TOWARD UNDERSTANDING THE ROLE OF WEB 2.0 TECHNOLOGY IN SELF-DIRECTED LEARNING AND JOB PERFORMANCE IN A SINGLE ORGANIZATIONAL SETTING: A QUALITATIVE CASE STUDY

by

Shirley J. Caruso

A Dissertation Presented in Partial Fulfillment

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WE, THE UNDERSIGNED MEMBERS OF THE COMMITTEE,
HAVE APPROVED THIS DISSERTATION

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Abstract

This single instrumental qualitative case study explores and thickly describes job performance outcomes based upon the manner in which self-directed learning activities of a purposefully selected sample of 3 construction managers are conducted, mediated by the use of Web 2.0 technology. The data collected revealed that construction managers are concerned with the performance expected of them, in addition to how well they perform their work-related activities (orientation to learning), indicating that organizations should provide guidelines on the use and expected outcomes of self-directed learning in addition to providing the tools, resources, and time (environmental factors) to match performance needs; construction managers feel that work-related activities expected of them, how well the work-related activities are performed, and consequences for poor performance at work are determining factors in selecting Web 2.0 technologies; while construction managers understand the need for rules restricting the use of Web 2.0 technologies in performing their jobs, they feel these rules do hinder their performance because access to specific information they need to answer a question, solve a problem, or research to learn something new is sometimes restricted; and successful performance outcomes are determined by compliance to expected performance behaviors of others, such as answering a question or solving a problem an architect or superintendent have presented, as well as expectations construction managers have set for themselves.

Dedication

To my husband, Mark, my children, Robert and Sarah, and my late parents, Glenn and Kathaleen Hall, whose love, support, and encouragement helped make earning this degree a reality. All of you have always believed I am destined to do great things in my lifetime. You are my cheerleaders.

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Table of Contents

Page

Table of Contents (Cont.)

Page

Table of Contents (Cont.)

Page

Table of Contents (Cont.)

Page

Table of Contents (Cont.)

Page

List of Tables

Page

List of Figures

Page

Chapter 1: The Study

In today's workplace, construction managers have access to incessant self-directed learning opportunities through the use of Web 2.0 technology (Boileau, 2011). Construction managers are employees of construction companies who oversee construction projects of all types, and their duties may begin with the planning and budgeting process, the selection of materials, the securing of all permits and licenses, and the hiring of workers and subcontractors (Reese, 2014). Web 2.0 is a term that describes the changing developments in the use of World Wide Web technology and Web design that aim to enhance creativity, procure information sharing, increase collaboration, and improve the functionality of the Web as we know it (Web 1.0; Stern, 2015). These changes have led to the development and evolution of Web 2.0 technology (Boileau, 2011; Stern, 2015). Examples of Web 2.0 technology include Web-based communities and hosted services, such as social-networking sites (e.g., Facebook), video sharing sites (e.g., YouTube), wikis, blogs, performance support tools, performance support systems, and search engines such as Bing, Yahoo, and Google.

Performance support is a tool, system, or other resource, ranging from print to technology supported, which provides just the right amount of task guidance, support, and productivity benefits to the user, precisely at the moment of need (Rosenberg, 2013). Web 2.0 technologies are quickly moving from providing static information and facilitating transaction to dynamic collaboration that is a more interactive, personable, and social experience (Reiser & Dempsey, 2012). Consequently, construction managers have access to Web 2.0 technology at their disposal (i.e., videos, podcasts, blogs, and wikis, as well as Web conferencing and social networking sites such as LinkedIn and

Facebook) that provide self-directed learning opportunities resulting in performance support (Boileau, 2011). Construction managers have also adopted hardware-driven technology such as smart phones and tablets and the use of applications (apps), which are accessed from these mobile devices, in addition to the Web 2.0 technologies listed.

Self-directed learning (SDL) appeared within the discipline of adult learning, or andragogy, during the 1960s, and it has developed rapidly since then (Karakas & Manisaligil, 2012). Nearly 50 years ago, Knowles (1968) offered "a new label and a new technology" (p. 351) of adult learning to distinguish it from childhood learning. The idea of andragogy, defined as "the art and science of helping adults learn" (Knowles, 1980, p. 43), was differentiated from pedagogy, the art and science of helping children learn. There are various definitions of SDL in the literature. However, this study is in part undergirded by Knowles's theory of andragogy and his idea of the self-directed learner. Therefore, SDL is primarily defined in this study as:

> A process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. (p. 18)

While SDL typically happens outside classrooms and training programs, it can and should be jump-started, encouraged, systematized, and enhanced by human resource development (HRD) professionals (McGuire, 2014).

HRD is a process for developing and unleashing human expertise (McGuire, 2014; Werner & DeSimone, 2012). Learning, including SDL, is at the core of all HRD efforts. A major focus is on self-directed workplace learning and performance (Werner &

DeSimone, 2012). For purposes of this study, HRD can be defined as a set of systematic and planned activities designed by an organization to provide its members with opportunities to learn necessary skills to meet current and future job demands. HRD seeks to develop people's "knowledge, expertise, productivity, and satisfaction, whether for personal or group/team gain, or for the benefit of an organization" (p. 322).

HRD professionals are concerned with facilitating organizational learning, job performance, and change through organized interventions, initiatives, and management actions for the purpose of enhancing an organization's performance capacity, capability, competitive readiness, and renewal (Werner & DeSimone, 2012). Job performance can be generally defined as the achievement of an expected or predetermined outcome (Boileau, 2011). HRD professionals must discover and adopt processes and procedures to increase workforce productivity and organizational competitiveness and profitability. In most cases, the professional skills and knowledge required by both the employee and the organization cannot be effectively learned through formal settings (Bernardez, 2012). Instead, SDL activities need to be developed and enhanced (Leslie, Aring, & Brand, n.d.). The environment in which SDL takes place is often the same one in which the work is performed (Boileau, 2011). As a result, measurement of performance is correspondingly tied to the setting and a transfer of activities to achieve a predetermined goal. Individual performance models, such as Gilbert's (1996) classic Behavior Engineering Model (BEM), are quite helpful in understanding and optimizing performance of an individual worker at a specified job level (Bernardez, 2012). BEM helps diagnose performance problems as well as engineer a supportive environment for learning, including SDL, to take place. The implication is that SDL is critical to an organization's overall

effectiveness and its ability to compete, and competitiveness of organizations cannot be achieved without managing performance and, at the same time, developing the skills and competence of construction managers (Adhikari, 2010). Performance management should, therefore, include the valuable knowledge of construction managers gained through SDL experiences that are supported by Web 2.0 technology.

