (Q57).

To answer the second research question of the study, a second multiple regression was accomplished by looking at the levels of deployment of norms, behaviors, and tools to only the Dissemination and Diffusion (integration learning) function of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000), as measured by the Organizational Learning Survey (Johnson, 2000). Table 16 identifies these findings.

Table 16

Multiple Regression Summary of Dissemination and Diffusion (Integration Learning) of Results for PM Deployment Levels I, II, and III for Project Managers and Individual Contributors

Learning Function	**Project Managers Adjusted R^2**	**Individual Contributors Adjusted R^2**
Dissemination/Diffusion Learning Function	PM Level I 30% • *PM Level I T Sig. (p=. 004)*	PM Level II 30% • *PM Level II B2 Sig. (p=. 015)*

Thirty percent of the variation of the project manager's Dissemination and Diffusion (integration learning) score was accounted for by the project managers' Level-I deployment, specifically Level-I tools (the utilization of GANTT charts) (p=. 004). Although GANTT charts are utilized in the *planning* function of the project management process, this sample group reported the tools as significant for *execution* and *controlling* the project as measured by PMI (1996, 2000). Thirty percent of the variation of the individual contributors' Dissemination and Diffusion (integration learning) score was accounted for by project managers' ability (p=.015) to demonstrate uses of the formal and informal structure of the organization, while building support and creating a collaborative relationships to achieve project goals and objectives (Level II B2) (Q53).

Summary of the Findings

The findings from the research questions and analysis of the learning functions within the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000)—as measured in the Organizational Learning Survey (Johnson, 2000) and the project

manager's role characteristics of norms, behaviors, and tools and their interrelationships—are presented below.

1. Overall, the teams' scores on the learning functions reflected an internal focus, with highest values in the Dissemination and Diffusion and the Meaning and Memory learning functions, as reflected in *execution*, *controlling*, and *closing* of the project (PMI, 1996, 2000). These learning functions and their associated actions reflected high ratings of communication, collaboration, mentoring, and leadership skills (*communication* management process of PMI) to the individual contributors sample. In addition, the project teams saw the need for continuous change, reflected in the PMI *quality* process and valuing customer feedback in the process.

2. Overall scores for the Environmental Interface (adaptation learning) and Action/Reflection (goal learning) functions of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000) were the lowest mean scores. In particular, the Environmental Interface (adaptation learning) function was the lowest rated, which includes actions associated with tracking of competitors and evaluation of external information received as part of the *initiation* and *planning* PMI process.

3. With respect to the characteristics of the project manager's role—

a. Although the *norms* scale was discounted because of low inter-item relationships, the individual questions indicated wider disparity between project managers and individual contributors with respect to the value of the extent to which the project manager follows specific guidelines and procedures for managing the project. The project managers' sample used this

norm to Disseminate and Diffuse learning information to the project team. The individual contributors' sample saw this being significant to the Action/Reflection (goal learning) function—necessary to get the project accomplished.

b. The scores for the project manager's *behaviors* scale were high compared to the other scales (norms and tools). Significant differences were found in the project managers' scores versus the individual contributors scores. The individual contributors rated the behaviors lower than did the project managers. The project manager's sample saw the important behaviors as clarifying the task, roles, and expectations while encouraging initiative and information-seeking skills within the project members. The individual contributors sample saw the project managers' important behaviors as negotiating all factors of the project, fostering collaboration, mentoring, and providing leadership skills.

c. Overall scores for the *tools* scales were rated low for both project managers and individual contributors. However, the individual contributors scored lower with a high standard deviation. The tools were seen as the means to the end. That is, tools are there for managing the project, not for doing the actual work. There was a divergence of opinion on the value of tools.

4. When the relationships between the project manager's role and learning functions were examined, the following findings were obtained.

a. With respect to *norms* (only Q48), there was a significant correlation between the project managers' score and the Dissemination/Diffusion learning function. However, this item for the individual contributors correlated with Action/Reflection (goal learning) function. The project manager saw the rules as being related to the movement of information, while the individual contributor saw rules as being related to the achievement of the project, thus achieving the team's learning and performance goals.

b. The overall *behavior* scale for the total sample was correlated significantly to Environmental Interface (adaptation learning), Action/Reflection (goal learning), and Meaning and Memory (latency learning) functions. However, individual contributors saw behaviors as being significantly correlated to the Action/Reflection (goal learning) function, the process of getting the project through *execution* and *controlling* in the PMI process. The project managers sample rated behaviors, as defined in this study, as significant to Environmental Interface (adaptation learning) function (*initiation* and *planning*), Action/Reflection (goal learning) function (*execution* and *controlling*), and Meaning and Memory (latency learning) function (*closing* of the project).

c. The overall *tools* scores for the total sample were significantly correlated with Action/Reflection (goal learning) (*execution* and *controlling* in the PMI processes) and Dissemination and Diffusion (integration learning) (*planning*, *execution*, *controlling*, and *closing* PMI processes). To the project managers'

sample, tools were significant to Action/Reflection (goal learning), Dissemination and Diffusion (integration learning), and Meaning and Memory (latency learning) functions. Individual contributors had no significant correlations between the tools and the learning functions. In fact, the correlations, although small and non-significant, were in the negative direction. However, tools were significant to the Overall Learning Score to both the project managers and the individual contributors.

The next chapter covers the conclusions of this exploratory study with recommendations for future study.

CHAPTER 5

DISCUSSION AND IMPLICATIONS

This chapter discusses the conclusions drawn from the findings and their implications. It includes the interpretation of the findings some supported through the literature while other findings are not yet supported and require further study. Implications and recommendations from the study are also included.

This study was framed around two constructs: the role of the project manager as measured by norms, behaviors and tools, and project team learning. Using the Organizational Learning Survey (Johnson, 2000), based on Schwandt's Organizational Learning Model (1995, 1996, 1997) (in turn built upon on Parsons, Bales, and Shils's [1953] theories), data were collected for the purpose of gaining an understanding of the role of the project manager and the learning functions associated with the project team. In addition, an expert panel developed a set of questions from the literature review to better understand the project manager's role through norms, behaviors, and tools that are associated with the project team concept.

Discussion of Findings of the Study

The conceptual frame (Figure 36) of the study looked at the construct of the role of the project manager reflected through specific norms, behaviors and tools, and the organizational learning construct measured by the Learning Survey (Johnson, 2000). The project manager's role under study utilized the PMI 1996 processes measured through the five stages of project activities *(initiation, planning, execution, and closing*). The *controlling* project activity occurs during each of five project stages. The five project activities align with activities seen in the four organizational learning quadrants of the Schwandt model (Schwandt, 1995, 1996, 1977) under study. The results of this study are presented around Schwandt's (1995, 1997) Organizational Learning Systems Model. This model provided the researcher with a means to assess organizational learning from the perspective of the project managers (PM) and the individual contributors (IC) concerning the role of a project manager.

The dependent variables of the study were a set of actions representing an Overall Learning Score (OLS) and the four learning functions of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000), as measured by the Organizational Learning Survey (Johnson, 2000): Environmental Interface (adaptation learning), Action/Reflection (goal learning), Dissemination and Diffusion (integration learning), and Meaning and Memory (latency learning). The independent variables were the project manager's associated norms, behaviors, and tools.

Figure 36. Conceptual frame.

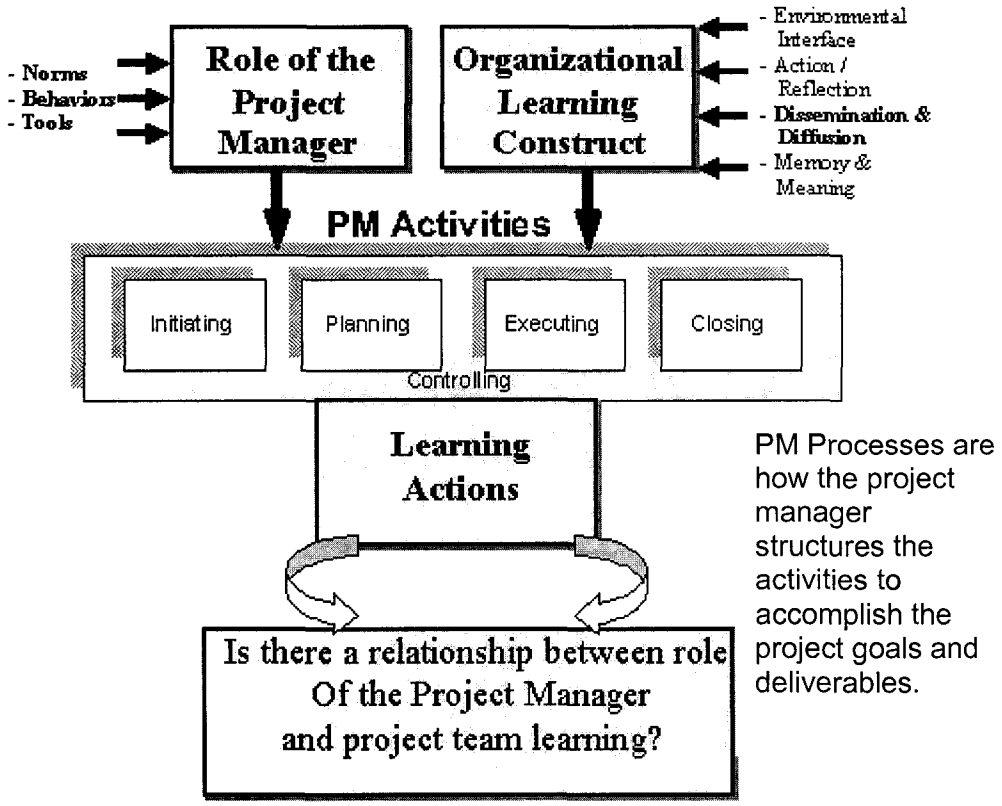
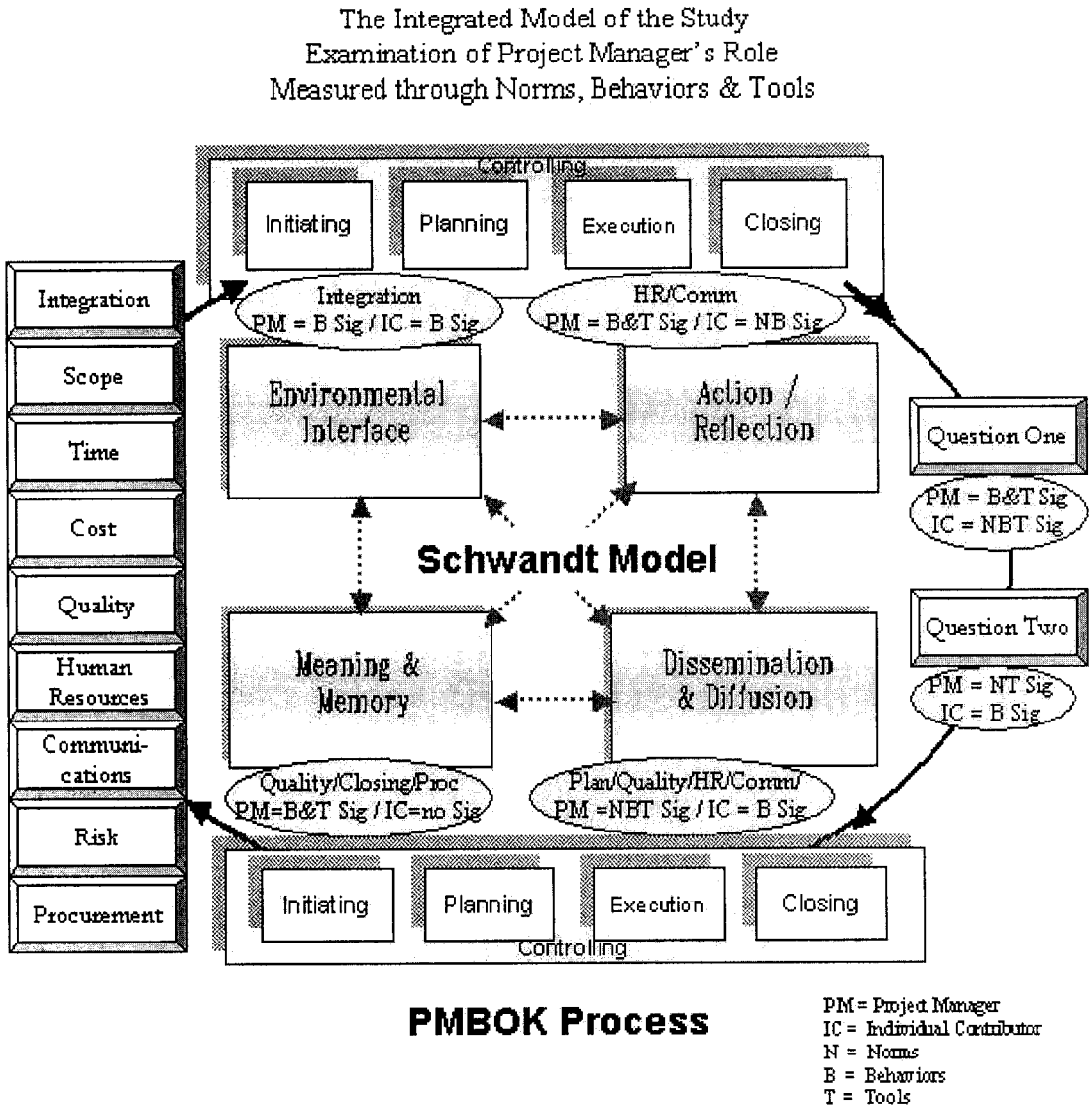


Figure 36 shows how the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000) compares with the process flow of the project manager under study. The findings from the analysis of the Organizational Learning Survey (Johnson, 2000) are related to various activities of the PMI process to provide an integrated view of the study's findings. First, the figure shows the answers to the study's two questions. Question 1 was answered by showing the role of the project managers' norms, behaviors, and tools were significant to project team learning within this sample group. Answering Question 2, project manager's sample reported that norms and tools were significant to the project manager sample in dissemination and diffusion of information to the project

team, while the individual contributors reported that project manager's behaviors alone were significant in the dissemination and diffusion of project team information.

In addition, Figure 36 highlights the findings by learning quadrant (Schwandt, 1995, 1996, 1997; Schwandt & Marquardt, 2000). *Environmental Interface* learning functions showed project manager behaviors were significant to both project managers and individual contributors. The project manager's activities are highlighted in the (PMI, 2000) integration process flow. In the *Action/Reflection* learning functions, the project manager's sample reported behaviors and tools to be significant, while the individual contributors reported norms and behaviors to be significant. In the *Dissemination and Diffusion* learning function—activities seen in the *planning, quality*, and *HR communication* project management processes—project manager reported norms behaviors and tools as significant, while the individual contributors reported project manager's behaviors as significant. Finally, in the *Meaning and Memory* learning function—activities such as *quality processes* and *closing* the project—project managers reported behaviors and tools as significant, while the individual contributors reported no significance.

Figure 37. Integration analysis of the study's findings.



The integrated model shows the complete correlations and findings of the study as they relate to the role of the project manager and project team learning. The findings are highlighted in this section through the Schwandt model learning subsystems (1995, 1996, 1997; Schwandt & Marquardt, 2000) in *italics* as well as through the related project management process (PMI, 1996, 2000).

Finding 1: Overall Learning Score

The study asked the following question: *Is there a relationship between the role of the project manager and organizational learning within the project team, as measured by an Overall Organizational Learning score?* The project manager's role as measured by norms, behaviors, and tools does create and influence the overall learning perceptions within this one project management organization of a specific company. This was explored through Schwandt's (1995) definition of organizational learning: "a system of actions, actors, symbols, and processes that enables an organization to transform information into valued knowledge that is in turn increases its long-term adaptive capacity" (p. 11).

However, the way this learning was perceived depended upon the sample group. The project managers reported behaviors and tools as structuring variables (Giddens, 1984) that are significant to the overall learning of the project team. The individual contributors saw norms, behaviors, and tools as structuring variables (Giddens, 1984) as contributing to the overall learning perceptions. In addition, this purposeful sample group was more internally focused on learning functions such as *Dissemination and Diffusion* (integration learning) and *Meaning and Memory* (latency learning) functions as defined

by the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000) and measured by the Organizational Learning Survey (Johnson, 2000). This purposeful sample was located at the corporate office of the company and could have been more focused on internal projects relating to the growth of the company, than on projects centering on external customers.

The following three aspects of the project manager's role were studied: norms, behaviors, and tools. To appreciate the complexity of the project manager's role under investigation, the three independent structuring variables' findings will be discussed.

Project Manager's Norms

Although the *norms* scale was discounted due to low inter-item relationships, one aspect measured was significant to this sample. The project managers saw the extent to which the project manager follows specific guidelines and procedures for managing the project as being significant to the *Dissemination and Diffusion* (integration learning) (internal learning activities); however, the individual contributors saw this activity as being significant to the *Action/Reflection* (goal learning) function, an external process of accomplishing the goals of the project. While the project manager uses project management procedures such as PMI processes, the project manager provides the structure for relating the goals and objectives of the project to the internal learning processes of the organization (Schwandt, 1995, 1997; Schwandt & Marquardt, 2000).