The concept of SDL has been around for many years and has been defined by several models and theories; with the recent advances in Web 2.0 technology, SDL is being transformed (Evelyn, 2011). The methodology used in this dissertation is qualitative and specifically a qualitative case study to explore the role of Web 2.0 technologies in the SDL activities and job performance of construction managers. The study obtained information from multiple methods of data collection to provide triangulation of data sources for strengthening internal validity to include interview, observation, and documents. This first chapter of the dissertation presents the background of the study; statement of the problem; purpose of the study; theoretical framework; research questions; definition of terms; delimitations, limitations, and assumptions; nature of the research; dissertation structure; and concludes with a summary.

Background of the Study

Construction managers are continually confronted with challenges that influence their job performance (McGuire, 2014). They are expected to adjust constantly and bring up to date their work practices in order to perform well and remain employed. Consequently, construction managers are finding ways, without formal training, to get their jobs done and to get them done well (Gottfredson, & Mosher, 2012). They are accessing and using Web 2.0 technology to enhance their SDL experiences to solve

problems and achieve desired job performance outcomes. Organizations find it difficult to control or direct learning because it comes in many forms, but organizations should create an environment to support and promote the SDL of its employees (Cross, 2011). The first step in meeting this challenge is recognizing that employees are a main source of creativity and organizational improvement (Caruso, 2009). Cross (2011) suggests that we "think of a worker as the sum of employee and support systems, combining the strengths of each into a whole greater than the sum of the parts" (p. 8).

Giving equal value to self-directed workplace learning implies that it is transformed into components of teaching to enable its integration into a blended learning site (Caruso, 2009). Because the great majority of learning in the workplace is acquired informally through SDL activities (Merriam, Caffarella, & Baumgartner, 2012), it is reasonable to advocate that self-directed, employee-driven, employee-led learning and its ensuing performance be recognized, embraced, integrated, supported, and shared as a necessary component of amalgamated workplace learning (Caruso, 2009).

HRD professionals find it challenging, if not impossible, to conduct sufficient training programs to address all learning needs (McGuire, 2014). Limited or no funding for formal training further diminishes the possibilities to offer formal training (Gottfredson & Mosher, 2012). Another factor is the need for training to be developed immediately, not at some point in the future when funding may be secured. SDL shifts responsibility to the employee, leveraging Web 2.0 technologies to make education, information, and support available where they are most needed, close to work (Reiser & Dempsey, 2012). SDL is appealing because it relies less on formal training, in rooms

with instructors, and more on technology to create vivid experiences to help employees with informed decisions on how to perform their jobs.

HRD professionals strive to provide meaningful learning and development opportunities to employees, which lead to an increase in job satisfaction (McGuire, 2014). As job satisfaction increases, so do employee retention, customer satisfaction, and a resulting profitability and competitiveness of the organization overall. Understanding the role of Web 2.0 technologies in the SDL and job performance serves as an appropriate contribution to the existing literature for determining the intricacies in enhancing supportive and responsive work environments that ensure employees find meaningful learning and development opportunities and job satisfaction.

Statement of the Problem

Winston Churchill said, "Personally, I'm always ready to learn, but I do not always like being taught" (as cited in Reiser & Dempsey, 2012, p. 169). SDL is a form of informal learning and is self-powered, self-administered, and self-motivated learning (Azulay, 2012). While it could take a multitude of forms, the most common types of SDL are reading, listening to prerecorded information, watching videotaped information, and following printed or recorded instructions to complete a task. This type of learning is embedded into the jobs employees perform. For purposes of this study, informal learning and SDL are used interchangeably.

In today's competitive marketplace, organizations and their employees have no choice but to make lifelong learning a priority to keep up with the constant changes in the information age and global economy (Kouzes & Posner, 2012). Ideas, information, and innovation are the capital that organizations demand from employees. To meet these

demands, employees often turn to SDL to add value to organizations, to become and stay competitive, and to respond to job demands.

Web 2.0 technologies have become abundant and easily accessible in today's society, workplaces included (Stern, 2015). There is much research indicating that SDL activities and on-the-job performance are facilitated by Web 2.0 tools. However, the manner in which Web 2.0 technology is used by construction managers who share the same roles and responsibilities and expected job performance outcomes within the same organizational setting is conflicting. Absent is a collective understanding to contribute insight into this phenomenon.

Purpose of the Study

The purpose of this study was to explore and thickly describe job performance outcomes based upon the manner in which SDL activities of a sample of construction managers are conducted, mediated by the use of Web 2.0 technologies in a single organizational setting. It was anticipated that a better understanding of the role Web 2.0 technology plays in the SDL activities and job performance of construction managers would provide a more collective view of the role that Web 2.0 technology has in self-directed workplace learning and job performance outcomes to benefit construction managers, organizations, and HRD professionals. In an effort to expand further the knowledge base of adult learning and SDL, this study focused on the role of Web 2.0 technology in adult learners' engagement in SDL. Part of the discussion focused on learners' preferences in relation to the emergence of Web 2.0 technology. In this discussion of learner preferences, learning environments that participants engaged in and the motivation behind their engagement were explored.

This study contributed to the field of HRD by providing a new lens to view the role of Web 2.0 technology in SDL and job performance within an organizational setting, thereby enabling its integration into a blended-learning site. A practical application for the study is to provide insight to HRD professionals and the participants of this study into best practices and recommendations for the adoption and application of Web 2.0 technology.

Theoretical Framework

This section provides an overview of the theoretical underpinnings supporting the inquiry into the problem. Two theoretical constructs, Andragogy and the Behavior Engineering Model, were considered central to this study to support its purpose. Each of these theoretical constructs was influential in moving from studying the individual learning and performance of construction managers in a single organizational setting to studying the larger schemes affecting SDL and on-the-job performance in relation to the work context or environment. These theoretical constructs are discussed in the following paragraphs.

Andragogy. The first theoretical construct central to this study is andragogy. Andragogy is based on a number of assumptions about the adult learner. In his original work, Knowles (1980) came up with a set of four assumptions, which were influential in framing this study:

1. Self-Concept. As a person matures, his or her self-concept moves from that of a dependent personality toward one of a self-directing human being.
2. Experience. An adult accumulates a growing reservoir of experience, which is a rich resource for learning.

3. Readiness to learn. The readiness of an adult to learn is closely related to the development tasks of his or her social role.
4. Orientation to learning. There is a change in time perspective as people mature—from future application of knowledge to immediacy of application. Thus, an adult is more problem centered than subject centered in learning. (pp. 44–45)

These four principles of andragogy were relevant to this study because they brought together the concepts of SDL as a type of informal learning, extend rich resources for learning beyond the context of the workplace, brought the motivation of the adult learner into view in relationship to workplace roles and responsibilities, and helped bring into focus the ways in which Web 2.0 technology is utilized by adult learners in a workplace situation to solve problems and achieve desired job performance outcomes. Knowles' four principles of andragogy are graphically depicted in Figure 1.