The project managers deliver results through following specific guidelines and procedures. The process followed in this study was the PMI process of *initiating*, *planning*, *executing*, *controlling*, and *closing* the project. Subsequently, the individual

contributors are focused on getting the job completed, and they see the project management processes as a way to identify the goals for the project through the PMI *communication* process (PMI, 1996, 2000) to the *Action/Reflection* subsystem (goal learning) (external learning activities) (Schwandt, 1995, 1996, 1997; Schwandt & Marquardt, 2000).

This finding supports Watkins and Marsick (1993), Daft and Huber (1987), and Walsh and Ungson (1991) by providing evidence that project managers consider guidelines and procedures (Q48) to be significant in disseminating and diffusing of learning. In addition, Daft and Huber (1987) and Walsh and Ungson (1991) suggested that structures and systems ensure that knowledge is stored and shared for the organization's memory, thus creating learning. This is relevant to the project manager since *closing* a project is a required process of a project, and the project manager needs to be proficient in storing project lessons learned as part of the project memory.

Project Manager's Behaviors

The most significant variable that contributed to the perceptions of learning within this purposeful sample was the project manager's *behaviors*. The project managers' sample reported that the behaviors of clarifying project scope are important to *Environmental Interface* (adaptation learning) function. Further, determining roles and expectations achieves *Action/Reflection* (goal learning) and encourages individual contributors to take the initiative as agents of diffusing learning. The information-seeking skills found in the *Dissemination and Diffusion* (integration learning) subsystem are significant to performing the project management job. In return, the project managers'

sample receive this information from the project team and then negotiate and balance all factors and issues relating to the project team, the project, and the project stakeholders, thereby creating memory while *closing* the project. This evidence supports Watkins and Marsick's (1993) research on the importance of developing cross-functional, self-directed work teams focused on building collaborative skills, as identified in the PMI *communications* process. Project manager behaviors such as encouraging information-seeking skills and negotiating all factors relating to the project both restate the need for cross-functional and self-directed project teams.

Project Manager's Tools

The third variable significant to project team learning for this study was the project manager's *tools*. The tools employed in the PMI process (see Figure 14) serve as the means to carry out each set of activities within a project. This study selected a few tools as representative of the entire tool process. Whether the project manager is accomplishing the goals of the project through *Action/Reflection* (goal learning) activities while *executing* the project, through *Dissemination and Diffusion* (integration learning) of information to the project team, or through creation of *Meaning and Memory* (*controlling* or *closing* of the project)—each phase of the project is managed through a set of tools. The project managers' sample saw the *planning* and *scheduling* tools as significant to accomplishing the project. The individual contributors' sample uses the outcome of the project manager's utilization of tools to understand the project status and deadlines associated with activities of *Action/Reflection* (goal learning) and *Dissemination and Diffusion* (integration learning) functions. This further highlights

Giddens' (1984) focus on recursive interplay of structures and process as interrelated elements of the structuring process through which the structures are constituted. In addition, the project manager demonstrates the adaptive capacity between structure and practice, such as the following-the-rules ("this is how we do it here") and legitimation ("this is how we should do it") aspects of the structure (Giddens, 1984).

Tools were viewed as being significant to overall learning as reported by the participants in this study. The premise of project management is rooted in providing a structure that allows the information to guide the activities within the project. These structures provide the content and importance of the mechanics to accomplish the project.

Finding 2: Environmental Interface Learning Function

The second finding highlights the *Environmental Interface* (adaptation learning) subsystem of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000) as measured by the Organizational Learning Survey (Johnson, 2000) and the PMI (1996, 2000) activities depicted in the *initiating* and *planning* PMI process (see Figure 36). Of the four learning subsystems measured in this study, Environmental Interface had the weakest support.

For example, some organizations may not have a formal process for the project *initiation* process and may encourage limited amounts of work to be done in order to secure the approvals of a formal initiation (PMI, 1996, 2000). The dispersion of resources could cause the team to focus on the wrong things. This is evident in this sample group, since the *Environmental Interface* (adaptation learning) and *Action/Reflection* (goal learning) functions had the lowest mean scores, showing more focus on internal activities

of *Dissemination and Diffusion* (integration learning) and *Meaning and Memory* (latency learning) functions. With an unbalanced focus on internal processes, missed opportunities affecting the *initiating* process can occur. The *initiating* process—such as performing feasibility studies, identifying an upcoming market thrust, or responding to a customer request—requires endless scope modifications and many changes to the plan to reflect an accurate plan for the project. Also while members of an organization interact with the internal and external environment, their perceptions of reality change continually as new information is gained. Subsequently during this process, new plans are developed and revised. When this happens, the organization learns to adapt by changing its behavior to align with existing goals. Cyert and March (1963) described this process in terms of adjustments made to rules and also of changes in levels of expectations. This description emphasizes the behavioral and instrumental character of the change. The stimulus for this kind of learning is the gap between the objectives set outside the project team environment and the outcomes of the project deliverables.

While the project team's learning actions associated with the external world (non-team environment) measured in the *Environmental Interface* learning function were least supported for this sample group, this finding may indicate a need for the project team to have a broader view of the requirements and details of the project necessary in Levitt and March's (1988) learning imperatives. While organizational learning success is measured by how well the organization achieves planned outcomes, Levitt and March (1988) viewed it from three dimensions of organizational learning: (1) routine action ("action stems from logic of appropriateness of legitimacy more than from logic of intention" [p.

320]); (2) actions viewed in terms of past experiences; and (3) actions that are target-oriented. In other words, for an organization to be successful, learning is action-oriented toward outcome-focused. For the project team, this means they resonate to internal actions to achieve specific external outcomes. This is further supported in Watkins and Marsick's (1993) model of learning organizations' action imperatives. The project team needs to have the overall big picture of the collective vision communicated through an established process (Watkins & Marsick, 1993). Busch (personal e-mail communication, August 31, 2003) suggested that if the individuals are not aware of the big picture, but instead see it as a task or job, then this could be reflected in a low rating in the *Environmental Interface* (adaptation learning) function.

Glynn and Milliken (1994) combined adaptive learning concepts and knowledge development as a way to increase team learning. These two perspectives, adaptive learning and knowledge development, differ in assumptions about learning, the level of analysis, and the methodologies employed in research. The adaptive learning perspective assumes that the organization is target-oriented, uses routine or project structures from its experiences, and repeats behaviors that have been successful while avoiding those that have failed (Levitt & March, 1988). In this way, the adaptive learning approach views learning as a process of adjusting behaviors in response to experience and fails to capture the complexities of organizational learning and the intra-organizational dynamics that underlie learning (Glynn & Milliken, 1994). In contrast, the knowledge development perspective focuses on the content produced by the learning process: i.e., the pattern of cognitive association or cause-effect relationships and the processes with which these

causal beliefs, or theories-in-use (Argyris & Schon, 1978), are communicated and institutionalized. In this study, the evidence suggests that, of the two perspectives, "adaptive learning" is dominant.

Finding 3: Action/Reflection Learning Function

In this study, participants gave the most importance to producing the best products and services of the highest quality possible (Q24—see Appendix H). In contrast, participants gave low scores to reflecting on organizational experiences to improve their product and services—the *Action/Reflection* (goal learning) function. One explanation for this could be the sense of efficacy that participants possessed. The role of the project manager enables the *execution* and *controlling* of the projects, as measured by PMI (1996, 2000), but this sample group had significantly different views on how to achieve the best products and services, as measured by responses to questions in the *Action/Reflection* (goal learning) subsystem of the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000).

There was weak agreement on the significance of Q20, which looks at the perceptions of the project manager and individual contributors around the goals for researching and developing new process. At first glance, the responsibility of researching and developing new process is beyond the scope of the project manager or team. But under further investigation, PMI (1996, 2000) suggested that, for example, the *quality assurance and quality control* process requires a variety of change activities such as "Benefit/Cost Analysis, Flowcharting, Design of Experiments and Benchmarking" (PMI, 1996, p. 86) that require the process of generating ideas for improvement. In addition,

quality audits measure how well a project team may have followed the processes of the project or may have developed alternative methods, leading to a dispersion of opinions on this question. This is further support of the need for more cause-effect relationships analysis as part of knowledge development (Glynn & Milliken, 1994).

There was also a significance difference between the project managers and the individual contributors relating to Q44, which looks at the extent to which the project team has clear goals for individual and team development. This question relates directly to 9.3 Team Development of the PMI Process (1996, 2000). Individual and team development is seen as enhancing the ability of stakeholders to contribute, as well as their ability to function as a team. This sample group had different perspective on how this development should occur, which would require further study.

Giddens (1984) suggested that this divergence in efficacy is driven on three levels: (1) the level of interpretation and understanding; (2) the normal level of norms, morality, proper conduct, and "the right thing to do"; and (3) the level of power, the sense of possibility and potency one has in the situation. He also contended that most are obsessed with the subject (the actor's or project manager's role) or the object (the project) and fail to see how these two phenomena interact in action and structure (Giddens, 1984): "both are the medium and the outcome of the practices they recursively organize" (p. 69). It is possible the corporation's compensation system rewards action over reflection, thus project managers may focus on project deliverables and spend little time reflecting on activities that have occurred in the project.

Further, the participants' perspectives are reinforced by the practice of project management. For example, as part of the *Action/Reflection* (goal learning) function (or execution) of the project, team members should have clear goals and objectives defined. This is explained in the project *human resource management* process of the PMI guide (1996, 2000). In this study, for this sample group to accomplish project team goals and objectives, the project manager's behaviors were identified as most significant in supporting the team to accomplish the goals using the *communication* PMI process. Manager's behaviors such as delegating, motivating, coaching, and mentoring were viewed as significant by the individual contributors, while project manager's tools were significant to the project managers as a way to communicate the goals and objectives of the project, further supporting Giddens (1984) and Parsons' (1951) duality of structures.

For the project manager to employ cooperative work practices with the project manager's tools, the individual contributors view the project manager's use of power and authority as motivating, coaching, and coaching to accomplish the project goals. Giddens (1984) suggested that human actors (project managers) shape and reshape the structures from the system-in-use through the adaptive capacity, while the individual contributors view the activity as legitimate power necessary to complete the project goals.

With respect to the characteristics of the project manager's role, the behaviors had the most impact on the *Action/Reflection* learning subsystem. A broad range of project manager behaviors came under study, including goal setting and clarification of the project scope, expectations, and data requirements for the project (Harrison, 1985; Kerzner, 1984; Termini, 1999). The role is complex. In addition, the project manager's

behaviors were found to reflect the climate and culture of the organization while encouraging initiative and information-seeking skills from the project team (Q52) (adapted from Craig, 2001; Gorelick, 2000; Gundlach, 1994; Hauschildt, Keim, & Medcof, 2002). Other behaviors investigated were collaboration (Schrage, 1990), mentoring and personal contact (Cunningham & Turnbull, 1982), and leadership skills (Q54) (Harris, 1985; Kerzner, 1984; Meredith & Mantel, 1995)—as significant to individual contributors. The evidence of the study reinforced the research of Cunningham and Turnbull (1982), Schrage (1990), Harris (1985), Kerzner (1984), and Meredith and Mantel (1995)—identifying the need for collaboration, mentoring, and leadership skills from the project manager.

Finding 4: Dissemination and Diffusion (Integration Learning) Learning Function

The second question of the study was as follows: *Is there a relationship between the role of the project manager and the Dissemination and Diffusion of information within the project team?* The answer is yes: this purposeful sample saw the role of the project manager as being critical to the *Dissemination and Diffusion* (integration learning) of information as measured by the survey in accordance with the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000). Also, project managers ranked high the importance of quick and accurate communications among all team members. This finding supports the *communicatio*n and *quality management* process of PMI (1996, 2000). In addition, the project managers' sample reported that the norms of following specific guidelines and procedures for managing the project were significant to the Dissemination and Diffusion (integration learning) function of organizational learning.

Opinion varied widely between the project managers and individual contributors regarding how the project management department provides opportunities for team members to develop their knowledge, skills, and capabilities as recommended by the *human resource management* process (PMI, 1996, 2000). The project managers' sample saw development occurring through use of their tools and the norm of following specific guidelines. In contrast, the individual contributors saw development as occurring through the use of specific behaviors of the project manager, such as using organizational structures to build and maintain relationships while accomplishing project goals.

Schein's (1992) work on levels of perception as depending on the level of responsibility within the team supports this finding—i.e., that project managers differ from individual contributors in their perspectives on development. Jacques (1990) suggested that "roles are not separate entities but part of the role relationship" (p. 24), or "the knot in a social net of relationships" (p. 25). Accordingly, part of the development relationship is tools and norms, while part is relational. Biddle (1979) described this viewpoint as the social exchange that occurs between two or more people, demonstrating certain patterns that are determined to a large extent by the role expectation and actual roles that each adopts.

In the study, tools appeared to be valued less than the behaviors of the project manager, as measured in the *Dissemination and Diffusion* (integration learning) function. Tools were seen as the means to accomplishing the goal. Schulz (2000) cautioned, though, to keep a tight lid on tools and to be careful to not throw out good management practices that project managers have accumulated through years of experience. This

relative diminishment of tools also supports Cunningham and Turnbull's (1982) research highlighting personal contact as most important to inter-company relationships, including the "hard" and "soft" sides demonstrated in the project manager's role.

In addition, the premise of project managers' tools is rooted in providing a structure that allows the information to flow and be readily available. These structures provide the content and importance of the mechanics to accomplish the project. According to Giddens (1984), the interaction with structures catalyzes changes and negotiation. It is this interplay of information through the social system that allows the project manager and project team (i.e., individual contributors) to accomplish the project deliverables and team learning, as defined in the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000) and measured in the Organizational Learning Survey (Johnson, 2000).

In the experience of this researcher, project managers in the telecommunications industry value systems such as PMI, promoted as the new and latest tools of the month. Busch (personal email communication, August 31, 2003) added that future studies could consider "the level of capability within project driven firms that perform projects incidental to their business" or perform them after the fact. Other companies have seen project management tools as a way to manage complex projects, viewing the tools as necessary to having a repeatable process while keeping solid management practices.

In summary, the project manager's role is viewed as critical to the internal organization of *Dissemination and Diffusion* of information to the project team. According to Schwandt (1995), the *Dissemination and Diffusion* subsystem exists to

transfer information and knowledge to the rest of the subsystems. In this study, this is demonstrated through the project manager's role performed through norms, behaviors, and tools.

Finding 5: Meaning and Memory (Latency Learning) Function

This purposeful sample group had different ideas on the extent to which project managers make use of suggestions in the *Meaning and Memory* (latency learning) function. The project managers' sample saw *Meaning and Memory* (latency learning) as occurring through the project manager's behavior of clarifying project scope and expectations. While the tool were significant to the project managers' sample, the tools were not significant to the individual contributors as part of the *Meaning and Memory* (latency learning) function. One explanation for this finding is provided by Benner and Tushman (2003), who cautioned against over-controlling system improvement processes by focusing only on the process or tools: "Both technological and organizational contexts moderate the relations between process-focused activities and organizational adaptation, arguing that process management techniques stabilize and rationalize organizational routines while establishing a focus on easily available efficiency and customer satisfaction" (p. 239). According to Schwandt (1995), the *Meaning and Memory* subsystem provides the foundations from which the other learning systems draw guidance. This learning subsystem sustains processes, values and assumptions, and artifacts necessary to every organization (Schwandt & Marquardt, 2000). In other words, having a strong process for documenting the project can result in commercial advantage for project start-ups, research, and ongoing conduct of the stream of corporate projects

Summary of Findings

This study has looked at the role of the project manager and how that role may influence the project team's perceptions of learning. First, this study discovered that the project manager's role and learning are linked. Second, the role of the project manager primarily resides in the *Dissemination and Diffusion* (integration learning) function within the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000), as measured by the Organizational Learning Survey (Johnson, 2000). In summary, this study provides evidence that the project manager's role contributes to team learning by following a set process and procedures (Q48), creating an interaction between the structures and the performance of the project team (Giddens, 1984).

The project manager is significant to *Dissemination and Diffusion* (integration learning) of information to the project team. While the project manager's role resides in the *Dissemination and Diffusion* (integration learning) function, how that is communicated varies within the sample group. An unexpected finding is the divergence of opinions between individual contributors and projects managers as to the perceptions of learning. Individual contributors were shown to learn through collaborative learning, coaching and mentoring, and action learning built on problem solving, while the project managers facilitated learning to the project team by performing project objectives (Schwandt & Marquardt, 2000). In contrast, the project managers sample saw learning, as a result of their actions to include the transfer and capture of information while having a good system to articulate meaning for the project team's deliverables (Schwandt & Marquardt, 2000).

Finally, this sample group saw the role of the project manager as being more significant to the internal activities (i.e., *Dissemination and Diffusion* subsystem and *Meaning and Memory* subsystem) than to the external activities (i.e., *Environmental Interface* subsystem and *Action/Reflection* subsystem) as articulated by the model (Schwandt & Marquardt, 2000). This finding suggests that the role of the project manager is perceived as an internal process. Consequently, these findings raise questions about the viability of the adaptation function. For organizations to be more adaptive to society, Parsons (1951) said that there should be a link between the "actions" of the members of the social system and their collective ability to adapt to both their internal and external environments. It may be that the very projects conducted by these study participants represented adaptations that the organization had already made.

Implications of the Study

This study provided the researcher with a set of questions to further investigate the norms, behaviors, and tools utilized by project managers. By incorporating these questions in the Organizational Learning Survey (Schwandt & Johnson, 2000), this study created a survey format that provides quantitative evidence of the project manager's role in learning. Accordingly, this study advances the understanding of the complex role of the project manager and how that role may affect the learning within the project team. Further, it provides a survey format for studying these phenomena in other organizations.

Implications for Practice

The practitioner—project manager or OD (organizational development) consultant—can apply the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt,

2000), as measured in the Organizational Learning Survey (Johnson, 2000), to conduct organizational diagnoses of project teams and/or project managers through the lens of learning or performance. In general, the quantitative nature of the survey allows organizations to benchmark themselves and to measure their growth toward learning and performance. Multiple organizations within a company could benefit from this analysis to provide a strategic assessment of their learning and performance systems.

Another implication of this study is the use of the survey and the model at the organizational level of the project management department. According to Watkins and Marsick (1993), there are benefits in an organizational level of analysis that will create flexible structures to enhance learning for everyone. Companies wanting their project management organizations to become enterprise-wide in process deployment or in preparation for ISO9000, SEI, or PMI certification would benefit from employing the Schwandt model (1995, 1996, 1997; Schwandt & Marquardt, 2000) and the Organizational Learning Survey (Johnson, 2000).

Implications for Theory

This study provides additional empirical verification of project manager's norms, behaviors, and tools. This study's methods contribute new scales for measuring project manager behaviors and tools and their correlations to team learning. In addition, this study contributed to the growing database of research findings related to Schwandt's Organizational Learning Model (1995, 1996, 1997; Schwandt & Marquardt 2001) and the Organizational Learning Survey (Johnson & Schwandt, 2000), as well as the project management literature.

The study also suggests that further analysis is needed in connection with some theoretical assumptions. For example, project manager's Level-I and Level-III norms did not correlate with organizational learning. The norms of the project manager form a complex construct including specific social norms, teams norms, organizational norms, structural norms, cultural norms, upper-management norms, meeting norms, customer-driven norms, and project methodology norms, to name a few aspects of this variable. This study assumed norms to be a discrete, measurable variable—but learned that it is complex and depends on the perspective of a study's participants. Schein (1992) reflected this view in trying to determine the norms of a culture (like project management), listing ten categories in which norms associated with culture could be identified. Future studies with a larger population might explore the nuances of the project manager's norms.

This study does contribute to the theories that project manager's behaviors play a crucial role within learning in the project team. Behaviors are significant to both the project manager and the individual contributor. The project manager seems focused on transactional and tactical behaviors (e.g., clarifying scope, roles, and expectations). The individual contributors seem focused on the manager's behaviors in working with various stakeholders and the customers and in fostering negotiating, mentoring, and leadership skills within the project team. These behaviors are included in the *human resource management* part of the PMI process.

The project manager's tools play a role within the project team as a way to disseminate and diffuse information, a way to make sense, and a focus for staying on target with tasks. Tools played a strategic role within project teams' learning, as

measured through the correlations and multiple regressions of the sample group in this study. Though the individual contributors sample did not correlate with the significance of tools to the learning subsystems, they did see the need for utilization of tools in the overall learning process.

Implications for Future Research

Project Manager's Norms

The project manager's Level-I and Level-III norms scale did not correlate; therefore, any conclusions based on these data would lack reliability. Further study is required to better understand the norms at work in the project manager role. What norms are observable and measurable in the project manager role? This study has shown that structuration is a normative function of dissemination and diffusing information to the project team. Some researchers (Turner, 1964; Turner & Killian, 1987) have suggested that, in a crisis such as getting the project finished and to the customer, project managers create nontraditional and collective behaviors. Accordingly, norms are spontaneous and innovative. Perhaps the research around emergent norm theory (ENT) (Turner, 1964; Turner & Killian, 1987) would help to further elucidate the role of the project manager, since much of the role involves putting out fires and keeping the project on task, in scope, and within budget.

Parsons (1951) further highlights the emerging norms through the open system concept. He describes it as the tension between stability and equilibrium, chaos and order in any system. All systems are organizations have multiple dynamics at play within the organizations. These dynamic systems balance the equilibrium of the system. Learning

is the process of managing these two systems (Johnson, 2000). While this study did contribute to the notion of emergent norm theory (ENT) (Turner, 1964, Turner & Killian, 1987) further study is required understand this tension of the normative role of the project manager.

It would be interesting to measure other industries such as assembly, heavy industry, services, or military to test reliability of the project manager's norms scale. Further study is needed to understand what type of infrastructure makes the project manager an integral part of a corporation-wide project management strategy (Q49) (project manager's Level-III norms).

Building on an interpretivist perspective, this study could be further developed through Qualitative methodology. Interviews and dialogue with project managers to determine the type of norms observed as levels of project maturity developed within an organization could further describe the emergent normative role of the project managers. In addition, Schein's (1992) categories of norms such as "observed behavior regularities when people interact," "espoused values," "climate," embedded skills," and "habits of thinking" (pp. 8-9) could be empirically tested for more insight into the project manager's norms.

Project Manager's Behaviors

No statistical significance was found for learning and behaviors such as collaboration, mentoring, and leadership skills for the project manager's sample (Q54). Further analysis would be needed to understand why the individual contributors sample

would rate these behaviors as significant, while project managers viewed more tactical and transactional behaviors as significant (Q50).

Q51, which looked at the project manager's behaviors as a way to reflect the climate and culture of the organization, did not show statistical significance. The primary focus of project manager's behaviors was getting the project completed on time and within budget. While this sample was highly focused—meeting the triple constraints of time, budget, and performance criteria (PMI, 1996, 2000)—organizational constraints such as historical precedents, organizational hierarchies, flows and roles, performance and reward systems, and professional codes and conventions are a few of the constraints. Future research could build on Schein's (1992) ideas.

In addition, while the literature suggests the need for collaboration, mentoring, and leadership skills (Harrison, 1985; Kerzner, 1984; Meredith & Mantel, 1995) further investigation is required to understand how project managers employ these skills while creating solutions of time, cost, and human factors affecting completion of the project. Schrage's (1990) theory of collaboration could be utilized as a theoretical framework for further study of the project manager's role in disseminating and diffusing learning within the project team. In addition, further study is also required to understand the role of leadership within the project manager's function.

Project Manager's Tools

Huber (1991) and Walsh and Ungson (1991) theorized that learning uses tools as "retention facilities." As shown in Figure 13, the project manager's tools are critical to each step of the PMI process (1996, 2000). This study only sampled three tools that are

employed by the project manager. While this organization saw the value of tools in this study as contributing to the overall learning perceptions of the project team, this finding cannot be conclusive in any way. An array of tools for scope, time, cost, quality, human resources, communication, risk, and procurement could affect the learning within the project team and lend themselves to further study.

Investigation could focus on how the technology and software tools are used to assess the cost and quality performance of project, in addition to schedule performance, as employed in Q58 of the study. This question was not significant in this study for this sample group. Tools are seen as a way to manage the project and to perform repeatable processes and projects needed for SEI, PMI, and ISO certifications. In addition, tools create the sensemaking that provides the Meaning and Memory (latency learning) function for the survival of the organization (Schwandt, 1995). While not supported in this study, further investigation is required around "ad hoc" (Busch & Milosevic, 1999) norms of the project manager. In addition, Benner and Tushman (2003) suggested that focus should be placed on technology and maturity cycles, to determine whether projects are in stable or turbulent environments. Different environments require different adaptations to allow for more creativity and flexibility.

Concluding Thoughts

Limitations to the Study

This study is but a first step in understanding a complex construct involving the role of the project manager. The greatest single limitation to the study is its exploratory nature and design, which impedes generalizability. This study was conducted in a single

organization composed of project managers (PM) and individual contributors (IC) with a defined and established culture. The sample size, while sufficient for the purposes of this exploratory study, is insufficient to make broader assumptions to a larger population. The constructs investigated and the methods employed require more study and validation to establish any firm conclusions applicable to other industries or to project management in general.

Personal Learning

This study is intended to contribute to the growing body of research on organizational learning, project management, and role theories of the project manager. However, neither the study nor the research was immune to pressures from the study's context. The cooperation of the company was paramount. With the company's stock prices devalued to 78% of its worth at the start of the study, as well as the threat of war, conducting research was a challenge. These fears may have influenced the value that the company placed on cooperating with the research. The geographical region of participants in this study is a telecom industry corridor, hosting more than 600 companies. The telecom decline has produced a ghost town with a handful of players. Other companies stocks have become penny stocks, and cynicism is high. This also may have undermined the cooperative atmosphere of the study.

This researcher often wondered if the results of the study would have been different if the researcher were an employee of the company. Participants were concerned with the amount of time in taking the survey. Ten to fifteen minutes of time was

considered a large investment of time to contribute to a study. As an external consultant, the researcher did not have access to company artifacts that may have provided insights.

Schwandt's (1995) theories consider learning a process that is evident by patterns of action in a social system. In the study of the participants' system, the dynamic of chaotic change was constant. This chaos makes it difficult because the learning systems may be undergoing radical adaptation and functional changes during the study.

Conclusions

While this has been an exploratory research project, it has shown that the role of the project manager is multifaceted and serves an important function in the performance and learning of a project team. This study is the first step in understanding a complex set of variables that will require further study.

This study provides empirical evidence in support of the four subsystems within Schwandt's Organizational Learning Systems Model (1995, 1996, 1997; Schwandt & Marquardt, 2000) and demonstrates that the constructs of organizational learning and the project manager's role are linked. The project teams engage in dynamic patterns of actions that adapt to the external environment through the Environmental Interface (adaptation learning) function in order to attain organizational goals through the Action/Reflection (goal learning) function, while integrating or re-integrating all parts of the organization in the Dissemination and Diffusion (integration learning) function, and reinforcing the organization's cultural patterns through the Memory and Meaning (latency learning) function (Schwandt, 1995, 1996, 1997; Schwandt & Marquardt, 2000). Schwandt (1995) encouraged a simultaneous focus on both organizational performance

and learning so that project teams can deal with the changing environmental conditions in order to survive in the complexity of today's business climate. The significance of this relationship is rich for further investigation that will benefit the advancement of the project manager's role for learning within project teams and project management organizations.

REFERENCES

Abdel-Hamid, T. K., Sengupta, K., & Swett, C. (1999). The impact of goals on software project management: An experimental investigation. *MIS Quarterly, 23*(4), 531-555.

Ancona, D. G., & Caldwell, D. F. (1992). Bridging the boundary: External activity and performance in organizational teams. *Administrative Science Quarterly, 37*, 634-665.

Anderson, S.D. & Tucker, R.L. (1994). Improving project management of design. *Journal of Management in Engineering, 10* (4), 35-44.

Argyris, C., & Schon, D. A. (1978). *Organizational learning*. Reading, MA: Addison-Wesley.

Ashforth, B. E. (2001). *Role transitions in organizational life: An identity-based perspective*. Mahwah, NJ: Lawrence Erlbaum.

Australian Institute of Project Management (2000). *APM body of knowledge self assessment form*. Retrieved October 10, 2000, from http://www.aipm.com.au/html/ncspm.cfm

Ayas, K. (1997). *Design for learning for innovation*. Deift, Netherlands: Euboron Publishers.

Barker, J., Tjosvold, D., & Andrews, R. I. (1988). Conflict approaches of effective and ineffective project managers: A field study in a matrix organization. *Journal of Management Studies, 25*(2), 167-178.

Barley, S. R. (1990). The alignment of technology and structure through roles and networks. *Administrative Science Quarterly, 61*(35). 61-203.

Bashi, V. (2003). *Minority Groups in America—Sociology 108*. Retrieved October 15, 2003, from Rutgers, The State University of New Jersey, Department of Sociology website: http://www.rci.rutgers.edu/~vbashi/SOC108-syllabus.pdf

Beard, F. K. (1999). Client role ambiguity and satisfaction in client-ad agency relationships. *Journal of Advertising Research, 39*(2), 69-78.

Benner, M. J., & Tushman, M. L. (2003). Exploitation, exploration, and process management: The productivity dilemma revisited. *The Academy of Management Review, 28*(2), 238-256.

Berends, H., Boersma, F. K., & Weggeman, M. P. (2001, November). *The structuration of organizational learning* (Working Paper 01.12). The Netherlands: Technische Universiteit Eindhoven, Eindhoven Centre for Innovation Studies.

Berends, H., Boesma, K., & Weggesman, M. (2003). The structuration of organizational learning. *Human Relations, 56*(9), 1035-1056.

Biddle, B. J. (1979). *Role theory: Expectations, identities and behaviors*. New York: Academic Press.

Biggs, M. (1999). Increasing support for project leaders will improve the odds of reaching your goals. *InfoWorld, 21*(34), 70-72.

Broderick, A. J. (1999). Role theory and the management of service encounters. *The Service Industries Journal, 19*(2), 117-131.

Brown, R. (1986). *Social psychology*. New York: Free Press.

Brown, S. L., & Eisenhardt, K. M. (1995). Product development: Past research present findings, and future directions. *Academy of Management Review, 20*(2), 343-378.

Busch, J. S., & Milosevic, D. (1999). *SPM: Call it streamlined or standardized PM: It gets results.* Unpublished materials.

Carnegie Mellon Software Engineering Institute. (2002). *Capability maturity model (SW-CMM) for software.* Retrieved on February 1, 2003, from http://www.sei.cmu.edu/cmm/cmm.sum.html

Casey, A. (1994). *Collective memory in an organization: Content, structure and process.* Doctoral dissertation, The George Washington University, Washington, DC.

Cavaleri. S.A. & Fearon, David S. (2000). Integrating organizational learning and business praxis: a case for intelligent project management. *The Learning Organization 7* (5).

Champoux, J. E. (1996), *Organizational Behavior: integrating individuals, groups and processes.* Minneapolis/St. Paul, West Publishing Company.

Cioffi, D. F. (2001, August 28). *Management 267: Project Planning and Scheduling.* [Videotaped class]. Washington, DC: The George Washington University.

Cioffi, D. F. (2002). *Managing project integration.* Vienna, VA: Management Concepts Inc.

Copestake, J. (2000). Impact assessment of microfinance and organizational learning: Who will survive? *Journal of Microfiance, 2*(2), 2-11.

Craig, W. A. (2001). *Software engineering improvement.* Retrieved from http:asqhuntsville1503.org/www/swdiv/Presentations/CraigSPIN.ppt.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*(3), 297-334.

Cross, R., & Baird, L. (2000). Technology is not enough: improving performance by building organizational memory. *Sloan Management Review, 41*(3), 69-78.

Crossan, M. M, Lane, H. W., & White, R. E. (1999). An organizational learning framework: From intuition to institution. *The Academy of Management Review, 24*(3), 522-537.

Crossman, D. E. (1996). *A study of certain personality factors, perceived participativeness and success levels of NASA project managers.* Unpublished doctoral dissertation, The George Washington University, Washington, DC.

Croswell, C.V. (1996). *Organizational learning in nonprofit organizations: A description of the action patterns of a professional association's governing network and leadership role in turbulent times*. Published dissertation. The George Washington University, D.C.

Crowston, K. (1991). *Towards a coordination cookbook: Recipes for multi-agent action.* Unpublished doctoral dissertation, MIT Sloan School of Management.

Cunningham, M. T., & Turnbull, W. (1982). Inter-organizational personal contact patterns. In H. Hakansson (Ed.), *International marketing and purchasing of industrial goods: An interaction approach.* Cranford University: Bedford England. (pp. 304-316)

Cyert, R. M, & March, J. G. (1963). *A behavioral theory of the firm*. Englewood Cliffs, NJ: Prentice-Hall.

Daft, R.L. & Lengel, R.L. (1986). Organizational information requirements, media richness and structural design. *Management Science.* 32 (5), 554.

Daft, R.L. & Huber, G.P. (1987). How organizations learn. *Research in the Sociology of Organizations, 5*, 1-36.

Daft, R. L., & Weick, K. E. (1984). Toward a model of organizations as interpretative systems. *Academy of Management Review, 9*(2), 284-295.

Davis, S. M., & Lawrence, P. R. (1977). *Matrix* Reading, MA: Addison-Wesley.

DeJaager, G. (1988). *The project manager's tool kit: The practical guide to successful project execution.* Palo Alto: Seiler-Doar Books.

Deutsch, M., & Krauss, R. M. (1965). *Theories in social psychology.* New York: Basic Books.

Dewey, J. (1916). *Democracy and education.* New York: The Free Press.

DiBella, A.J. & Nevis, E.C. (1998). *How organizations learn.* San Francisco: Jossey Bass.

Dixon, N. M. (1994). *The organizational learning cycle.* London: McGraw-Hill Book Company.

Dodgson, M. (1993). Organizational learning: A review of some of the literatures. *Organizational Studies, 14*(3), 375-394.

Duncan, R., & Weiss, A. (1979). Organizational learning: Implications for organizational design. In B. Straw (Ed.), *Research in organizational behavior* (Vol. 1, pp. 75-123). Greenwich: JAI Press.

Duncan, W. R. (2000). *Guide to the project management body of knowledge.* Upper Darby, PA: PMI Publications.

Easterby-Smith, M., Crossan, M., & Nicolini, D. (2000). Organizational learning: Debates past, present and future. *Journal of Management studies, 37*(6), 785-796.

Fiol, C. M., & Lyles, M. A. (1985). Organizational learning. *Academy of Management Review, 10*(4), 803-813.

Floyd, S. W., & Lane, P. J. (2000). Strategizing throughout the organization: Management role conflict in strategic renewal. *The Academy of Management Review, 25*(1), 154-177.

Ford, R. C., & Randolph, W. A. (1992). Cross-functional structures: A review and integration of matrix organization and project management. *Journal of Management, 18*, 267-294.