Figure 1. Knowles' four principles of andragogy. Adapted from *The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development* (p. 4), by M. S. Knowles, E. F. Holton, III, & A. Swanson, 1998, Woburn, MA: Butterworth-Heinemann. Adapted with permission.

Behavior engineering model. The second theoretical construct central to this study was Gilbert's (1996) BEM. Gilbert's BEM provided a framework for taking the role of environment and individual factors tied to information, instrumentation, and motivation. Gilbert's BEM proposes six factors affecting performance outcomes divided

among the environment and individual realms. Among the factors in the environment realm are data, resources, and incentives. The factors grouped into the individual realm are knowledge, capacity, and motives. Gilbert's BEM is graphically depicted in Figure 2.

	Information	**Instrumentation**	**Motivation**
Environment	*Data* 1. Relevant and frequent feedback about the adequacy of performance 2. Descriptions of what is expected of performance 3. Clear and relevant guides to adequate performance	*Resources* 1. Tools, resources, time and materials of work designed to match performance needs	*Incentives* 1. Adequate financial incentives made contingent upon performance 2. Non-monetary incentives made available 3. Career-development opportunities 4. Clear consequences for poor performance
Individual	*Knowledge* 1. Systematically designed training that matches the requirements of exemplary performance 2. Placement	*Capacity* 1. Flexible scheduling of performance to match peak capacity 2. Prosthesis or visual aids 3. Physical shaping 4. Adaptation 5. Selection	*Motives* 1. Assessment of people's motives to work 2. Recruitment of people to match the realities of situation

Figure 2. Behavior Engineering Model. Adapted from *Human Competence: Engineering Worthy Performance* (p. 85), by T. F. Gilbert, 1996, Silver Spring, MD: ISPI. Adapted with permission.

In the context of this study, the six factors (data, resources, incentives, motives, capacity, and knowledge) divided between the two realms (environment and individual) are representative of a set of variables impacting SDL and the resulting performance.

Considered together, Knowles's (1980) theory of andragogy and Gilbert's (1996) BEM provide a theoretical framework to extend the concept of SDL and the need for its immediate application to include the adult learner's interactions with Web 2.0 technology

and the work environment.

Research Questions

In order to examine the role of Web 2.0 technology in the SDL and job performance behaviors of construction managers in a single organizational setting, this study was guided by a central question and a set of subquestions.

Central Question:

What is the role of Web 2.0 technology in the SDL activities and job performance of construction managers in one Chicago-based construction company?

Subquestions:

1. What SDL and job performance needs are supported by the use of Web 2.0 technology?
2. What factors are used to identify Web 2.0 technology for use at the individual level to enable SDL tied to specific job performance outcomes?
3. What environmental factors affect a construction manager's ability to use Web 2.0 technology to engage in SDL?
4. How is the success of job performance outcomes resulting from Web 2.0-enhanced SDL opportunities determined?

Definition of Terms

To avoid misconceptions and to promote clarity, the following key terms are defined as they were used in the study. This methodology permits the reader to understand the term from the onset, reducing the potential to read the material and operate with an incorrect or unintentional view. If authoritative or accepted reference in the field for a particular term is not available, the term is defined here so that its use is

consistent throughout the study.

Andragogy: The idea of andragogy, defined as "the art and science of helping adults learn" (Knowles, 1980, p. 43), is differentiated from pedagogy, the art and science of helping children learn, and is based on a number of assumptions about the adult learner.

Behavior Engineering Model: BEM is the third leisurely theorem defined by Gilbert (2007). Gilbert defined the third leisurely theorem as—for any given accomplishment, a deficiency in performance always has as it immediate cause a deficiency in a behavior repertory, or in the environment that supports the repertory, or in both. But its ultimate cause will be found in a deficiency of the management system.

Construction Managers: Construction managers are employees who coordinate and oversee construction projects of all types (Reese, 2014). Their duties may begin with the planning and budgeting process, the selection of materials, the securing of all permits and licenses, and the hiring of workers and subcontractors. In addition to overall supervision of the project, their other responsibilities may include coordination with architects, engineers, and other professionals; maintaining budgets and timelines; and ensuring safety practices on the job site. Construction managers may work in a field office or on job sites, which may be residential, commercial, industrial, or institutional. Although high school and on-the-job experience have been sufficient to gain employment as construction managers in the past, increasingly, employers are seeking candidates with more formal education—either associate degrees from two-year community and technical colleges or bachelor's degrees from four-year colleges and universities. The nature of work and corresponding expectations for individual as well as organizational

performance in the workplace are very different for construction managers as compared to laborers in manufacturing and service industry jobs; for example, because construction managers get paid for applying what they learned in school, rather than for their physical strength or manual skill (Moore, 2015).

Human Resource Development: HRD is a process for developing and unleashing human expertise (McGuire, 2014; Werner & DeSimone, 2012). Learning, including SDL, is at the core of all HRD efforts. A major focus today is on self-directed workplace learning and performance (Werner & DeSimone, 2012). For purposes of this study, HRD can be defined as a set of systematic and planned activities designed by an organization to provide its members with opportunities to learn necessary skills to meet current and future job demands.

Job Performance: For purposes of this study, job performance is generally defined as the achievement of an expected or predetermined outcome (Boileau, 2011).

Performance Support: In the interest of supporting the performance of employees, many organizations employ strategies that attempt to extend key messages and create mantras to influence more effectively learning and performance. Through print and online materials, such as job aids or performance support, documentation, and help systems, organizations, along with their HRD professional counterparts, are able to break the physical and temporal boundaries associated with training experiences (Bernardez, 2012; Rossett & Sheldon, 2001). Some circumstances merit the use of information support rather than training. The authors say that these approaches should be pursued when a task is performed infrequently; when it involves many steps and decisions; when the consequences of making a mistake would be grave; when knowledge is changing,

vast, and complex; and when resources are tight.

Performance Support Systems: Performance support systems are often one of a number of training-and-support-related systems within a larger organization's infrastructure, and most organizations have a learning management system that is used to deliver and track training (Reiser & Dempsey, 2012). Others may also have a learning content management system or knowledge management system to support the development of learning content by trainers or subject matter experts.

Self-Directed Learning: SDL is a broad type of employee development (Azulay, 2012). Knowles (1980) wrote that it is,

> …a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. (p. 18)

While it could take a multitude of forms, the most common types of SDL are reading, listening to prerecorded information, watching videotaped information, and following printed or recorded instructions to complete a task (Azulay, 2012). This type of learning is embedded into the jobs employees perform.