Fraenkel, J. R., & Wallen, N. E. (1996). *How to design and evaluate research in education* (3rd edition). New York: McGraw-Hill, Inc.

Gabriel, Y., Fineman, S., & Sims, D. (2000). *Organizing and organizations* (2nd edition). London: Sage Publications.

Garvin, D.A. (1993). Building a learning organization. *Harvard Business Review.* (July-August). 78-91.

Gibson, C.B., & Kirkman, B.L. (1999). Our past, present, and future in teams: The role of human resources professionals in managing team performance. In A.I. Kraut & A.K. Korman (Eds). *Evolving Practices in Human Resources Management:*

Responses to a Changing World of Work (pp. 90-117). San Francisco: Jossey-Bass.

Giddens, A. (1976). *New rules of sociological method.* London: Hutchinson.

Giddens, A. (1979). *Central problems in social theory: Action, structure and contradiction in social analysis.* London: Macmillan.

Giddens, A. (1984). *The constitution of society: Outline of the theory of structuration.* Cambridge: Polity Press.

Gieske, J. F. B., & ten Brocke, A. M. (2000). Infrastructure under construction: continuous improvement and learning in projects. *Integrated Manufacturing Systems, 11*(3), 188-198.

Gleick, J. (1987). *Chaos: Making a new science.* New York: Penguin Books.

Glynn, M. A., Milliken, F. J., & Lant, T. K. (1991). *Learning about organizational learning: A critical review and research agendas* (Working paper series A—Paper No. 88). New Haven, CT: Yale University.

Goodwin, R. S. (1993). Skills required of effective project managers. *Journal of Management in Engineering, 9* (3), 217-226.

Gorelick, C. K. (2000). *Toward an understanding of organizational learning and collaborative technology: A study of structuration and sensemaking in a virtual project team.* Unpublished doctoral dissertation, The George Washington University, Washington, DC.

Grauf, W. M. (1995). Critical success factors of manufacturing improvement projects. *APICS: The Performance Advantage, 5*(11), 34-38.

Gundlach, M. (1992). *Sensemaking and organizational learning.* Doctoral dissertation, The George Washington University, Washington, DC.

Haddad, M.D. (1999). *The hidden cost of software for the contracting organization,* Doctoral dissertation, The George Washington University, Washington, DC.

Hamilton, P. (1983). *Talcott Parsons*. London: Tavistock Publications Limited.

Hammer, M. & Champy, J. (1993). *Reengineering the Corporation*, Harper Collins, New York.

Handy, C. (1995). Trust and the virtual organization. *Harvard Business Review*. May-June. 40-50.

Hansen, M. T., & von Oetinger, B. (2001). Introducing T-shaped manager: Knowledge management next generation. *Harvard Business Review, 79*(3), 106-116.

Harris, G. B., & Steven, S. T. (1998). *Organizational structuration: Interaction and interrelation*. Paper presented to the 14th EGOS Colloquium, subtheme 19: Relational perspectives on organizational forms, Maastricht, The Netherlands, July 1988. Retrieved from http://www.workframe.com/WFI_Corp/OrgStrctHTML.htm.

Harrison, E. L. (1985). *Advanced project management* (2nd edition). Aldershot: Gower.

Hatch, M. J. (1997). *Organizational theory: Modern, symbolic and postmodern perspectives.* Oxford: Oxford University Press.

Hauschildt, J., Keim, G., & Medcof, J. W. (2000). Realistic criteria for project manager selection and development. *Project Management Journal, 31*(3), 23-32.

Hedberg, B. (1981). How organizations learn and unlearn. In F. Nystrom & W. Starbuck (Eds.), *Handbook of organization design* (pp. 1-27). New York: Oxford University Press.

Heiss, J. (1990). *Social roles.* In M. Rosenberg & R. H. Turner (Eds.), *Social psychology: Sociological perspectives* (pp. 94-129). New Brunswick, NJ: Transaction Publishers.

Hinds, R. C. (1995). *Information technology and organizational learning: A study of structuring in a military environment.* Unpublished doctoral dissertation, The George Washington University, Washington, DC.

Hinkle, D. E., Wiersma W. & Jurs, S.G. (1995). *Applied Statistics for the Behavioral Sciences*, Boston: Houghton Mifflin.

Holder, L. B. (2001). Computer system design project I (CSE4316). *Project manager's Survey.* Retrieved April 8, 2003, at the University of Texas at Arlington website: http://www-cse.uta.edu/~holder/courses/cse4316.html

Holt, S. (2000). *Managing global networks: The role of the global account manager.* Retrieved on May 14, 2003, from http://bath.ac.uk/imp/pdf51-holtmcdonald.pdf

Huber, G. P. (1991). Organizational learning: The contributing processes and the literatures. *Organizational Science, 2*(1), 88-115.

Hult, G., Tomas, M., Nichols, E. L., Giunipero, L. C., & Hurley, R. F. (2000). Global organizational learning in the supply chain: A low versus high learning study. *Journal of International Marketing, 8*(3), 61-83.

IPMA (1999). International Project Management Association. IPMA competence baseline. Editorial Committee: G. Caupin, H. Knopfel, p. Morris, E. Motzel, O. Pannebacker. Ver 2. Retrieved: [June, 2000] from http://www.ipma.ch

Jacques, E. (1990). In praise of hierarchy. *Harvard Business Review, 68*(1), 127-134.

Johnson, C. G. (2000). *A theoretical model of organizational learning and performing action systems: The development and initial validation of the duality of a Parsonian action frame of reference through confirmatory factor analysis.* Unpublished doctoral dissertation, The George Washington University, Washington, DC.

Kahane, L. H. (2001). *Regression basics*. Thousand Oaks, CA: Sage Publications.

Katz, D., & Kahn, R. L. (1966). *The social psychology of organizations*. New York: John Wiley & Sons.

Kerlinger, F. N. (1986). *Foundations of behavior research* (3rd edition). Forth Worth: Harcourt Brace College Publishers.

Kerzner, H. (1984). *Project management: A system approach to planning, scheduling and controlling*. New York: Van Norstrand Reinhold.

Kharbanda, O. P., & Pinto, J. K. (1996). *What made Gertie gallop?: Lessons from project failures*. New York: Van Nostrand.

King, W. R. (2001). Strategies for creating a learning organization. *Information Systems Management, 18*(1), 12-20.

Kotnour, T. (2000). Organizational learning practices in the project management environment. *International Journal of Quality and Reliability Management, 17*(4/5), 1-7.

Kouzes, J. M., & Posner, B. Z. (1987). *The leadership challenge: How to get extraordinary things done in organizations.* San Francisco: Jossey-Bass.

Kuprenas, J. A, Jung, C. L., Fakhouri, A. S., Jerif, W. G. (2000). Project manager workload: Assessment of values and influences. *Project Management Journal, 31*, (4), 44-54.

Kwak, Y.H. (1997). *A Systematic Approach to Evaluate Quantitative Impacts of Project Management.* Ph.D. Dissertation, University of California at Berkeley.

Levitt, B., & March, J. G. (1988). Organizational learning. *Annual Review of Sociology, 14*, 319-340.

Lewis, M. W., Welsh, M. A., Dehler, G. E., Green, S. G. (2002). Product development tensions: exploring contrasting styles of project management. *Academy of Management Journal, 45*(3), 546-564.

Lord, A. M. (1989). An investigation into the role of the project manager: A comparative study of project leadership, organization and culture in UK defense contractors and engineering constructors. (Doctoral dissertation, Brunel University, United Kingdom, 1989). *Dissertation Abstracts International, 51*(10), 3461.

Lundberg, C. C. (1989). On organizational learning: implications and opportunities for expanding organizational development. In R. W. Woodman & W. A. Pasmore

(Eds.), *Research in organizational change and development* (Vol. 3, pp. 61-82). Greenwich, CT: JAI Press.

Mader, T. F., & Mader, D. C. (1993). *Understanding one another: Communicating interpersonally.* Madison, WI: WCB Brown & Benchmark Publishers.

Malone, T. W. (1998). *What is coordination theory?* (Working paper #2051-88). Cambridge, MA: MIT Sloan School of Management.

March, J. G., & Olsen, J. P. (1976). *Ambiguity and choice in organizations*. Bergen, Norway: Universitetsforlaget.

Marsick, V. J., Dechant, K., & Kasl, E. (1997). Team as learners. *Journal of Applied Behavioral Science, 33*(2), 227-246.

McDonough III, E.F. (1990). An Investigation of the Relationship Between Project Performance and Characteristics of Project Leaders. *Journal of Engineering and Technology Management, 6*, Nos. 3/4, May, 1990, pp. 237-260

McMillan, J. H., & Schumacher, S. (1989). *Research in education: A conceptual introduction* (2nd edition). Harper Collins Publishers.

Meredith, J. R., & Mantel, S. J. (1995). *Project management: A managerial approach.* New York: Wiley.

Mills, P. K., & Margulies, N. (1980). Toward a core topology of service organizations. *The Academy of Management Review, 5*(2), 255-265.

Milosevic, D. Z. (1996). Standardizing unstandardized project management. *Northcon, 96*, 12-17.

Mintzberg, H. (1973). *The nature of managerial work.* New York: Harper and Row.

Morgan, G. A., & Griego, O. V. (1998). *Easy use and interpretation of SPSS for Windows: Answering research questions with statistics*. Mahwah, NJ: Lawrence Erlbaum.

Mumford, A. (1994). Individual and organizational learning: The pursuit of change. In C. Mabey & P. Illes (Eds.), *Managing learning* (pp. 77-86). London and New York: The Open University.

Newton, R. R., & Rudestam, K. E. (1999). *Your statistical consultant: Answers to your data analysis questions*. Thousand Oaks, CA: Sage Publications.

Nonaka, I. (1991) 'The knowledge-Creating Company', *Harvard Business Review*, November-December. 65-77

Nonaka, I., & Takeuchi, H. (1995). *The knowledge creating company: How Japanese companies create the dynamics of innovation*. New York: Oxford University Press.

O'Hara, C., & Frank, D. (2002). *OPM draft to elevate project managers' role: Improving skills essential to e-gov programs*. Retrieved on November, 4, 2002, from http://www.fcw.com/fcw/articles/2002/1104/news-opm-11-04-02.asp

Organ, D. W. (1971, December). Linking pins between organizations and environment. *Business Horizons, 14*, 73-80.

Orlikowski, W. (1991). Integrated information environment of matrix of control?: The contradictory implications of information technology. *Accounting, Management and Information Technology, 1*(1), 9-42.

Parsons, T. (1968). *Sociological theory and modern society*. New York: Free Press.

Parsons, T., Bales, R. F., & Shils, E. A. (1953). *Working papers in the theory of action.* New York: Free Press.

Parsons, T., & Shils, E. A. (Eds.). (1951). *Towards a general theory of action.* New York: Harper and Row.

Patton, M. Q. (1990). *Qualitative evaluation and research methods.* Newbury Park, CA: Sage Publications, Inc.

Peal, W. C. (2000, August). The case for project management. *Government Executive, 32*(9), 100-110.

Pedler, M., Burgoyne, J., & Boydell, T. (1991). *The learning company: A strategy for sustainable development.* London: McGraw-Hill.

Pittiglio Rabin Todd & McGrath Company. (2003). *Execution of supply chain management.* Retrieved in January 2004 from http://www.ncausa.org/public/pages/SupplyChainTrends_NCAWebcast_Jan142003_PRTM.pdf

Popper, M., & Lipshitz, R. (1998, June). Organizational learning mechanism: A structural and cultural approach to organizational learning. *The Journal of Applied Behavioral Science, 34*(2), 161-179.

Popper, M., & Lipshitz, R. (2000, June). Organizational learning: Mechanisms, culture, and feasibility. *Management Learning, 31*(2), 181-196.

Preskill, H., & Torres, R. T. (1999). *Evaluative inquiry for learning in organizations.* Thousand Oaks, CA: Sage Publications.

Project Management Institute (PMI). (2001). *Project manager competency development framework exposure draft.* Upper Darby, PA: Author.

Project Management Institute (PMI) Standards Committee. (1996). *A guide to the project management body of knowledge (PMBOK® Guide).* Upper Darby, PA: Author.

Project Management Institute (PMI) Standards Committee (2000). *A guide to the project management body of knowledge (PMBOK® Guide).* Upper Darby, PA: Author.

Puccinelli, B. (1999). Principles of a project leader. *Inform, 13*(1), 50-51.

Ranson, S., Hinings, B., & Greenwood, R. (1980). The structuring of organizational structures. *Administrative Science Quarterly, 25*, 1-17.

Rodham, K. (2000, June). Role theory and the analysis of managerial work: The case of occupational health professionals. *Journal of Applied Management Studies, 9*(2), 71-81.

Rose, J. (1998). *Evaluating the contribution of structuration theory to the information system discipline.* Retrieved from http://www.cs.auc.dk/~jeremy/pdf%20files/ecis1998.pdf

Savage, S. P. (1981). *The theories of Talcott Parsons: The social relations of action.* New York: St. Martin's Press.

Schein, E. H. (1992). *Organizational culture and leadership.* San Francisco, CA: Jossey Bass-Inc.

Schrage, M. (1990). *Shared Minds: The New Technologies of Collaboration.* New York: Random House.

Schulz, Y. (2002, June). Keep a tight lid on tools: project managers and developers shouldn't throw out fundamental rules just because it's a Web application. *Computing Canada, 28*(13), 23.

Schwandt, D. R. (1995). Learning as an organization: A journey into chaos. In S. Chawla and J. Renesch (Eds.), *Learning organizations* (pp. 365-379). Portland, OR: Productivity Press.

Schwandt, D. R. (1996). *Exploring dynamic organizational learning process: A social action theory perspective.* Unpublished manuscript.

Schwandt, D. R. (1997). Integrating strategy and organizational learning: A theory of action perspective. In *Advances in Strategic Management* (Vol. 14, pp. 337-359). Greenwich, CT: JAI Press.

Schwandt, D. R., & Gundlach, A. M. (1992). *Organizational learning: The development and implementation of an operational system model.* Paper presented at the 52nd Annual Meeting of the Academy of Management, Las Vegas, NV.

Schwandt, D. R., & Marquardt, M. J. (2000). *Organizational learning: From world class theories to global best practices.* Washington, DC: St. Lucie Press.

Scott, W. R. (1992). *Organizations: Rational, natural and open systems* (3rd edition). Englewood Cliffs, NJ: Prentice-Hall.

Senge, P. M. (1994). The leader's new work: Building learning organizations. In C. Mabey and P. Illes (Eds.), *Managing learning* (pp. 5-21). London and New York: The Open University.

Singh, J., & Rhoads, G. K. (1991, August). Boundary role ambiguity in marketing-oriented positions: A multidimensional, multifacted operationalization. *Journal of Marketing Research, 28*, 328-338.

Shrivastava, P. (1983). A topology of organizational learning systems. *Journal of Management Studies, 20*(1), 7-28.

Snedecor, G. W., & Cochran, W. G. (1989). *Statistical methods* (8th edition). Ames: Iowa State University Press.

St. Germain, R. (1997, spring). Humanizing project management: A revolution in progress. *Information Strategy,* (13), 30-35.

Stockburger, D. W. (1996). *Introductory statistics: Concepts, models, and applications.* Springfield: Southwest Missouri State University. Retrieved August 28, 2003, from http://www.psychstat.smsu.edu/introbook/sbk00.htm

Tempest, S. (1999). *Ideas work: A study of learning in network contexts: The case of the UK television industry.* Doctoral dissertation, University of Nottingham, UK.

Termini, M. J. (1999). *Strategic project management.* Dearborn, MI: Society of Manufacturing Engineers.

Troyer, L., Muller, C. W., & Osinsky, P. I. (2000). Who's the boss? A role-theoretic analysis of customer work. *Work and Occupations, 27*(3), 406-427.

Turner, R. (1964). Collective behavior. In R. E. L. Faris (Ed.), *Handbook of modern sociology* (pp. 382-425). Chicago, IL: Rand McNally.

Turner, R., & Killian, L. (1987). *Collective behavior.* Englewood Cliffs, NJ: Prentice-Hall.

University of Sydney, Australia. (2003). *Project and Programme management outreach: Self assess*. Retrieved on April 9, 2003, from http://www.pmoutreach.usyd.edu.au/selfassess

Vaill, P. B. (1996). *Learning as a way of being: Strategies for survival in a world of permanent white water*. San Francisco: Jossey-Bass.

Verhagen, H. (2001, November 28). *Norms and artificial agents* (Working Papers, Forum 100). Stockholm: The Royal Institute of Technology and Stockholm University.

Walsh, J. P., & Ungson, G. R. (1991). Organizational memory. *Academy of Management Review, 16*(1), 57-91.

Watkins, K. E., & Marsick, V. J. (1993). *Sculpting the learning organization*. San Francisco: Jossey Bass.

Weiss, N. A., & Hassett, M. J. (1991). *Introductory statistics* (3rd edition). Reading, MA: Addison Wesley Publishing Company.

Yuki, G. A. (1989). *Leadership in organizations*. Englewood Cliffs, NJ: Prentice Hall.

Appendix A: Definition of Terms

A closed system: "A system concentrating on the principles of internal functioning and disregarding the environment. Internal moves are planned without regard for the effects on the environment" (Katz & Kahn, 1966 p. 31).

Collaboration: Sharing ideas, working together to create an understanding about a process, a product or event that no one that had previously possessed or could have come to by their own efforts.(Schrage, 1995).

Construct: The study has used the term construct from a sociological perspective. Bashi (2003) provides the following definition.

> "Although we behave sometimes as if our social world is based on "scientific fact," the truth is that we have simply made up rules that indicate the way we understand the world around us. This set of rules and definitions that guides our understanding is a sociological construct."
>
> http://www.rci.rutgers.edu/~vbashi/SOC108-syllabus.pdf

For this study the sociological construct is Parsons, Bales & Shils (1953) Theoretical Framework that identifies variables such as *Adaptation, Goal Attainment, Latency, & Integration*, modified by Schwandt (1993) as *Environmental Interface (Adaptation Learning), Action Reflection (Goal Learning), Dissemination and Diffusion (Integration*

Learning), and Meaning and Memory (Latency Learning) (Schwandt, 1995, 1997, 1999; Schwandt and Marquardt, 2000).

Software Capability Maturity Model ®: "SEI established it 1984 to help improve software engineering in DOD and its contractors. The model describes the principles and practices underlying software process maturity and is intended to help software organizations improve the maturity of their software process in terms of evolutionary path from ad hoc, chaotic processes to mature disciplined software processes" (Written by Carnegie Mellon Software Engineering Institute home website; http://www.sci.cmu.edu/cmm) Dated: 11/24/2002.

Leadership is "traits, behavior, influence over people, interaction patterns, role relationships, occupation of administrative position, and perception by others regarding legitimacy of influence" (Yukl, 1989, p. 2). Kouzes & Posner described leadership as "challenging the process, inspiring a shared vision, and enabling others to act, modeling the way, and encouraging the heart" (Kouzes & Posner, 1987, p. 5).

Matrix Management is defined by Davis and Lawrence (1977), as "any organization that employs a multiple command system that includes not only a multiple command structure but also related support mechanisms and an associated organizational culture and behavior pattern" (p. 3).

Exploratory study research using Survey Instruments is a "systematic empirical inquiry in which the scientist does not have direct control of independent variables

because their manifestation has already occurred or because they are inherently not manipulable. Inferences about relations among variables are made, without direct intervention, from concomitant variation of independent and dependent variables" (Kerlinger, 1986, p. 348).

Open Systems Theory is defined by Katz and Kahn (1966) as a pattern of activities of input, transformation and output.

Survey Research Design is a "methodology to gain the opinions of a large group of people about a particular topic or issue. Survey Research asks questions, all related to the issue, to find answers" (Fraenkel & Wallen, 1996, p. 367).

Organizational Learning Terms

Interchange Media - an essential concept of the organizational learning model used in this study (Schwandt, 1995, 1997). They constitute the connections which product the "functional products" of each learning functions of the Schwandt Model (1995, 1997, 1999 and Schwandt & Marquardt 2000) of the organizational learning system. There are four interchange media: New Information, Goal referenced knowledge, Structuring, and Sensemaking.

Structuring is the "dynamic combination of organizational structures, roles, policies, objects, and processes" (Schwandt, 1993, p. 33). Schwandt (1994) functionally defines them as the "objects to be manipulated by the collective and individual actors and

that result in products of interchange that are the invisible networks within which patterns of actions take place" (p. 5).

Organizational Knowledge - the product of awareness, familiarity, or understanding of the facts, data and information developed at an organizational level.

Organizational Learning - "a system of actions, actors, symbols, and processes that enables an organization to transform information into valued knowledge that is in turn increases its long-term adaptive capacity" (Schwandt, 1993, p. 11).

Organizational Roles are "the behavior enactment of the part of the status that prescribes how the status occupant should act toward one of the persons with whom his status and rights and obligations put him in contact" (Deutsch & Krauss, 1965, p. 190).

Organizational Structure is "a firm's formal role configuration, procedures, governance and control mechanisms, and authority and decision making processes" (Hitt, Ireland & Hoskisson, 2000, p. 444). Structures can be viewed as the arrangement interrelation of all the parts of the organization (Schwandt, 1999).

Project Management Terms

The following definitions are taken from the project management body of knowledge (Project Management Institute Standards Committee, PMBOK) (Duncan 1996).

Critical Path Method ("CPM") - A network analysis technique used to predict project duration by analyzing which sequence of activities (which path) has the least amount of scheduling flexibility (the least amount of float). Early dates are calculated by means of a forward pass using a specified start date. Late dates are calculated by means of a backward pass starting from a specified completion date (usually the forward pass's calculated project early finish date). Source: Project Auditors. PM Definitions. [On-line], Available: http://www.projectauditors.com/Dictionary/C.html.

Network Diagram: "A graphic representation of activity sequence and relationships. Activity boxes are connected together with one-way arrows to indicate precedence. The first activity is placed on the let side of the diagram with the last activity on the right side. Activity boxes are usually placed at different levels to accommodate activities that are done simultaneously". Source: Project Auditors. PM Definitions. [On-line], Available: http://www.projectauditors.com/Dictionary/N.html.

Process: A series of actions causing a result.

Program: Group of projects managed in a coordinated way. Programs usually include an element of ongoing activity.

Projects: "Temporary endeavor undertaken to create a unique product or service" (Project Management Institute Standards Committee, PMBOK) (Duncan, 1996, p.167). A project is viewed as "any undertaking with a defined starting point and defined

objectives by which completion is identified" and "in practice, most projects depend on finite or limited resources by which objectives are to be accomplished" (Duncan, 1996, p. 4). The project is initiated as the solution to an identified organizational problem, and is supported by a high-level sponsor.

Project Management: "The application of knowledge, skills, tool, and techniques to project activities to meet or exceed stakeholder needs and expectations from a project" (PMBOK, Duncan, 1996, p. 167).

Project Management Processes: Processes concerned with describing and organizing the work of projects, generally falling in one of the following groups: initiating, planning, executing, and closing.

Project Manager: Individual responsible for managing a project. The project manager solicits project team members from various functions of the company ensuring that specific assignees have the requisite expertise to provide realistic planning for the project. Team members are often assigned according to the needs of the project. The project manager is responsible for the plan, and the work itself.

Scheduling – The planned dates for performing activities and the planned dates for meeting the milestones of the project (PMI, 1996, p. 168).

Sponsor: The sponsor facilitates the initiation of the project by communicating the vision, providing resources, establishing boundaries, and running interference (Grauf, 1995).

Stakeholders: Individuals and organization who are actively involved in the project, or whose interests may be positively or negatively affected as a result of project execution of success or failure of the project.

Statistical Terms

Adjusted R^2: The R^2 is the coefficient of multiple determination, is a measure of the part of the variation in the dependent variable that is explained by the variation of independent variables. The *Adjusted* R^2 is the R^2 weighted by the number of independent variables and observations. "It can be used for comparing the goodness of fit of two regression models when they have the same dependent variable, but a different number of independent variables" (Kahane, 2001, p. 187).

ANOVA: "An acronym for analysis of variance, which is the breakdown of the total variation of the dependent variable into its two components; the variation explained by the regression and the variation that is unexplained (or the "residual" variation)" (Kahane, 2001, p. 187).

Correlation Coefficient: "A measure of degree to which two variables are linearly associated. The coefficient ranges from -1 to +1, where a value of -1 means that two variables are perfectly negatively correlated; a value of +1 means that they are perfectly

positively correlated. A value of 0 means that the two variables are not linearly associated" (Kahane, 2001, p. 188).

Cronbach's alpha: "The Cronbach's Alpha is a numerical coefficient of reliability. The alpha is based on the reliability of a test relative to other tests with same number of items, and measuring the same construct of interest. It is used to assess and improve upon the reliability of variables derived from summated scales" (Cronbach, 1951, p. 321).

Degrees of Freedom (ddf): "The number of degrees of freedom of a statistic depends on the number of sample observations *(n).* The number of degrees of freedom (abbreviated df) is the number of observations less the number of variables (restrictions) placed on them; being *(n-1)"* (Hinkle, Wiersma & Jurs, 1994, p. 183).

Dependent Variable: In a regression model, it is the variable that we are trying to explain. It is assumed that the dependent variable, sometimes referred to as the Y variable, is a function of the independent variable(s), which are often called the X variables(s). (Kahane, 2001, p. 189).

Exploratory Research: "Exploratory research is often conducted because a problem has not been clearly defined as yet, or its real scope is as yet unclear. It allows the researcher to familiarize herself with the problem or concept to be studied, and perhaps generate hypotheses (definition of hypothesis) to be tested. It is the initial

research, before more conclusive research is undertaken. Exploratory research helps determine the best research design, data collection method and selection of subjects" (http://www.ryerson.ca/~mjoppe/ResearchProcess/ExploratoryResearch.htm).

F Test: An F-test is used to test if the standard deviation of two populations is equal. This test can be a two-tailed or one-tailed test (Snedecor and Cochran, 1983).

Multiple Regression: Multiple regression is used when there is more than one independent variable to fit data to the model. This is to highlight relative contribution from several independent variables to the dependent variable (Stockburger, 1996 and Weiss & Hassett, 1991, p. 585).

Normal Quartile Plots (QQ Plots): Normal distribution of data is important to make statistical inferences. Normally distributed data should lead to a fairly straight plot. The advantage of a normal plot over a histogram is that it is easier to judge linearity or lack of it. Normal Plots shows the normality of distribution of the data. Regression analysis also requires QQ plots. (http://www.ens.gu.edu.au/stats/sashelp/inqqplot.htm).

Regression Analysis: Used to prove the relative contribution and relationship between two variables, in this case; organizational learning and the role of the project.

Residual: "The difference between the actual value of an observation and the predicted value for that observation in a sample regression" (Kahane, 2001, p. 194).

Residual (Min and Max): the difference of the actual value of the dependent variable and the predicted dependent variable corresponding to the particular value of the independent variable is the residual. Then take all the residuals and the minimum and maximum value of that set and that is what is reported as the minimum and maximum value.

T-Tests: The mean of two sample groups. It will show if there are differences between two groups being measured.

Variance: A measure of the dispersion of spread of a random variable around to its mean. For a sample of data, it is equal to the sum of squared deviations for a random variable from its mean, divided by the degrees of freedom. (Kahane, 2001, p. 196).

Appendix B - Human Subject Forms

THE GEORGE WASHINGTON UNIVERSITY & MEDICAL CENTER
OFFICE OF HUMAN RESEARCH

IRB Submission Check List for Non-Medical Research Projects

PROJECT TITLE:

An Exploratory Study of Project Team's Learning Environment:
Examination of Norms, Behaviors and Tools
Of the Project Manager

PLEASE REVIEW YOUR APPLICATION PACKET PRIOR TO SUBMISSION; INCOMPLETE PACKETS WILL BE RETURNED UNREVIEWED. **THE FOLLOWING INFORMATION MUST BE INCLUDED WITH YOUR APPLICATION:**

included	N/A	
x		All contact information (phone/fax/e-mail/address(including room #) for Principle Investigator, sub-investigators (in any) and coordinator
x		*Completed* Submission form, including
x		...Signatures of the chairperson(s) of ***each*** **department involved in the study**
	N/A	Grant proposal (for federally funded studies)
x		1 copy of the IRB Submission Form
x		1 copy of the Informed Consent
x		1 copy of the Protocol Summary
		1 copy of any other associated documents (i.e. recruitment advertisements, flyers, and radio ads)

Note: If you are submitting a master's thesis, doctoral dissertation, or grant proposal, a copy needs to be included with the submission packet.

PERSON COMPLETING THIS FORM (please print):	**Beverly Hollandsworth-George**
PHONE: **817-472-6894**	E-MAIL: **george1@ticnet.com**
SIGNATURE:	DATE: **March 8, 2002**

OHR USE ONLY:
Submission complete: Y N (circle one)

If Incomplete: contact PI/Coordinator re: revisions. Person contacted:

THE GEORGE WASHINGTON UNIVERSITY & MEDICAL CENTER
OFFICE OF HUMAN RESEARCH

IRB Submission Form for Non-Medical Research Projects

TITLE OF PROJECT:	An Exploratory Study of Project Team's Learning Environment: Examination of Norms, Behaviors and Tools Of the Project Manager

PLEASE CONSIDER THIS PROJECT FOR THE FOLLOWING:
__x__ Full Committee Review or ____ Expedited Review or ____ Exemption

SECTION I: INVESTIGATOR AND PROJECT INFORMATION

A. Investigator Team Information

1. PRINCIPAL: If you are a student, please list your advisor contact information under coordinator/ contact person section.

Name Beverly A. Hollandsworth-George

Department Department of Counseling and Human and Organizational Studies GWU GSEHD

Address 2134 G. Street N.W. Washington, D.C. 20052

Phone # 817-472-6894 Fax # 817-472-6894 E-mail george1@ticnet.com

2. SUB-INVESTIGATOR(S), IF ANY (attach additional information as required)

Name _____

Department _____

Address _____

Phone # _____ Fax # _____ E-mail _____

3. COORDINATOR / CONTACT PERSON/ FACULTY SPONSOR (please circle one)

Name Dr. David R. Schwandt

Department Department of Counseling and Human and Organizational Studies GWU GSEHD

Address 2134 G. Street, N. W. Ste. 219, Washington, D.C. 20052

Phone # 202-994-8650 Fax # 202-994-4928 E-mail DRSchwandt@msn.com

4. ADDRESS FOR IRB CORRESPONDENCE (attach additional information as required)

Department(s)Involved	Chaos GWU GSEHD	
Address(s)	2134 G. Street, N. W., Ste. 326	Washington, D.C. 20052
Chair name(s)	Dr. Sylvia A. Moretta	
Chair signature(s)		

These signatures are required. Unsigned submissions will be returned unreviewed.

B. project Information

1. Protocol type: (Check appropriate category)

____ Observational _ X_ Survey / Interview ____ Data Set Review

____ Pilot ____ Experimental _X__ Other Indicate Type: (Document Review)

2. Has this project been previously submitted by this or any other investigator to the GWU IRB?

Y N (If yes, please attach copy of previous protocol, investigator information, IRB number, and documentation of substantive changes or alterations, if any.)

3. Has this project been submitted by this or any other investigator to another IRB?

Y N (If yes, please attach copy of IRB approval / disapproval and supporting documents, if any.)

C. Sponsor Information

1. Funding Source: Please describe all sources of funding for your project. **Be thorough.** If federal government funding is being utilized, please specify funding agency. DO NOT attach budget information. If a grant application is involved, please include deadline information. If more space is needed, please provide attachment.

None

2. Has the Office of Research Services been notified of this project as of submission date? Y N

3. Is this a multi-center project (That is, will the same research be conducted at different sites, outside of GWU?)? Y **N**
If yes, please complete Section IV, **Multi-center Project Information,** found here.

Subject Recruitment Information

1. Please describe the population being studied. Check all that apply.

_X__ Normal volunteers	___ Students	___ Black (not of Hispanic origin)
_X__ Both genders	___ Pregnant women	___ White (not of Hispanic origin)
___ Males only	___ Mentally disabled persons	___ Asian/Pacific Islanders
___ Females only	___ Physically handicapped persons	___ Hispanic
___ < 18 years of age (minors)	___ Prisoners	___ Other (specify):
___ > 65 years of age (elderly)	_X__ All ethnic groups included	

Please use this space to add any additional descriptors of your subject population:

. Numbers: How many subjects will be recruited from GWU? __Approx. 75
2
If this is a multi-site project, what is the total number of subjects intended for recruitment? _____

3. Subject recruitment: Please check all that apply.

____ Public Advertisement	_X__ Referrals	____ Classroom announcements
____ Investigator client database	____ Mailings	____ Other (specify): _____

NOTE: Copies of **all** advertising materials must be included in this submission package. If a potential subject is exposed to it, the IRB must approve it first.

____ Check here if you have attached a narrative description of subject recruitment.

4. Subject compensation: N Y Indicate amount: _____

5. Finders' fee: N Y Indicate amount: _____

E. Confidentiality and Privacy for Subjects

1. Please detail how the investigators will ensure confidentiality and privacy for subjects involved in the study (i.e. use of pseudonyms, code names and/or numbers, how these identifiers will be linked with subject information, etc.)

Unique numerical identifiers will link study participants with the Schwandt's Organizational Learning System Model Survey administered to the project manager and the project teams.

2. Please list all persons who will have access to the data set, and their roles in the project. Attach additional information if necessary.

Name		Study Role
Beverly Hollandsworth-George		Principal Investigator
Dr. David R. Schwandt		Chair, Dissertation Committee

3. Where will study records be kept? Please list address(s).

Office of Beverly Hollandsworth-George in a locked file cabinet at private home office; 817 Gillon Drive, Arlington, Texas 76001

4. a. Subject identifiable material (That is, will you be taking down information that will easily identify the subject?): please check all that apply.

_X__ None ___ Videorecording ____ Other: specify _____

____ Photographs ___ Audiorecording _____

(If none, please skip question 4. B.)

4. b. If you the options in 4a. apply to your study, please describe in detail how and where this material is to be catalogued, stored, transported, kept secure, and ultimately disposed of. Please be specific. Attach additional information if necessary.

SECTION II: CONFLICT OF INTEREST DECLARATION

A. Does any participating investigator have an equity interest (e.g., own or control stock) in the sponsor, collaborating organization(s), or other organization(s) having financial interest in products or services which are a subject of the proposed project? **N** Y (If yes, please attach detailed description of equity interest and proposed mechanisms for avoiding conflict of interest. Be specific.)