Web 2.0 Technology: Web 2.0 is a term that describes the changing developments in the use of World Wide Web technology and Web design that aim to enhance creativity, procure information sharing, increase collaboration, and improve the functionality of the Web as we know it (Web 1.0; Stern, 2015). These changes have led to the development and evolution of Web 2.0 technology (Boileau, 2011; Stern, 2015). In this study, Web 2.0 technology refers to hardware, software, or Web-enabled technology including, but not

limited to, Web-based communities and hosted services, such as social-networking sites (i.e., LinkedIn and Facebook), video sharing sites (i.e., YouTube), wikis, blogs, performance support tools, performance support systems, and search engines such as Bing, Yahoo, and Google; and the hardware that supports this technology, including, but not limited to desktop, laptop, or handheld computers, web cams, smart phones, and tablets; and the use of applications (apps), which are accessed from mobile devices.

Delimitation, Limitations, and Assumptions

This section addresses the conditions the researcher assumes true to perform the intended examination and evaluation of phenomena related to the problem. It also describes how the study was narrowed, and it depicts the potential weaknesses of the study. Parameters in the study establishing its boundaries, exceptions, reservations, and qualifications are defined in the study as its delimitation and limitations (Creswell, 1994). The delimiting points that narrowed the scope of the study are that it was restricted to a particular group in a single organization, examining only construction managers in one Chicago-based construction company. However, in case study research, it is more valuable to obtain opinions from a small number of participants. Creswell (2003) recommends that three to five participants be used for case study research, along with other types of data. Potential limitations of the study included the dependability of the available literature and the accuracy and reliability of data gathered. No effort has been made to examine the documents utilized in this investigation for authenticity. Additional limitations may relate to certain methodology characteristics such as:

1. The extent to which analysis of the findings is enlightening or liberating.
2. The sensitivity in how the researcher relates to the material being studied.

3. The researcher's ability to reconstruct credibly and authentically the findings.
4. The extent to which patterns discovered in the data correspond to predictions from a predetermined set of theoretical propositions underlying the research question.

Conditions that governed the investigation and that must prevail for the recommendations to be valid depend upon certain assumptions. There were three assumptions made about construction managers who participated in this study:

1. Construction managers have access to and use interactive technology tools within the context of the work environment and beyond.
2. Construction managers create personal SDL experiences with specific performance-based outcomes to support ongoing learning.
3. Construction managers are comfortable with change, adoption of new practices, and motivation to embrace Web 2.0 technologies.

It was intended that the findings in this investigation represent the degree to which the data provide a viable resource in performing research on the stated topic. The three construction managers in one organizational setting produced representative groups from which to compare perceptions.

Nature of the Research

This study operated under a qualitative paradigm. A narrative reporting style was employed with a case study approach. The case study intensively investigated the current issues, backgrounds, and environmental interactions of a small group of construction managers in one organizational setting. It was intended that the findings contribute to the existing literature leading to the formulation of a theory that explains the practical aspects

of the case.

The study obtained information from multiple methods of data collection to provide triangulation of data sources for strengthening internal validity to include interview, observation, and documents. These methods were fully aligned with the research questions and information required as shown in Table 1.

Table 1

Research Questions, Information Required, and Method of Data Collection

Research Question	Information Required	Method of Data Collection
1. What SDL and job performance needs are supported by the use of Web 2.0 technology?	Participants' behavioral factors that influence identification of performance improvement.	Interview Observation Document
2. What factors are used to identify Web 2.0 technology for use at the individual level to enable SDL tied to specific job performance outcomes?	Participants' behavioral factors that influence implementation of Web 2.0 technology in learning activities.	Interview Observation
3. What environmental factors affect construction manager's ability to use Web 2.0 technology to engage in SDL?	Participants' behavioral and organizational contextual factors that influence use of Web 2.0 technology in learning activities.	Interview Observation
4. How is the success of job performance outcomes resulting from Web 2.0-enhanced SDL opportunities determined?	Participants' behavioral and organizational contextual factors that influence job performance as a result of using Web 2.0 technology in learning activities.	Interview Observation Document

Dissertation Structure

Although this study largely followed the qualitative paradigm in its inquiry methodology, the structure of its content was guided by a quantitative paradigm. The quantitative, five-chapter structure was applied and maintained the structure of the five chapters as herein outlined.

This first chapter offers an introduction to this study, discussing the purpose of conducting the investigation. The contextual framework of the study as well as its key assumptions, delimitation, and limitations are described. The research question, which guided the research, is discussed.

The second chapter is a review of the literature, which attempts to sketch a wider pattern of similar research activities, discussing prior studies and fitting the present study into a broader scheme. It further defined the parameters of the study and produced its contextual framework. Perhaps most important, it denoted the significant points in the research concerning the topic of this study.

The third chapter includes an explanation of the methodology of the study's design and procedures. It explains the protocol for data collection as well as the techniques used for examination and evaluation of the data.

The fourth chapter details the findings of the study in addressing each of the research questions. This chapter produced factual findings.

The fifth chapter concludes the study with a discussion and recommendations for further research. It recaps the fundamental stimuli guiding the investigation, highlighting the major results of the study. It draws a correlation between the results and the contention of the investigation, and it presents interpretation of the findings.

Summary

This chapter introduced the study for the dissertation as a whole, presented an overview of the background and problem statement, outlined the purpose of the study, stated the research question and study significance, defined conceptual terms used during the course of this dissertation research, identified delimitations and limitations of the study, described the nature of the study, and described how the dissertation document is constructed. A theoretical foundation for the study was developed, drawing from andragogy and the BEM. A set of research questions emerged, which provided guidance for the research study design. An appropriate review of the literature follows in Chapter 2.

Chapter 2: Literature Review

The major purpose of this chapter was to discuss relative research activities that address what is known about the subject under study as well as the conceptual and theoretical framework of the study. The purpose of this study was to explore a sample of construction managers' behaviors, or SDL activities and job performance outcomes, mediated by the use of Web 2.0 technology in a single organizational setting. The principal theoretical framework used in the design of this research study was the theory of andragogy and its resulting set of four assumptions about the adult self-directed learner presented by Knowles (1980), summarized in Chapter 1. For this reason, a review of the relevant theoretical literature for the theory of andragogy and the self-directed adult learner was considered central to this literature review. A conceptual framework based on the research questions addressed in this study also guided this literature review.

This literature review is organized into five sections. The first section provides a review of andragogy as the conceptual framework that served as the basis for the research study's design, which is detailed in Chapter 3. The second section provides rationale for the topic of Web 2.0 technology as an SDL mediator. The third section reviews relevant studies related to this research study. The fourth section provides the literature that defines and supports the selected methodology use, outlining its appropriateness related to the design of the study. The fifth and final section provides a summary of conclusions and implications of the literature for further research specifically related to this study.

Conceptual Framework

Andragogy. The first of two constructs that informed this study was Malcolm Knowles's (1968) theory of andragogy. Andragogy and its related concepts provide a

descriptive tool of the adult learner, with nearly 50 years of scholarly work associated with its development. Andragogy, the art and science of helping adults learn, has a long and rich history that has shaped understanding of adult learning and continues to be a strong force in guiding the way adults learn (Henschke, 2011). Although the term andragogy was not clearly explained in the 1800s, the term would resurface again in Europe in the 1920s (Evelyn, 2011). It was not until the late 1960s that the term became popularized in the United States. Attempts at codifying differences between adults and children as a set of principles, a model, or even a theory of adult learning have been, and continue to be, pursued by adult educators (Merriam et al., 2012). There is no single theory of adult learning, but the best known effort for contributing a number of assumptions to aid in our understanding of adults as learners is andragogy, a concept Knowles introduced from Europe in a 1986 article. While human resource development practitioners in the U.S. are familiar with andragogy through Knowles's work, the theory of andragogy reaches a worldwide audience of human resource development practitioners striving to improve learning through its respectful and engaging method focused on the learner (Henschke, 2011).

***History of andragogy*.** Nearly 50 years ago, Knowles (1968) proposed "a new label and a new technology" (p. 351) of adult learning to distinguish it from preadult schooling. The concept of andragogy has its first known origins in 1833, in Germany in a book titled *Plato's Educational Ideas*; the book discusses a lifelong necessity to learn (Reischmann, 2014). Although the term andragogy was not clearly explained in the 1800s, the term resurfaced again in Europe in the 1920s (Evelyn, 2011). It was not until the late 1960s that the term became popularized in the United States. In 1970, Knowles

published his first article about his understanding of andragogy titled "Andragogy, Not Pedagogy," and with the publication of this article the term andragogy became linked to Knowles's concept and received general recognition throughout North America and other English-speaking countries. According to Pratt (1998), "Within North America, no view of teaching adults is more widely known, or more enthusiastically embraced, than Knowles' description of andragogy" (p. 33).

Andragogy's roots extend to 1833 when, according to Taylor and Kroth (2009), Alexander Knapp developed the term in an attempt to describe Plato's methods of instructing his young adult pupils (Tappin, 2014). After a period of obscurity, it was popularized in the 1920s when adult participation in academe increased as a result of social, economic, and the technological changes that demanded higher education levels. Adult education philosophical concepts began to emerge as a result of the influx of adults seeking higher education during this period (e.g., Taylor & Kroth, 2009; Zmeyov, 1998).

The 1950s, 1960s, and 1970s saw the development of andragogy as an independent field of study (Zmeyov, 1998). Lindeman, an early contributor to the concept of adult learning, and who is considered to have "laid the philosophical foundations for the field of adult education" (Imel, 1999, p. 54), offered theories about the ways that adults learn and how they should be taught; he situated his theories around the term "adult education" (as cited in Taylor & Kroth, 2009, p. 3). He was of the opinion that adults learn differently from children, whose learning was more dependent on a teacher-focused curriculum. Knowles was influenced by Lindeman's ideas (Imel, 1999) and his theory of andragogy was initially based on four assumptions about learners and their development, which are described in the next section.

Theoretical framework of andragogy. Andragogy is based on a number of assumptions about the adult learner. In his original work, Knowles (1980) came up with a set of four assumptions, which were influential in framing this study:

1. Self-concept. As a person matures, his or her self-concept moves from that of a dependent personality toward one of a self-directing human being.
2. Experience. An adult accumulates a growing reservoir of experience, which is a rich resource for learning.
3. Readiness to learn. The readiness of an adult to learn is closely related to the development tasks of his or her social role.
4. Orientation to learning. There is a change in time perspective as people mature—from future application of knowledge to immediacy of application. Thus, an adult is more problem centered than subject centered in learning. (pp. 44–45)

Knowles's concept of andragogy, the art and science of helping adults learn, is built upon a conception of learners as self-directed and autonomous (Pratt, 1998). Andragogy has been adopted and practiced widely in adult education (Evelyn, 2011). Even with its wide acceptance, there has been much debate over the validity of andragogy as a theory. According to Davenport and Davenport (2005), several key researchers have disputed the key assumptions of andragogy. Much of the controversy stems from differing philosophical orientations, classifications of andragogy (Evelyn, 2011). The main debate surrounds whether it is a theory, method, technique, or set of assumptions and the general contention over whether the term is of value to adult education. Major criticisms came from Houle (1972) and J. London (1973). Houle (1972)

wrote *The Design of Education*, where he expressed his philosophy of education to use a single process-oriented approach rather than the term andragogy (Evelyn, 2011). His view was essentially that men and women learn in the same way as boys and girls and that andragogy was just simply a technique that could be applied to adult learning. J. London (1973) followed up with an essay "Adult Education for the 1970's: Promise or Illusion?" In this essay he agrees with Houle (1972). J. London argued that some of the five assumptions of andragogy presented by Knowles could be applied to early education (Evelyn, 2011).

Even with these debates, andragogy provides an understandable framework for conceptualizing the difference in adult education and child education (Davenport & Davenport, 2005). Although there may not be many empirical studies to support andragogy as a valid theory of adult education, there are other studies based on each of the four assumptions that support their validity, such as SDL. Knowles (1980) suggested that others would use his theory of adult learning as a model of assumptions about learning or a conceptual framework that serves as a basis for emergent theories (Evelyn, 2011). It is evident that Knowles's work has served as a catalyst for theoretical thinking in the fields of education and psychology, and many scholars utilize this model consistently to support their work. Knowles (1980) recognizes that the andragogical model cannot completely explain how adults learn, but the model is intended to be adopted or adapted as needed (Evelyn, 2011).

In an analysis of Knowles's work, Merriam et al. (2012) emphasize that adult learners are "self-directed, bring a repertoire of experience, are internally motivated to learn, and want to apply what they are learning immediately because learning is closely

related to the developmental tasks of his or her social role" (p. 272). From Knowles's four assumptions, it can be surmised that adults like to solve problems, think critically, engage in work that fills an immediate need, and contribute to building self-efficacy (Bandura, 2006; Keay & Lloyd, 2011; Knowles, 1975; Knowles & Associates, 1984).

BEM. The second construct that informed this study was Gilbert's (1996) BEM. Gilbert's BEM provided a framework for considering the effect of environmental and personal factors on activity tied to informal learning and performance. HRD professionals look to identify causes of performance gaps (Russell, 2010). Gilbert's (2007) BEM is a model that evaluates the environmental influences and the individual influences that can cause a gap in performance (Pershing, 2006). The strength of Gilbert's (2007) BEM emphasizes both the individual and the individual's environment (Swanson & Holton, 2001) in regard to improving human performance, achievements valued by HRD professionals and the organization or system (Stolovitch & Keeps, 1991). Once the cause(s) has been identified, then interventions or possible solutions can be implemented (Russell, 2010). This study utilized Gilbert's (2007) BEM as the foundational model to identify individual and environmental factors influencing job performance outcomes.