B. Does any participating investigator have a consultant relationship with any of the above? **N** Y (If yes, please attach detailed description of the nature of this relationship. Be specific.)

SECTION III: INVESTIGATORS' STATEMENT

I certify that the information provided on this submission form is complete, true, and correct to the best of my knowledge. I am aware that I must receive approval from the Committee on Human Research (CHR) prior to either conducting this study or implementing any modifications to this study. I will promptly report any unexpected or otherwise significant adverse events or effects encountered in the course of this study to the CHR. It is my responsibility to ensure that this research study is conducted according to CHR guidelines and applicable federal regulations. It is my responsibility to ensure that CHR reports are submitted at appropriate intervals, and that this research study is re-approved or terminated at the appropriate time.

	Beverly Hollandsworth-George	March 8, 2002
Principle Investigator's signature	PI name (please print)	Date

Appendix C - Informed Consent

An Exploratory Study of Project Team's Learning Environment:
Examination of Norms, Behaviors and Tools
Of the Project Manager

Beverly Hollandsworth-George, Principal Investigator
817-472-6894

I. INTRODUCTION

You are invited to take part in a research study. Before you decide to be a part of this study, you need to understand the risks and benefits. This consent form provides information about the research study. The Principal Investigator of the research study will be available to answer your questions and provide further explanations. If you agree to take part in the research study, you will be asked to sign this consent form. This process is known as informed consent.

Your decision to take part in the study is voluntary. You are free to choose whether or not you will take part in the study.

II. PURPOSE

Beverly Hollandsworth-George, a doctoral candidate in the Department of Counseling and Human and Organizational Studies of The George Washington University Graduate School of Education and Human Development is carrying out an exploratory research study designed to investigate how the project manager's role is used in creating learning within the project team. Specifically, she is interested in how the project manager structures that role to increase the opportunity for organizational learning and knowledge creation within the project team.

III. PROCEDURES

This project will be conducted at your work site. The study involves the project management organization. Project managers and their project teams consisting of at least

five or more members will participate in the process. The project manager and project team will take the Schwandt's Organizational Learning Systems Survey. This survey will take approximately 15 - 30 minutes to complete.

This informed consent form applies only to the administration of the survey. Should you and other members of your team be selected to participate, you will have the opportunity to review and sign this document. Examination of this data will focus on the structuration functions of the project manager's role and their actions and how they may affect creating project knowledge and the integration of performance and learning of the project teams.

IV. POSSIBLE RISKS

To the best of my knowledge, participating in the study has no more risk or harm than you would experience in everyday life.

V. POSSIBLE BENEFITS

You will receive a written, team level analysis, of the group data associated with your project team.

VI. COMPENSATION

There is no compensation for participation in this study.

VII. RIGHT TO WITHDRAW FROM THE STUDY

Your participation in this research study is voluntary and will not affect your job status. You may decide not to begin or to stop this study at any time. You will be told of any new information about the research study that may cause you to change your mind about participation.

VIII. COSTS

There are not any costs associated with taking part of this study.

IX. CONFIDENTIALITY OF RESEARCH RECORDS

All aspects of this research project are completely confidential. The following elements have been designed in this process, the instrument and accompanying demographic information has been designed to limit personal data and will be coded to remove any identifying information, and data will be reported in the aggregate form and in case where the data cannot be aggregated, any information that could identify you will be removed.

Your records will be confidential. You, your team, and organization will not be identified in any reports or publications of this study. Research study records will be kept confidential unless you authorize their release or the records are required by law (i.e. court subpoena).

All records associated with this study will be maintained in a locked file cabinet in the Principle Investigator's office. The records shall be under the sole and exclusive control of the Principle Investigator. At the conclusion of the study, any records that may identify individuals will be destroyed.

X. QUESTIONS

If you have questions about the procedures of this research study, please contact Beverly Hollandsworth-George by telephoning 817-472-6894. If you have questions about the informed consent process or any other rights as a research subject, please contact Kim Filbert, Acting Director, in the George Washington University Office of Human Research at (202) 994-2715. Ms. Filbert is your representative.

XI. SIGNATURES / ACCEPTANCE

By signing the consent form, you affirm that you have read this Informed Consent Form; the study has been explained to you, your questions have been answered and you agree to take part in this study. You do not give up any legal rights by signing this informed consent form. You will receive a copy of this consent form.

_____
Participant (Print Name

_____ _____
Signature Date

XII. INVESTIGATOR STATEMENT

I certify that the research study has been explained to the above individual by me including the purpose, the procedures, the possible risks and the potential benefits associated with participation in this research study. Any questions raised have been answered to the individual's satisfaction.

Beverly Hollandsworth-George
Principal Investigator

_____ _____

Signature Date

Appendix D - Protocol Summary

An Exploratory Study of Project Team's Learning Environment:
Examination of Norms, Behaviors and Tools
Of the Project Manager

Protocol Summary

Summary and Purpose: A web based instrument and qualitative techniques (individual self assessment and team assessment) will be utilized to collect data from formal project teams to identify how the project manager structures that role to create collective learning.

Research Plan: This dissertation study involves an organization that has three or more formal project teams consisting of at least five or members each. The project manager and that project team will take the Schwandt's Organizational Learning Model Survey.

Study Objective: The study proposed here endeavors to answer the following question: What is the relationship between the Project Manager's role and organizational learning within the project team as measured by an Overall Organizational Learning score (OLS)?

Study Population: The population for the study proposed here is all project team based organizations that meet two criteria. The organization must contain three or more formal project teams that consist of a minimum of five members each. The specification of minimums with respect to the number of project team and members is adopted to facilitate the use of the statistical techniques employed.

Risks and side-effects: There are no side effects from taking this survey. It will take approximately 20 to 30 minutes to complete the survey.

Statistical explanation for number of subjects to be enrolled: Four to six teams are studied here to facilitate both literal (similar results or findings across cases) and theoretical (contrasting resulting or findings across cases, but for predictable reasons) replication. Team size is specified as a minimum of 5 members to facilitate the statistical replication used in the Schwandt's Organizational Learning System Survey.

Informed Consent Issue: Participants in the study will be presented with the informed consent form prior to participating in the Schwandt's Organizational Learning System Survey.

Appendix E - Study Description and Solicitation

An Exploratory Study of Project Team's Learning Environment:
Examination of Norms, Behaviors and Tools
Of the Project Manager

Background and Project Focus

Project management as we know it today, reflects its origins in the defense and aerospace, engineering and construction projects of the postwar period. By the 1990's, the focus on the project manager has shifted to the role of the project manager and the whole project team for the management of projects. Most research has focused on the project management process, tools and methods that the project management discipline utilizes to accomplish the tasks of the organization. However, little empirical research has been conducted on to what extent the structuring variables of the project manager's role can enable organizations to examine the emphasis of performance and learning actions.

Methodology

I am seeking an organization that has three or more formal project teams that consist of at least five members each to participate in this study. This is an exploratory study that consisted of a Project Manager and his/her project team, utilizing the Schwandt's Organizational Learning System Model. All the data collected during this study will be combined and correlations will be drawn applying the Schwandt's Organizational Learning System Model as the area of research focus. Complete anonymity will be used to disguise individual comments, and the identity of the team and organization.

Benefits for the Participating Organization

This study is conducted as academic research, yet it has very practical implications. From a practical viewpoint, the results may be useful to the participating organizations considering, or currently implementing new project manager, and project team structures. For example, the findings may impact the way in which an organization hires projects managers and how they relate to the team performance within the

organization to meet the customer deliverable that drive each project. It is also hoped that the participating organization will be receptive to taking part in the study so they can help advance the industry of project manager research, a field that greatly need to increase its amount of empirically driven research. The lead researcher is willing to share the results with the participating organization in a format that is beneficial to them, such as written document or an oral presentation.

Researcher

Beverly Hollandsworth-George is conducting her doctoral dissertation in the Education and Human Development Department at The George Washington University. Beverly holds a M.S. (1996) in Human Resource Management from Houston Baptist University, Houston Texas; and a B.S. (1993) in Communication with a minor in Business from St. Edward's University, Austin Texas. Her academic training includes leadership development, teamwork survey development, research design, and training and development. Beverly has worked for thirty years in the public sector, conducting organizational diagnosis, professional coaching, business process diagnosis, and project management training.

She currently is a full time faculty at the University of Texas, Arlington, Texas. Beverly's dissertation is under the direction of David R. Schwandt, Ph.D., who expertise includes organizational learning, the application of complexity theory to organizational dynamics, team performance, and has developed an Organizational Learning System, Model and Survey to diagnosis and facilitate change and development within the organization. Beverly's committee members are Dr. Denis Cioffi in the Management Science Department in the School of Business and Public Management at the George Washington University, and Dr. Andrea Hornett at the University of Pennsylvania.

Contact Information

Your consideration is appreciated. To further discuss participating in this study, please contact Beverly at 817-472-6894, or george1@ticnet.com.

Appendix F - Letter to the Committee

An Exploratory Study of Project Team's Learning Environment:
Examination of Norms, Behaviors and Tools
Of the Project Manager

Dear Sir:

As you are aware, I am a doctoral student in the Human Resource Development at the Graduate school of Education and Human Development at The George Washington University. My dissertation chairperson is Dr. David Schwandt, HRD chair and professor at the George Washington University, Virginia Campus. During my course the past two years, I have developed an interest in how companies can improve their bottom line through business process improvements and project management methodologies. This has led me to select my dissertation topic as "An exploratory study of Project team learning environment: An examination of Norms, Tools & Behaviors of the project manager".

My research has highlighted a gap in understanding the project manager's role and how that role may create collective learning of the project team. Some studies has looked at the group processes, team output, project knowledge levels, but little has looked at the individual role of the project manager and how that role through skill development and deployment can create an environment for knowledge creation within the project team. The theoretical basis of this study is built upon Katz and Kahn's (1978) system's approach and grounded in Parsonian (1951) Action Theory of four functional prerequisites. In addition, Giddens' (1984) structuration theory will help to further delineate the project manager's role and how it pertains to collective learning (Schwandt, 1994, 1996, 1999, 2000).

I have read your work on Project Management and feel that your expertise would be a great contribution to my dissertation. I am enclosing the abstract for my dissertation, and sincerely hope that you would consider becoming a member of my dissertation committee. It would be a great honor to work with you if given the opportunity. I look forward to receiving your response.

Sincerely,
Beverly Hollandsworth-George

Appendix G-1 - Descriptive Statistics

Table G1: Demographics: Project Managers and Project Team Members - (Individual Contributors)

Category	N	%
Project Managers	22	52%
Individual Contributors	20	48%
Total	42	100%

Table G2: Demographics: People Distribution on the Project Team by Project Deployment

Project Process	PM	IC	N Total	% Total
Initiation	2	3	5	13%
Planning	4	8	12	31%
Executing	4	9	13	33%
Controlling	8	0	8	21%
Closing	1	0	1	02%
Unassigned			3	
Total	19	20	42	100%

Table G3: Demographics: How Many Project Teams People Work On

Project Team	PM	IC	N Total	%
One Team	7	7	14	33.3%
Two Teams	6	8	14	33.3%
Three Teams	2	3	5	12%
Four Teams	4	2	6	14.3%
Five Teams	3		3	7.1%
Total	22	20	42	100%

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Table G4: Demographics: Job Location of the Participants

Work Location	**PM**	**IC**	**N**
Web Based (Remote)	3	0	3
In-House (Corporate Headquarters)	19	20	39
Total	22	20	42

Table G5: Demographics: Participants Tenure

Seniority	PM	IC	TOTAL	%
Less than 1 Year	3	4	7	16.6%
1 yr to less than 3 years	4	7	11	26.2%
3 Yrs to less than 5 years	8	3	11	26.2%
5 Yrs to less than 10 Years	6	2	8	19.0%
10 Yrs to less than 15 Years	1	1	2	5%
15 Years or more	0	3	3	7%
Total	22	20	42	100%

Table G6: Demographics: Education Level of Participants

Education	PM	IC	Total	%
Some High School	0	0	0	0%
High School	0	0	0	0%
Some College	3	2	5	12.2%
2 Yrs College Degree	3	3	6	14.6%
4 Yrs College Degree	10	11	21	51.2%
Masters Degree	6	3	9	22.0%
Doctoral Degree	0	0	0	0%
Total	22	20	41	100%

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Table G7: Means and Standard Deviation of the Learning Functions

Learning Functions	N	Minimum Scores	Maximum Scores	Mean	Std. Deviation
Environmental Interface	42	1.50	4.25	2.6726	.63315
Action / Reflection	42	1.67	4.67	3.1746	.74803
Dissemination and Diffusion	42	1.75	4.75	3.7500	.60430
Meaning / Memory	42	1.75	5.00	3.7163	.60989

Table G8: Means and Std Deviation of the Project Manager's Role

Variables	N	Minimum Scores	Maximum Scores	Mean	Std. Deviation
Overall Project Mgr (OPM)	42	2.53	4.64	3.6882	.44427
Norms	42	2.67	4.67	3.6746	.49654
Behaviors	42	2.83	5.00	3.8333	.49932
Tools	42	1.00	4.67	3.3095	.89909

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Table G9: Mean & Standard Deviation of OLS and Learning Functions for Project Manager and Individual Contributor Sample

Variables		Sample N	Mean	Standard Deviation
OLS	PM	22	3.4256	.59326
	IC	20	3.2371	.39009
Environmental Interface	PM	22	2.7068	.63119
	IC	20	2.5250	.61719
Action Reflection	PM	22	3.3636	.71941
	IC	20	2.9667	.74063
Dissemination / Diffusion	PM	22	3.7841	.76796
	IC	20	3.7125	.36522
Meaning / Memory	PM	22	3.7424	.66314
	IC	20	3.6875	.56122
Overall Project Mgr (OPM) Questions	PM	22	3.8411	.44664
	IC	20	3.5200	.38547
Norms	PM	22	3.7424	.53385
	IC	20	3.6000	.45370
Behaviors	PM	22	4.0379	.45114
	IC	20	3.6083	.45971
Tools	PM	22	3.4091	.93538
	IC	20	3.2000	.86788

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Table G10: Mean & Standard Deviation of Project Manager's Performance

Project Manager and Individual Contributor Sample

Performance Deployment	Variables		Sample N	Mean	Standard Deviation
Budget Goals	Question 59	PM IC	22 20	4.09 3.60	.750 .883
Schedule Goals	Question 60	PM IC	22 20	3.86 3.60	.834 .995
Scope Goals	Question 61	PM IC	22 20	3.91 3.55	1.065 1.050

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Table G11: Independent t-tests of Survey functions - Project Manager and Individual Contributor

Functions	t	ddf	Sig. (2-tail)	Means Differences
OLS	1.203	40	.236	.1884
Environmental Interface	1.460	40	.152	.2818
Action Reflection	1.761	40	.086	.3970
Dissemination & Diffusion	.391	40	.698	0.716
Meaning / Memory	.288	40	.775	.0549
OPM	2.482	40	.017	.3211
Norms	.927	40	.360	.1424
Behaviors	3.054	40	.004	.4295
Tools	.749	40	.458	.2091

Appendix H – Cronbach Alpha and Pearson's Correlation Analysis

Table H1: Cronbach Alpha Values

Organizational Effective Measures		Project Manager	Individual Contributor	Total Sample Alpha Value	Internal Consistency Scores (Johnson, 2000)
Overall Learning Score (OLS)		.9013	.6761	.8307	
Overall Performance Score (OPS)		.8485	.6541	.8079	
Environmental Interface	Adaptation Learning	.6256	.5492	.6079	0.78
Acquisition of Resources	Adaptation Performing	.3947	.4806	.3856	0.62
Action Reflection	Goal Learning	.6650	.5181	.6168	0.64
Production Services	Goal Performing	.6587	.1718	.5673	0.76
Dissemination and Diffusion (Integration Learning)	Integration Learning	.7996	-.3441	.5938	0.81
Management & Control	Integration Performing	.5800	.4517	.5550	0.76
Meaning & Memory	Latency Learning	.7394	.5821	.6582	.74
Maintaining Cultural Patterns	Latency Performing	.4386	.3984	.4620	.71

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Scale	Project Manager	Individual Contributor		Total Sample Alpha Value
Overall Project Management (OPM)	.7477	.7185		.7357
PM Norms	-.2481	-1.3168		-.7176
PM Behaviors	.7473	.6002		.6819
PM Tools	.8386	.5974		.7275

Table H2: Cronbach Alpha Values

Scale	N of Items	Total Sample Alpha Value
PM Level I Deployment	4	-.2539
PM Level II Deployment	4	.5361
PM Level III Deployment	4	.6120

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Table H3: Correlation Table of the Project Manager's Role to Overall Learning Total Sample

		OLS	EI	AR	DD	MM	OPM	N	B	T
OLS	Pearson	1								
	p-value	..								
	N	42								
EI	Pearson	*.757	1							
	p-value	.000	..							
	N	42	42							
AR	Pearson	*.805	*.506	1						
	p-value	.000	.001	..						
	N	42	42	42						
DD	Pearson	*.771	*.449	*.406	1					
	p-value	.000	.003	.008	..					
	N	42	42	42	42					
MM	Pearson	*.843	*.423	*.676	*.590	1				
	p-value	.000	.005	.000	.000	..				
	N	42	42	42	42	42				
OPM	Pearson	*.556	*.320	*.654	*.386	*.434	1			
	p-value	.000	.039	.000	0011	.004	..			
	N	42	42	42	42	42	42			
Norms	Pearson	.171	.047	.179	.271	.059	*.496	1		
	p-value	.279	.766	.258	.083	.710	.001	..		
	N	42	42	42	42	42	42	42		
Behv	Pearson	*.578	*.460	*.682	.295	*.419	*.816	*.470	1	
	p-value	.000	.002	.000	.058	.006	.000	.002	..	
	N	42	42	42	42	42	42	42	42	
Tools	Pearson	*.339	.143	*.353	*.317	.280	*.695	.110	*.305	1
	p-value	.028	.366	.022	.041	.072	.000	.489	.050	..
	N	42	42	42	42	42	42	42	42	42

Note: * Designates statistical significance at the .05 level.