***History of BEM*.** Gilbert developed the BEM and published his work in the book *Human Competence: Engineering Worthy Performance* in 1978 (Russell, 2010). Gilbert's work is considered as an important benchmark in individual level performance improvement according to Swanson and Holton (2001). Gilbert's (2007) work is presented as three leisurely theorems and a BEM (Russell, 2010).

Gilbert explained the first leisurely theorem is about producing worthy performance (Chyung, 2005). This theorem is deemed by Gilbert as providing the basic

dimensions of competence (valuable performance and costly behavior). Furthermore Gilbert (2007) stated, "In performance, behavior is a means; its consequence is the end" (p. 16). Swanson and Holton (2001) stated, "According to Gilbert, this theorem tells us that having large amounts of work, knowledge and outcomes without accomplishments is not worthy performance" (p. 186). According to Theorem One, human competence is a function of worthy performance, which is a function of the ratio of valuable accomplishments to costly behavior (Gilbert, 2007).

Gilbert called Leisurely Theorem Two the "measurement theorem" (Chyung, 2005, p. 25). This theorem provides a way to measure competence. Gilbert (2007) stated, "Competence is a social concept, a comparative judgment about the worth of Performance" (p. 29). The potential for improving performance (PIP) provides an understanding of the gap between the potential competence (exemplary performance) and the actual competence. Gilbert clarifies that "PIP is a measure of opportunity.…People are not competent; performance is. People have opportunities, which the PIP can express with precision and validity" (p. 31). Gilbert also wrote:

> Theorem Two). Typical performance is inversely proportional to the potential for improving performance (the PIP), which is the ratio of exemplary performance to typical performance. The ratio, to be meaningful, must be stated for an identifiable accomplishment, because there is no general quality of competence. (p. 29)

Leisurely Theorem Three looks at changes that can be made to behavior to "create the accomplishments" (Swanson & Holton, 2001, p. 187) and is represented in the behavioral engineering model. Gilbert (2007) wrote:

> Theorem Three). For any given accomplishment, a deficiency in performance always has at its immediate cause a deficiency in a behavior repertory, or in the environment that supports the repertory, or in both. But its ultimate cause will be found in a deficiency of the management system. (p. 76)

***Theoretical framework of BEM*.** The BEM as shown in Figure 2 provides a tool for systematic and systemic use in cause analysis. The model identifies and measures competence and behavioral causes to performance outcomes. The model provides an ability to manipulate the influences on performance outcomes and defines a strategy to increase efficiency (Gilbert, 2007).

The model separates the factors influencing performance outcomes into two levels: environmental and individual. The model becomes a guide of questions (Gilbert, 2007) to identify the factors influencing job performance outcomes and subsequently leads to possible interventions. The model "points to the conditions of competence that we have the ability to change and…at a cost less than the perceived value" (p. 80).

The BEM is a matrix of six cells (Russell, 2010). Three cells identify the environmental supports (data, instruments, and incentives) and three cells identify the person's repertory of behavior (knowledge, capacity, and motives). Gilbert (2007) stated, "People generally care a great deal about how they perform on the job and defects in capacity—mental or physical—are the exception, not the rule" (p. 88). Gilbert continued by stating, "Whatever defects in motives or capacity exist, their consequences can usually be minimized by careful attention to the other variables in the Behavioral Engineering Model" (p. 89).

Topic Rationale

Performance in the workplace can be generally defined as the achievement of an expected or predetermined outcome (Boileau, 2011). The nature of work and corresponding expectations for individual as well as organizational performance in the workplace are very different for construction managers as compared to laborers in manufacturing and service industry jobs, for example, because construction managers get paid for applying what they learned in school, rather than for their physical strength or manual skill (Moore, 2015). Performance of construction managers involves a relationships among their perceptions of the job and setting, tools in the environment, and SDL activities leading to some new insight affecting on-the-job performance (Boileau, 2011). The tools for knowledge development and SDL activities engaged in by construction managers tend to be situated more closely to the environment in which the work is performed. In this context, the focus is on immediate transfer to affect improvements or enhancements to performance.

Web 2.0 has been heralded as having the potential to enhance learning and performance because it presents a dynamic social platform where members can share, participate, interact, create, and learn (Lucas & Moreira, 2009). Web 2.0 technologies in professional, social, and organizational contexts have rapidly gained momentum during the past few years (Zhao & Kemp, 2013). Social networking sites, for example LinkedIn and Facebook, have been widely embraced internationally. LinkedIn (2015) claims to be the world's largest professional network, with more than 100 million members in more than 200 countries. There are more than 2 million companies with pages on LinkedIn, and it is reported that there were nearly 2 billion searches on LinkedIn in 2010 (LinkedIn,

2015). Some independent studies on social networking sites reveal that approximately one third of employees are in the Facebook network (Facebook, 2015), and an equal number of employees have LinkedIn accounts (Skeels & Grudin, 2009).

The adult learner and his or her learning preferences have been researched since before the 1920s, when adult education became a formal field of practice (Merriam, 2011). As adult learners, the ability and skill level of construction project managers to use effectively Web 2.0 technology for acquiring information, solving problems, and integrating new knowledge into workplace tasks is of paramount importance for today's corporate construction environments. The need to understand the role of Web 2.0 technology in SDL for cultivating professional expertise and achieving desired performance outcomes brings focus to the interplay among the SDL activities, the work environment, and the characteristics of the construction project manager that affect performance (Boileau, 2011). Adult learners exhibit different characteristics than children (Merriam et al., 2012). Additionally, most adult learners are highly motivated and task-oriented (Merriam et al., 2012). Learning characteristics are an important element to consider, in that they determine how individuals approach learning tasks. There are many learning characteristics definitions. According to Felder (2013), "Learning characteristic are strengths and preferences in the way learners take in and process information" (p. 287). Merriam and Bierema (2014) explained that learning characteristics relate to the different ways people think and feel as they solve problems, create products, and interact. Learning characteristics research is a complex field that has seen the growth of many models and numerous inventories and tools (Boileau, 2011). Knowles (1980) posits that a combination of the learner's needs and personal characteristics influenced the learner.

There has been significant discussion on the role of Web 2.0 technology and the degree to which it influences SDL (Hurdle, 2010; M. London, 2013; Song & Lee, 2014). The conclusion most often drawn is that design and context play a larger role in the effectiveness of the content in its ability to affect learning, than does the Web 2.0 technology (Boileau, 2011). The ability of learners to acquire and convert knowledge into performance is dependent on a set of factors that are external to the learner. For learner engagement and knowledge transfer to occur, informal learning needs to be: (a) authentic, meaning that the learner should learn in the context of the workplace or other application environment; (b) situated in meaningful experience in order to build on learners' prior knowledge; and (c) anchored in relevant activities to promote transfer to workplace problem solving (Herrington, Oliver, & Reeves, 2003). This lends support for a more learner-centered approach to learning including problem-based learning in which Web 2.0 technology is an enabler (Boileau, 2011).

Web 2.0 technology has been shown to have a mediating effect on activity through the use of symbols for linguistic communication, and artifacts for externally managed collective knowledge (Boileau, 2011). Rossett and Schafer (2007) view this effect in terms of performance support, as a repository for information, processes, and perspectives that inform and guide planning and action. The Web 2.0 solutions that support employees during the performance of a task are termed sidekicks. One example of a sidekick is a step-by-step YouTube tutorial on how to apply varnish or polyurethane clear finishes. The tutorial provides the steps to follow while completing this specific task.

The need to plan prior to performing is applicable in certain situations in which it

would be inappropriate or even improbable to reference a performance support solution during the task (Rossett & Schafer, 2007). For this reason, Rossett and Schafer made a distinction between types of performance support and described a planner as performance support that is used in advance of the task and just after the task is complete. One example of a planner is a Web 2.0 mind-mapping tool used to plan out the different phases of a construction project. Instruction develops performance potential in a context-neutral activity; whereas, performance support is situated in the context of the activity, relying on the Web 2.0 technology to mediate performance (Boileau, 2011). Performance support is further characterized by Rossett and Schafer (2007) using the factors of convergence, simplicity, relevance to performance, and personalization.

Proximity is at the heart of convergence (Rossett & Schafer, 2007). The information and guidance is where the self-directed learner and the change are. At the desktop, in the car, or on the construction site, performance support informs the actions necessary to complete a task. Effective performance support is simple and focuses on the task at hand. Relevance ensures support enabling a self-directed learner to accomplish his or her goals in a specific context, and personalization adjusts information and guidance according to a set of individualized needs in a specific context. Web 2.0 technologies have a mediating effect on SDL using text, images, video, or audio to accommodate a variety of individual learner characteristics, preferences, and contexts (Boileau, 2011). Construction managers get paid for applying what they learned in school, rather than for their physical strength or manual skill and they must be motivated to self-direct informal learning activities through collaborative operations (Moore, 2015). This motivation may be intrinsic (learner driven) through Web 2.0 activities that help guide the learner, and

extrinsic (environment drive) to ensure that objectives for learning and performance are achieved (Keller, 2010).

Garcia-Peñalva, Colomo-Palacios, and Lytras (2012) found that there is generally a lack of acknowledgement of self-directed workplace learning mediated by Web 2.0 technology. Chiu, Tsai, and Fan Chiang (2013) consider that research on SDL in an organizational setting mediated by Web 2.0 technology is in its infancy. Li and Law (2012) state that Web 2.0 technology facilitates SDL in the workplace, but it is unclear how this occurs. Therefore, a need exists to study, and make visible, the SDL activities of adult learners mediated by Web 2.0 technology in an organizational setting in order to exercise its potential for organizational learning and development (Zhao & Kemp, 2013).

Related Studies

Perhaps the most influential existing study relative to the focus of this study is Boileau's (2011) analysis of the role of interactive technology in informal learning and performance in a social setting. Boileau used a qualitative multiple case research study to explore participants' perceptions and behavioral intentions related to interactive technology as a mediator for informal learning and performance activities in a professional work setting. The research setting for the study was a Canadian-based publicly traded company with operations and employees located worldwide. Of a sample of 30 employees within the same company, 25 participated in this research study from two office locations situated in different major U.S. Midwestern cities. In-depth interviews were also conducted. Boileau found that interactive technology tools to enable social learning and collaboration are being adopted by employees on their own initiative, rather than waiting for them to become available through the company.

Boileau (2011) also found that learning organizations in all business sectors are embracing social media to enable social learning. According to Boileau, "Social media allows individuals and organizations to embrace the needs of changing workplace demographics and enables people of all ages to learn in ways that are comfortable and convenient for them" (p. 151). Boileau recommended further research be conducted for understanding and documenting the mediating effect of Web 2.0 interactive technologies and emerging technologies on informal learning in other organizations and learning institutions, providing broader insight to practice and policy recommendations. The findings reported in Boileau's study provided a baseline for this research study.

Along with the growing interest in Web 2.0 technology is a significant body of research that investigates the pattern of user behavior with Web 2.0 technology in the workplace (Zhao & Kemp, 2013). However, there is a surprisingly limited body of research into the role of Web 2.0 technology in SDL in the workplace. This section discusses existing studies relative to the focus of the study and what the literature offers relative to the research questions using the theoretical foundations of andragogy and BEM as a guide. This is divided out by headings that represent each of the research questions listed in Chapter 1.

SDL and job performance needs supported by the use of Web 2.0 technology. Systematic research that focuses specifically on Web 2.0-based informal learning in the workplace remains novel and sparse (Chiu et al., 2013; García-Peñalvo et al., 2012). The recent study of Valencia-García, García-Sánchez, Casado-Lumbreras, Castellanos-Nieves, and Fernández-Breis (2012) attempted to develop a semantic platform for companies and users to gather useful information and conduct expertise mining from

social web content such as blog posts (Zhao & Kemp, 2013). In this qualitative study, Valencia-García et al. (2012) interviewed 10 employees within the same company at a shared location and found that social web content is a useful source for knowledge sharing throughout the company. Milovanovic, Minović, Štavljanin, Savković, and Starčević (2012) investigated how to use a wiki as a tool for corporate exchange of knowledge through a case study of a software development company involving 12 participants. The study found that a wiki did facilitate informal learning and was a useful informal tool for the employees in the company to share knowledge and learn from each other during the process of software development (Zhao & Kemp, 2013).

Littlejohn, Milligan, and Margaryan (2012), in their qualitative study of seven participants on self-regulated learning, demonstrated improved effectiveness in work-based learning where knowledge was created in a global online social network. Similarly, Hart (2012) observed in a quantitative study of 147 participants that many workers are using social networking tools to address their own learning and performance needs in the workplace. These workers share a great deal in common in terms of motivations and learning behavior (Zhao & Kemp, 2013). They constantly strive to improve their productivity and solve workplace problems through asking questions, and sharing ideas with friends and colleagues in their online social networks.