Appendix H-4

Table H4: Correlation of Survey Functions for the Project Manager Sample

		OLS	EI	AR	DD	MM	OPM	N	B	T
OLS	Pearson	1								
	p-value	..								
	N	22								
EI	Pearson	*.839	1							
	p-value	.000	..							
	N	22	22							
AR	Pearson	*.811	*.564	1						
	p-value	.000	.006	..						
	N	22	22	22						
DD	Pearson	*.877	*.743	*.489	1					
	p-value	.000	.000	.021	..					
	N	22	22	22	22					
MM	Pearson	*.883	*.549	*.810	*.677	1				
	p-value	.000	.008	.000	.001	..				
	N	22	22	22	22	22				
OPM	Pearson	*.658	*.456	*.631	*.561	*.614	1			
	p-value	.001	.033	.002	.007	.002	..			
	N	22	22	22	22	22	22			
Norms	Pearson	.120	.187	-.075	.293	-.058	*.445	1		
	p-value	.596	.405	.740	.185	.797	.038	..		
	N	22	22	22	22	22	22	22		
Behv	Pearson	*.587	*.550	*.599	.389	*.514	*.821	*.526	1	
	p-value	.004	.008	.003	.073	.014	.000	.012	..	
	N	22	22	22	22	22	22	22	22	
Tools	Pearson	*.551	.295	*.563	*.525	*.506	*.759	.083	.375	1
	p-value	.008	.183	.006	.012	.016	.000	.712	.085	..
	N	22	22	22	22	22	22	22	22	22

Note: * denotes statistical significance at .05 level

Appendix H-5

Table H5: Correlation of Survey Functions with the Individual Contributor Sample

		OLS	EI	AR	DD	MM	OPM	N	B	T
OLS	Pearson	1								
	p-value	..								
	N	20								
EI	Pearson	*.626	1							
	p-value	.003	..							
	N	20	20							
AR	Pearson	*.826	.376	1						
	p-value	.000	.102	..						
	N	20	20	20						
DD	Pearson	*.448	-.171	.303	1					
	p-value	.047	.472	.194	..					
	N	20	20	20	20					
MM	Pearson	*.805	.261	*.543	.421	1				
	p-value	.000	.266	.013	.064	..				
	N	20	20	20	20	20				
OPM	Pearson	.305	.009	*.613	-.010	.199	1			
	p-value	.192	.970	.004	.967	.401	..			
	N	20	20	20	20	20	20			
Norms	Pearson	.207	-.231	.428	.222	.224	*.536	1		
	p-value	.380	.367	.060	.346	.343	.015	..		
	N	20	20	20	20	20	20	20		
Behv	Pearson	*.551	.260	*.707	.156	.359	*.745	.373	1	
	p-value	.012	.267	.000	.511	.120	.000	.105	..	
	N	20	20	20	20	20	20	20	20	
Tools	Pearson	-.071	-.092	.075	-.169	-.045	*.634	.110	.177	1
	p-value	.766	.701	.755	.477	.850	.003	.645	.454	..
	N	20	20	20	20	20	20	20	20	20

Note: * denotes statistical significance at .05

Appendix H-6

Table H6: Correlation Table of the *Project Manager's Norms* to Learning Functions - All Scores

		Q 47	Q 48	Q 49	EI	AR	DD	MM
Norms Level I Q 47	Pearson	1						
	p-value	..						
	N	42						
Norms Level II Q 48	Pearson	-.425*	1					
	p-value	.005						
	N	42	42					
Norms Level III Q 49	Pearson	-.115	.097	1				
	p-value	.469	.540					
	N	42	42	42				
EI	Pearson	.019	-.005	.054	1			
	p-value	.904	.976	.735				
	N	42	42	42	42			
AR	Pearson	-.115	.371*	.057	.506*	1		
	p-value	.470	.016	.720	.001			
	N	42	42	42	42	42		
DD	Pearson	.061	.321*	.028	.449*	.406*	1	
	p-value	.701	.038	.860	.003	.008		
	N	42	42	42	42	42	42	
MM	Pearson	-.024	.169	-.044	.423*	.676*	.590*	1
	p-value	.882	.285	.780	.005	.000	.000	
	N	42	42	42	42	42	42	42

Note: * Designates statistical significance at the .05 level

Appendix H-7

Table H7: Correlation Table of the *Project Manager's Behaviors* to Learning Functions - All Scores

		Q 50	Q 51	Q 52	Q 53	Q 54	Q 55	EI	AR	DD	MM
Beh. Level I Q 50	Pearson	1									
	p-value	..									
	N	42									
Beh. Level I Q 51	Pearson	.366*	1								
	p-value	.017	..								
	N	42	42								
Beh. Level II Q 52	Pearson	.104	.087	1							
	p-value	.514	.585	..							
	N	42	42	42							
Beh. Level II Q 53	Pearson	.401*	.337*	.360*	1						
	p-value	.008	.029	.019	..						
	N	42	42	42	42						
Beh. Level III Q 54	Pearson	.350*	.142	.444*	.497*	1					
	p-value	.023	.370	.003	.001	..					
	N	42	42	42	42	42					
Beh. Level III Q 55	Pearson	.357*	.238	.143	.301	.601*	1				
	p-value	.020	.129	.366	.053	.000	..				
	N	42	42	42	42	42	42				
EI	Pearson	.261	.146	.301	.104	.429*	.501*	1			
	p-value	.095	.358	.053	.511	.005	.001	..			
	N	42	42	42	42	42	42	42			
AR	Pearson	.489*	.337*	.488*	.483*	.476*	.418*	.506*	1		
	p-value	.001	.029	.001	.001	.001	.006	.001	..		
	N	42	42	42	42	42	42	42	42		
DD	Pearson	.170	.053	.131	.342*	.213	.269	.449*	.406*	1	
	p-value	.281	.741	.407	.027	.176	.084	.003	.008	..	
	N	42	42	42	42	42	42	42	42	42	
MM	Pearson	.271	.055	.379*	.298	.291	.340*	.423*	.676*	.590*	1
	p-value	.071	.732	.013	.055	.062	.027	.005	.000	.000	..
	N	42	42	42	42	42	42	42	42	42	42

Note: * Designates statistical significance at the .05 level

Appendix H-8

Table H8: Correlation Table of the *Project Manager's Tools* to Learning Functions - All Scores

		Q 56	Q 57	Q 58	EI	AR	DD	MM
Tools Level I Q 56	Pearson	1						
	p-value	..						
	N	42						
Tools Level II Q 57	Pearson	.539*	1					
	p-value	.000	..					
	N	39	42					
Tools Level III Q 58	Pearson	.339*	.505*	1				
	p-value	.033	.001	..				
	N	40	39	42				
EI	Pearson	.159	.147	.001	1			
	p-value	.322	.364	.997	..			
	N	41	40	41	42			
AR	Pearson	.237	.252	.369*	.506*	1		
	p-value	.136	.117	.018	.001	..		
	N	41	40	41	42	42		
DD	Pearson	.371*	.266	.085	.449*	.406*	1	
	p-value	.017	.097	.596	.003	.008	..	
	N	41	40	41	42	42	42	
MM	Pearson	.317*	.102	.237	.423*	.676*	.590*	1
	p-value	.044	.530	.136	.005	.000	.000	..
	N	41	40	41	42	42	42	42

Note: * Designates statistical significance at the .05 level

Appendix H-9

Table H9: Correlation of *Project Manager's Performance Functions* (Developed by the committee for study)– All Scores

		Q 59	Q 60	Q 61	EI	AR	DD	MM
Project Schedule Q 59	Pearson	1						
	p-value	..						
	N	42						
Budget Goals Q 60	Pearson	.648*	1					
	p-value	.000	..					
	N	42	42					
Scope Goals Q 61	Pearson	.448*	.482*	1				
	p-value	.003	.001	..				
	N	42	42	42				
EI	Pearson	-.021	.122	.151	1			
	p-value	.894	.440	.341	..			
	N	42	42	42	42			
AR	Pearson	.285	.307*	.530*	.506*	1		
	p-value	.067	.048	.000	.001			
	N	42	42	42	42	42		
DD	Pearson	.044	.074	.254	.449*	.406*	1	
	p-value	.783	.643	.105	.003	.008		
	N	42	42	42	42	20	20	
MM	Pearson	.073	.225	.470*	.423*	.676*	.590*	1
	p-value	.644	.152	.002	.005	.000	.000	
	N	42	42	42	42	42	42	42

Note: * Designates statistical significance at the .05 level

Appendix H-10

Table H10: Correlation Table of the *Project Manager's Norms* to Learning

Functions - Project Manager Sample

		Q 47	Q 48	Q 49	EI	AR	DD	MM
Norms Level I Q 47	Pearson	1						
	p-value	..						
	N	22						
Norms Level II Q 48	Pearson	-.341	1					
	p-value	.121	..					
	N	22	22					
Norms Level III Q 49	Pearson	.029	-.046	1				
	p-value	.898	.838	..				
	N	22	22	22				
EI	Pearson	.093	.199	.073	1			
	p-value	.681	.375	.746	..			
	N	22	22	22	22			
AR	Pearson	-.083	.034	-.032	.564*	1		
	p-value	.713	.880	.888	.006	..		
	N	22	22	22	22	22		
DD	Pearson	.139	.463*	.049	.743*	.489*	1	
	p-value	.538	.030	.830	.000	.021	..	
	N	22	22	22	22	22	22	
MM	Pearson	-.073	.173	-.087	.549*	.810*	.677*	1
	p-value	.747	.442	.701	.008	.000	.001	..
	N	22	22	22	22	22	22	22

Note: * Designates statistical significance at the .05 level

Appendix H-11

Table H11: Correlation Table of the *Project Manager's Behaviors* to Learning Functions - Project Manager Sample

		Q 50	Q 51	Q 52	Q 53	Q 54	Q 55	EI	AR	DD	MM
Beh. Level I Q 50	Pearson	1									
	p-value	..									
	N	22									
Beh. Level I Q 51	Pearson	.251	1								
	p-value	.260	..								
	N	22	22								
Beh. Level II Q 52	Pearson	.157	.183	1							
	p-value	.486	.414	..							
	N	22	22	22							
Beh. Level II Q 53	Pearson	.430*	.477*	.199	1						
	p-value	.046	.025	.375	..						
	N	22	22	22	22						
Beh. Level III Q 54	Pearson	.291	.123	.130	.604*	1					
	p-value	.189	.584	.566	.003	..					
	N	22	22	22	22	22					
Beh. Level III Q 55	Pearson	.555*	.281	.005	.525*	.628*	1				
	p-value	.007	.205	.983	.012	.002	..				
	N	22	22	22	22	22	22				
EI	Pearson	.566*	.282	.242	.347	.267	.452*	1			
	p-value	.006	.203	.278	.113	.230	.035	..			
	N	22	22	22	22	22	22	22			
AR	Pearson	.520*	.165	.504*	.422	.400	.416	.564*	1		
	p-value	.013	.463	.017	.051	.065	.054	.006	..		
	N	22	22	22	22	22	22	22	22		
DD	Pearson	.180	.290	.111	.256	.303	.373	.743*	.489*	1	
	p-value	.422	.190	.624	.250	.170	.087	.000	.021	..	
	N	22	22	22	22	22	22	22	22	22	
MM	Pearson	.432*	.190	.368	.345	.347	.378	.549*	.810*	.677*	1
	p-value	.045	.396	.092	.116	.113	.082	.008	.000	.001	..
	N	22	22	22	22	22	22	22	22	22	22

Note: * Designates statistical significance at the .05 level

Appendix H-12

Table H12: Correlation Table of the *Project Manager's Tools* to Learning Functions - Project Manager Sample

		Q 56	Q 57	Q 58	EI	AR	DD	MM
Tools Level I Q 56	Pearson	1						
	p-value	..						
	N	21						
Tools Level II Q 57	Pearson	.627*	1					
	p-value	.004	..					
	N	19	20					
Tools Level III Q 58	Pearson	.644*	.526*	1				
	p-value	.002	.021	..				
	N	20	19	21				
EI	Pearson	.312	.357	.079	1			
	p-value	.168	.123	.735	..			
	N	21	20	21	22			
AR	Pearson	.499*	.534*	.428	.564*	1		
	p-value	.021	.015	.053	.006	..		
	N	21	20	21	22	22		
DD	Pearson	.584*	.592*	.181	.743*	.489*	1	
	p-value	.005	.006	.433	.000	.021	..	
	N	21	20	21	22	22	22	
MM	Pearson	.495*	.461*	.325	.549*	.810*	.677*	1
	p-value	.022	.041	.151	.008	.000	.001	..
	N	21	20	21	22	22	22	22

Note: * Designates statistical significance at the .05 level

Appendix H-13

Table H13: Correlation of *Project Manager's Performance Functions* (Developed by the committee for study) - Project Manager's Sample

		Q 59	Q 60	Q 61	EI	AR	DD	MM
Project Schedule Q 59	Pearson	1						
	p-value	..						
	N	22						
Budget Goals Q 60	Pearson	.706*	1					
	p-value	.000	..					
	N	22	22					
Scope Goals Q 61	Pearson	.845*	.683*	1				
	p-value	.000	.000					
	N	22	22	22				
EI	Pearson	.014	.264	.132	1			
	p-value	.952	.235	.558				
	N	22	22	22	22			
AR	Pearson	.377	.457*	.439*	.564*	1		
	p-value	.084	.032	.041	.006			
	N	22	22	22	22	22		
DD	Pearson	.132	.280	.319	.743*	.489*	1	
	p-value	.558	.206	.147	.000	.021		
	N	22	22	22	22	22	22	
MM	Pearson	.528*	.536*	.477*	.549*	.810*	.677*	1
	p-value	.012	.010	.025	.008	.000	.001	
	N	22	22	22	22	22	22	22

Note: * Designates statistical significance at the .05 level

Appendix H-14

Table H14: Correlation Table of the *Project Manager's Norms* to Learning Functions - Individual Contributor Sample

		Q 47	Q 48	Q 49	EI	AR	DD	MM
Norms Level I Q 47	Pearson	1						
	p-value	..						
	N	20						
Norms Level II Q 48	Pearson	-.616*	1					
	p-value	.004	..					
	N	20	20					
Norms Level III Q 49	Pearson	-.299	.353	1				
	p-value	.201	.127	..				
	N	20	20	20				
EI	Pearson	-.114	-.232	.150	1			
	p-value	.633	.324	.529	..			
	N	20	20	20	20			
AR	Pearson	-.214	.477*	.329	.376	1		
	p-value	.364	.033	.156	.102	..		
	N	20	20	20	20	20		
DD	Pearson	-.139	.378	.020	-.171	.303	1	
	p-value	.560	.101	.933	.472	.194	..	
	N	20	20	20	20	20	20	
MM	Pearson	.035	.187	.050	.261	.543*	.421	1
	p-value	.884	.430	.833	.266	.013	.064	..
	N	20	20	20	20	20	20	20

Note: * Designates statistical significance at the .05 level

Appendix H-15

Table H15: Correlation Table of the *Project Manager's Behaviors* to Learning Functions - Individual Contributor Sample

		Q 50	Q 51	Q 52	Q 53	Q 54	Q 55	EI	AR	DD	MM
Beh. Level I Q 50	Pearson	1									
	p-value	..									
	N	20									
Beh. Level I Q 51	Pearson	.318	1								
	p-value	.171	..								
	N	20	20								
Beh. Level II Q 52	Pearson	-.009	-.017	1							
	p-value	.971	.942	..							
	N	20	20	20							
Beh. Level II Q 53	Pearson	.371	.245	.422	1						
	p-value	.108	.297	.064	..						
	N	20	20	20	20						
Beh. Level III Q 54	Pearson	.184	-.087	.570*	.426	1					
	p-value	.436	.715	.009	.061	..					
	N	20	20	20	20	20					
Beh. Level III Q 55	Pearson	-.270	.060	.222	.000	.517*	1				
	p-value	250	.803	.347	1.000	.020	..				
	N	20	20	20	20	20	20				
EI	Pearson	-.301	-.070	.323	-.147	.489*	.527*	1			
	p-value	.197	.770	.165	.536	.029	.017	..			
	N	20	20	20	20	20	20	20			
AR	Pearson	.335	.344	.492*	.522*	.432	.325	.376	1		
	p-value	.149	.137	.028	.018	.057	.163	.102	..		
	N	20	20	20	20	20	20	20	20		
DD	Pearson	.120	-.311	.213	.596*	.074	-.132	-.171	.303	1	
	p-value	.615	.182	.367	.006	.756	.578	.472	.194	..	
	N	20	20	20	20	20	20	20	20	20	
MM	Pearson	.050	-.073	.443	.259	.255	.274	.261	.543*	.421	1
	p-value	.834	.761	.051	.271	.278	.242	.266	.013	.064	..
	N	20	20	20	20	20	20	20	20	20	20

Note: * Designates statistical significance at the .05 level

Appendix H-16

Table H16: Correlation Table of the *Project Manager's Tools* to Learning Functions - Individual Contributor Sample

		Q 56	Q 57	Q 58	EI	AR	DD	MM
Tools Level I Q 56	Pearson	1						
	p-value	..						
	N	20						
Tools Level II Q 57	Pearson	.482*	1					
	p-value	.031	..					
	N	20	20					
Tools Level III Q 58	Pearson	.011	.483*	1				
	p-value	.964	.031	..				
	N	20	20	20				
EI	Pearson	.012	-.076	-.165	1			
	p-value	.961	.751	.486	..			
	N	20	20	20	20			
AR	Pearson	.006	-.050	.257	.376	1		
	p-value	.981	.835	.273	.102	..		
	N	20	20	20	20	20		
DD	Pearson	.013	-.244	-.158	-.171	.303	1	
	p-value	.957	.300	.505	.472	.194	..	
	N	20	20	20	20	20	20	
MM	Pearson	.125	-.303	.103	.261	.543*	.421	1
	p-value	.600	.195	.665	.266	.013	.064	..
	N	20	20	20	20	20	20	20

Note: * Designates statistical significance at the .05 level

Appendix H-17

Table H17: Correlation of *Project Manager's Performance Functions* (Developed by the committee for study - Individual contributors' Sample

		Q 59	Q 60	Q 61	EI	AR	DD	MM
Project Schedule Q 59	Pearson	1						
	p-value	..						
	N	20						
Budget Goals Q 60	Pearson	.588*	1					
	p-value	.006	..					
	N	20	20					
Scope Goals Q 61	Pearson	.023	.272	1				
	p-value	.924	.246					
	N	20	20	20				
EI	Pearson	-.198	-.069	.099	1			
	p-value	.403	.774	.676				
	N	20	20	20	20			
AR	Pearson	.086	.124	.589*	.376	1		
	p-value	.719	.603	.006	.102			
	N	20	20	20	20	20		
DD	Pearson	-.171	-333	.125	-.171	.303	1	
	p-value	.470	.151	.599	.472	.194		
	N	20	20	20	20	20	20	
MM	Pearson	-.452*	-.118	.463*	.261	543*	.421	1
	p-value	.046	.621	.040	.266	.013	.064	
	N	20	20	20	20	20	20	20

Note: * Designates statistical significance at the .05 level

Appendix I - The Organizational Learning Survey

Appendix I-1: Review of Questions by Learning dimensions

FRAME #1: "Perceptions of current daily practices"
[Questions 5-23 / 33-46] "How we think we are doing?"

FRAME # 2: "Description of current action"
[Question 25-32] "Best representation of the project team...when forced to choose"

FRAME #3 "Importance of the Project Team's Actions"
[Question #24] "Rank order importance to the Project Team"

FRAME #4 "Project Manager Questions"
[Question 47-61] "Rank order importance to the Project Team"

Note: Multiple Regression Analysis and Performance Analysis available upon request.

Appendix I-2

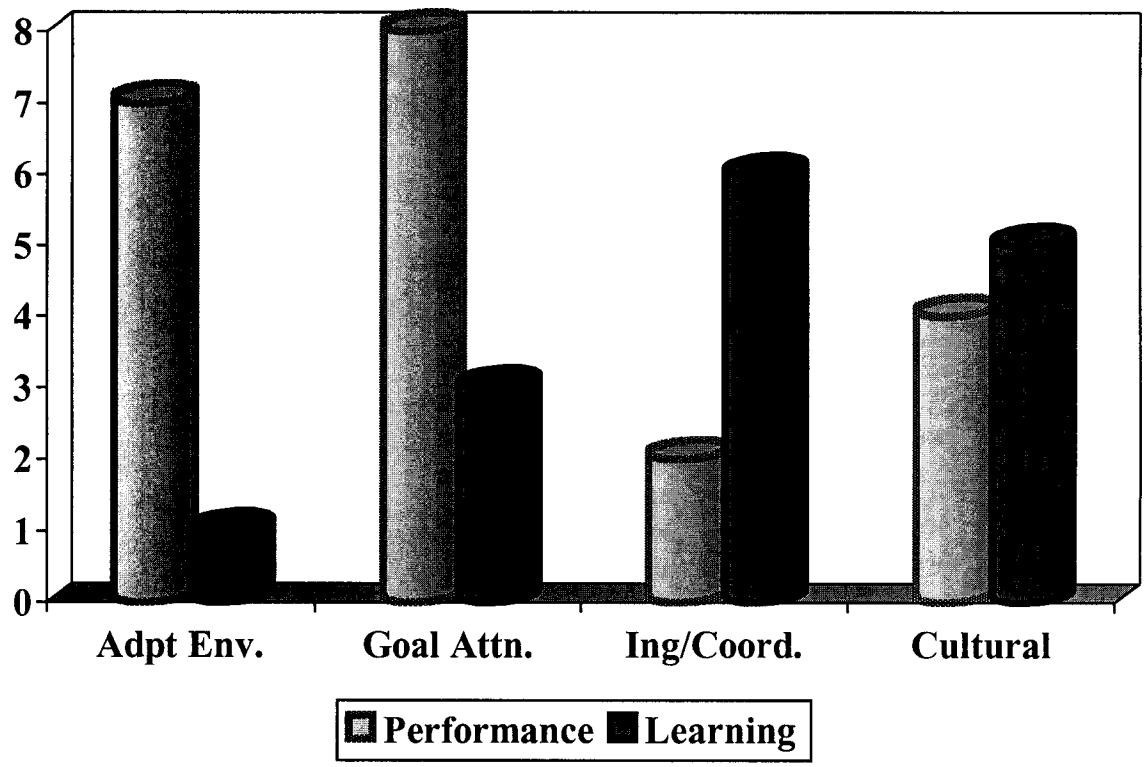
Table I-2: FRAME #3 "Importance of the Project Team's Actions"

[Question #24] "Rank order importance to the Project Team"

Adapting to the Environment			
Performance		**Learning**	
B	Identifying external resources required to meet organizational goals. **(Rank Order = 7)**	G	Obtaining information concerning changes in external environment. **(Rank Order = Lowest 1)**
Goal Attainment			
Performance		**Learning**	
F	Producing products and services of highest quality possible. **(Rank Order = Highest #8)**	C	Reflecting on organizational experiences to improve product and services. **(Rank Order = 3)**
Integration / Coordination			
Performance		**Learning**	
D	Utilizing organizational structures that support effective customer service. **(Rank Order = 2)**	A	Sharing information / knowledge for continuous project team improvement. **(Rank Order = 6)**
Maintain Cultural Patterns			
Performance		**Learning**	
H	Achieving performance standards established by the project team. **(Rank Order = 4)**	E	Reinforcing and open / flexible organizational culture. **(Rank Order = 5)**

Appendix I-3

The following graph highlights the integrated view of the project team's action framed around the Schwandt Model (1995, 1997, 1999 and Schwandt & Marquardt, 2000) and the Organizational Learning Survey (Johnson, 2000).



Appendix I-4

RadioShack CORPORATION

Project Management Team Study Organizational Action Survey©

The George Washington University — Center for the Study of Learning

Survey Website

This survey should only be filled out by RadioShack Project Management Team Members. The survey should take approximately 20-30 minutes to complete. The web version of the survey requires you to complete the survey before submitting it, so please only submit the survey when you have completed the entire survey. The George Washington University assures that your responses will be kept completely confidential.

This survey asks you to focus on your specific Project Management Team. Some of the items ask that you respond to questions about your Department, meaning the Project Management Department as a whole.

Your answers should indicate what actually happens, not what you believe or how you think things should be. There are no right or wrong answers and your opinion is very important. This web survey will be posted for two weeks.

Some questions regarding your most currently completed projects:

1. How would you rate this project team compared to similar project teams in RadioShack?

Click here to answer

2. In the last 1 year, how much has your project team changed in size?

Click here to answer

3. Other than size, how much has your project team changed in the last 1 year?

Click here to answer

4. Compared to other project teams in RadioShack, this project team is...

Click here to answer

Please indicate to what EXTENT each of the following items currently applies to your project team.

To what extent...

Appendix I-5

5. ... do members of your project team share external information (information from outside your project team)?

Click here to answer

6. ...is there intense competition among project teams within RadioShack?

Click here to answer

7. ...are team members in your project team held responsible for the decisions they make?

Click here to answer

8. ...does your project team predict the changes occurring in RadioShack?

Click here to answer

9. ...does your project team use stories and references to its history to let people know how they should perform their jobs?

Click here to answer

10. .. does your project team effectively allocate and distribute resources (e.g., people, materials, money, technology, equipment)?

Click here to answer

11. ...does your project team continuously track how competitors improve their products, services and operations?

Click here to answer

12. ...does your project team hold work groups accountable for achieving established goals?

Click here to answer

13. ...does your project team implement changes to help the team members be more effective in doing their jobs?

Click here to answer

14. ...does your project team deliberately reflect upon and evaluate information external to their team?

Click here to answer

15. ... does your project management department publicly acknowledge employees for outstanding performance (e.g., featuring them in newsletter, plaques, etc.)?

Click here to answer

16. ...does your project management department provide opportunities for team members to develop their knowledge, skills, and capabilities?

Appendix I-6

Click here to answer

17. ...does your project management department believe it needs to continuously improve customer service?

Click here to answer

18. ... does your project management department effectively use organizational resources?

Click here to answer

19. ...does your project team leader support quick and accurate communication among all team members?

Click here to answer

20. ... does your project team have set goals for researching and developing new processes and/or services?

Click here to answer

21. ... do members of the project team effectively use the organizational structures (e.g., chain of command, personal networks) when sharing ideas and innovations?

Click here to answer

22. ... is your project team's leader effective at achieving team goals?

Click here to answer

23. ...does your project team use ideas and suggestions from its team members?

Click here to answer

Project team success can be achieved through a variety of actions. Please rank the following actions according to their importance to your project team. 1=most important, 8=least important.

24. Read all items in the list below, then rank them according to their importance to your project team. The scale goes from (1) for the most important item, to (8) for the least important item. Rank the statements by assigning each choice a specific number.

Please use each number only once, giving each choice a distinct rank. Rank

a. Sharing of information and knowledge required for continuous project team improvement.

b. Identifying resources required to meet project team goals.

c. Reflecting on project team experiences to improve products and/or services.

Appendix I-7

d. Utilizing project team structures that support effective production/customer service?

e. Reinforcing an open and flexible project team culture.

f. Producing products and/or services of the highest quality possible.

g. Obtaining information concerning the changes in the project team's external environment.

h. Achieving performance standards established by the project management department.

The following list contains paired sets of actions. Considering each grouped pair by itself, please indicate which one of the two questions BEST describes the present actions of your project team.

25. Indicate which of the following paired items best represents the actions of your project team by answering how strongly you agree with the respective action?
(ANSWER ONLY ONE of the TWO CHOICES)

A. Utilization of external information (e.g., customer feedback, government regulations) to guide the project team's change.

Click here to choose this action

B. Utilization of the project team's resources to guide change.

Or click here to choose this action

26. Indicate which of the following paired items best represents the actions of your project team by answering how strongly you agree with the respective action?
(ANSWER ONLY ONE of the TWO CHOICES)

A. Production of valued processes and/or services.

Click here to choose this action

B. Production of new knowledge relevant to the project team.

Or click here to choose this action

27. Indicate which of the following paired items best represents the actions of your project team and how strongly do you agree with the respective action?
(ANSWER ONLY ONE of the TWO QUESTIONS)

A. Evaluating information and data to make informed decisions regarding the strategy of the project team.

Appendix I-8

Click here to choose this action
B. Accomplishment of established goals for your project team. Or click here to choose this action
28. Indicate which of the following paired items best represents the actions of your project team and how strongly do you agree with the respective action? (ANSWER ONLY ONE of the TWO QUESTIONS)
A. Meeting present project team performance standards. Click here to choose this action
B. Critically reviewing the present standards of your project team. Or click here to choose this action
29. Indicate which of the following paired items best represents the actions of your project team and how strongly do you agree with the respective action? (ANSWER ONLY ONE of the TWO QUESTIONS)
A. Using the most effective communication network to successfully deal with the situation at hand. Click here to choose this action
B. Following established chain of command to successfully manage the situation at hand. Or click here to choose this action
30. Indicate which of the following paired items best represents the actions of your project team and how strongly do you agree with the respective action? (ANSWER ONLY ONE of the TWO QUESTIONS)
A. Innovation of new processes and/or services. Click here to choose this action
B. Production of well established processes and/or delivery of services. Or click here to choose this action
31. Indicate which of the following paired items best represents the actions of your project team and how strongly do you agree with the respective action? (ANSWER ONLY ONE of the TWO QUESTIONS)

Appendix I-9

A. Ensuring that the human resources of the project team have the capabilities to effectively perform the work of the future. Click here to choose this action
B. Fair and equitable allocation of your project team's resources to meet future demands. Or click here to choose this action
32. Indicate which of the following paired items best represents the actions of your project team and how strongly do you agree with the respective action? (ANSWER ONLY ONE of the TWO QUESTIONS)
A. Using external data (e.g., competitor information, governmental regulations, customer feedback) to better understand customer needs. Click here to choose this action
B. Using the project team's forecasting data and procedures to meet customer needs. Or click here to choose this action
Please indicate how much you AGREE or DISAGREE with each of the statements as it currently applies to your project team. In my experience...
33. ...this project team believes that continuous change is necessary. Click here to answer
34. ...there are established ways to share new operational processes and procedures throughout the project team. Click here to answer
35. ...this project team has clear performance goals. Click here to answer
36. ...this project team effectively identifies and acquires external resources required to meet its goals. Click here to answer
37. ...this project team has a strong culture of shared values that guide the daily work activities. Click here to answer
38. ...people on this project team believe that evaluating what customers say is critical to reaching team goals.

Appendix I-10

Click here to answer

39. ...this project team has established work groups, networks, and other collaborative arrangements to help the team adapt and change.

Click here to answer

40. ...the managers and leaders of the project team have the skills needed to guide organizational change.

Click here to answer

41. ...this project team has established an achievable team mission.

Click here to answer

42. ...the end products of your project team are of much higher quality than anyone of you could have produced alone.

Click here to answer

43. ...this project team has a strong culture of shared values that support individual and team development.

Click here to answer

44. ...this project team has clear goals for individual and team development.

Click here to answer

This set of questions asks about the performance of your project team. Compared to project teams like yours, how would you assess your project team's performance in the following areas?

45. Overall Employee Satisfaction

Click here to answer

46. Overall Performance of the project management department

Click here to answer

This set of questions asks about specific practices of the Project Manager. Please indicate how much you agree or disagree with each statement as it currently applies to your project management team.

47. Project Manager develops their own style and tools for managing the project because each project is different and unique.

Click here to answer

48. Project Manager follows specific guidelines and procedures for managing the project. There is support through metrics, the organizational culture , and management methods to manage the project.

Appendix I-11

Click here to answer

49. Project Manager is seen as an integral part of a corporate-wide project management strategy.

Click here to answer

50. Project Manager clarifies project scope, roles, expectations, tasks, and data requirements.

Click here to answer

51. Project Manager's behavior reflects the climate and culture of the organization and recognizes the organizational constraints.

Click here to answer

52. Project Manager encourages initiative and information seeking skills within the project team members to act accordingly to their shared values and beliefs.

Click here to answer

53. Project Manager understands and uses the formal and informal structure of the organization, to influence support and build relationships to achieve project goals and objectives.

Click here to answer

54. Project Manager fosters collaboration, mentoring and leadership skills within the project team.

Click here to answer

55. Project Manager negotiates and balances all factors and issues relating to the project, the project team, and the project stakeholders.

Click here to answer

56. Project Manager uses GANTT charts to manage the project.

Click here to answer

57. Project Manager plans, manages, and performs analysis on the project with computer software (e.g., Critical Path Analysis, Scheduling, Network Diagraming).

Click here to answer

58. Project Manager utilizes the technology and software tools to assess the cost and quality performance of projects, in addition to schedule performance.

Click here to answer

59. My current project team is on its Schedule Goals.

Click here to answer

Appendix I-12

60. My current project team is on its Budget Goals.

Click here to answer

61. My current project team is on its Scope Goals.

Click here to answer

Some questions about your role in the organization. This information is not collected to match individuals with their responses but rather to gain a better understanding of how different groups of employees feel about the issues covered in the survey.

62. How long have you worked for this project team?

Click here to answer

63. Which one of the following best describes your present project management team role?

(•) Project Manager ( ) Individual Contributor

64. How many project teams are you on?

Click here to answer

65. What stage do you perform task on your project team?

Click here to answer

66. What is your job location?

(•) Web based ( ) In-house

67. What is the highest level of education you have completed?

Click here to answer

68. Please use the following text box to make any additional comments or suggestions.

Click in the box to enter text (Approximately 2 pages).

Appendix I-13

Thank you very much for participating in this survey. Before submitting your survey responses, please look over each question to ensure that you have answered each question. When you are ready to submit your answers, click on the "submit button" and your responses will be sent to the Center for the Study of Learning. If there are any problems with the survey, you will be sent to a page that lists the specific problems. Please fix any problems and resubmit the survey.

Submit Survey

THANK YOU