These studies provide empirical evidence on SDL and job-performance needs supported by the use of Web 2.0 technology. Moreover, findings from these studies exemplify Knowles's (1980) assumption that there is a change in time perspective as people mature—from future application of knowledge to immediacy of application. Thus, an adult is more problem centered than subject centered in learning. The workers in these

studies created knowledge in a global Web 2.0 social network. They used a wiki to facilitate informal learning and found it was a useful Web 2.0 tool for the employees in the company to share knowledge and learn from each other. They also used Web 2.0 social networking tools to address their own learning and performance needs in the workplace, constantly striving to improve their productivity and solve workplace problems through asking questions and sharing ideas with friends and colleagues in their online Web 2.0 social networks (Chiu et al., 2013; García-Peñalvo et al., 2012; Hart, 2012; Littlejohn et al., 2012; Milovanovic et al., 2012; Valencia-García et al., 2012; Zhao & Kemp, 2013). Adult learners seek immediacy of application (Knowles, 1980). Web 2.0 technologies allow adult learners to access information, interact with others, and share knowledge at the speed of their connectivity (Zepeda, 2015). Adult learners have a need for immediacy and for application, and Web 2.0 technologies can provide for these two conditions (Hanley, 2009).

Factors used to identify Web 2.0 technology for use at the individual level to enable SDL tied to specific job performance outcomes. The majority of studies seem to focus on the context of use of the Web 2.0 tools as opposed to how and why the Web 2.0 tools were implemented (Baxter & Connolly, 2014). For example, Holtzblatt, Damianos, and Weiss (2010) assumed an investigative study to explore whether wikis could be applied effectively to support SDL within a nonprofit organization. Employing the use of unstructured and open-ended interviews, the study uncovered various factors that prohibit the usage of wikis for SDL, namely, a reluctance to share information on the wikis among colleagues because of issues of information sensitivity, an unwillingness to share work that is unfinished, and concerns about the openness of information on the

wikis (Baxter & Connolly, 2014). The study also concluded that to ensure successful adoption of wikis, organizations should consider factors such as incentive structures to entice staff to use the wikis in addition to authoring clearer guidelines and policies defining the scope and use of the wikis.

Nyaude (2008) "examined the impact of Gilbert's (2007) BEM variable on employee perception of motivation" (p. iii). Surveys (200) were distributed to hourly employees at an aerospace equipment manufacturing plant in Georgia. A survey return rate of 39% was achieved. Nyaude stated, "Knowledge and skills were perceived as highly motivating, followed by capacity, resources, information, motives and lastly incentive" (p. 86). Nyaude confirmed research findings by Swanson and Holton (2001). Swanson and Holton suggested, "Work is meaningful, workers are motivated by meaningful goals and participation and those workers should be increasingly self-directed and this self-control will improve efficiency and work satisfaction" (p. 48). Nyaude (2008) concluded that the aerospace equipment manufacturing plant would benefit from implementing the recommendations from this study of building organizational growth by motivated employees who are knowledgeable, skilled, with the capacity to produce results for the business and abundant supply of resources.

Another empirical study conducted by Stocker and Tochtermann involved a multiple-case study in three Austrian organizations that were using wikis to support the process of intraorganizational knowledge transfer (Baxter & Connolly, 2014). Through conducting interviews and issuing surveys, it was identified that the majority of employees in the respective organizations considered that the wikis were beneficial for the dissemination and accessing of knowledge. In most organizations, the flow of

communication moves downward, or via a top-down approach—from someone of higher authority to someone of lower authority (Ober, 2009). Upward, or bottom-up communication is the flow of information from lower-level employees to upper-level employees. One interesting point of note derived from the research was that although all three wikis investigated in the studies were implemented via a top-down approach, the content created on the wikis mostly occurred from the bottom (Baxter & Connolly, 2014). This finding exemplified SDL as a type of employee development where employees were given an opportunity to be heard.

A qualitative study completed by Grudin and Poole (2010) explored factors associated with successful wiki deployment in three large organizations. Through the use of interviews, the study identified common themes in relation to wiki adoption, namely, that there can be on occasion different expectations from management and staff as to what their visions are on how a wiki should be best applied in the workplace, conflict among staff members on how content is organized on wikis, and how to introduce wikis into the workplace against potential barriers of an existing information ecology and corporate culture (Baxter & Connolly, 2014). In contrast, an exploratory study conducted by Mansour, Abusalah, and Askenas (2011) discovered factors that impacted the use of a wiki as a tool for sharing knowledge gained from informal learning and aiding in its collaboration within communities in organizations.

The research occurred in a large multinational contracting organization, consisting of employees who were regularly engaged in SDL projects (Baxter & Connolly, 2014). The wiki employed by the organization consisted of five distinct communities of practice. Findings of the study revealed that the majority of the users of the wiki found it to be

beneficial for collectively formulating and disseminating knowledge. However, a salient finding of the study was the openness of the wiki served to have a dual impact on staff members' attitudes and perceptions toward using the wiki in the workplace. For example, in addition to the wiki serving as a beneficial knowledge management tool among the communities of practice, some staff members lacked confidence in sharing their knowledge acquired through SDL activities to a wider audience in addition to accepting criticism or comments from colleagues regarding their contributions. Furthermore, certain staff members were not comfortable to comment on contributions made by senior management on the wiki.

Another Web 2.0 tool that is gaining measured recognition as a medium for supporting the process of internal communication and knowledge sharing in organizations is blogs (Baxter & Connolly, 2013). Empirical research into the internal uses of blogs within organizations is an area that requires further investigation (Lockwood & Dennis, 2008). However, research into organizational blog use is slowly increasing (Baxter & Connolly, 2014). For example, an empirical study conducted by Stocker and Tochtermann (2008) assessed the use of an internal corporate blog for the purposes of sharing knowledge gained from SDL. The study explored the use of an internal blog by the manager of the organization to disseminate knowledge to staff members (Baxter & Connolly, 2014). Utilizing surveys, the study revealed that communicating the benefits of a blog in an organization is an important prerequisite for its success; employees in an organization will use a blog if the content included on it is relevant to their work, and blogs will be used more by employees if they cannot obtain relevant knowledge from other types of communication channels.

These studies provide empirical and qualitative evidence on factors used to identify Web 2.0 technology for use at the individual level to enable SDL tied to specific job performance outcomes. Furthermore, findings from these studies exemplify Knowles's (1980) assumption that the readiness of an adult to learn is closely related to the development tasks of his or her social role. There are various factors that prohibit the use of Web 2.0 technology for SDL, factors that entice use of Web 2.0 technology, factors associated with successful Web 2.0 deployment, and evidence that employees in an organization will use Web 2.0 technology if the content is relevant to their work and social roles (Baxter & Connolly, 2014; Grudin & Poole, 2010; Holtzblatt et al., 2010; Lockwood & Dennis, 2008; Mansour et al., 2011; Stocker & Tochtermann, 2008).

Environmental factors affecting an employee's ability to use Web 2.0 technology to engage in SDL. In a different study, Kosonen, Henttonen, and Ellonen (2007) assessed the use of blogs for internal communication in a large engineering organization and investigated factors that might have an impact on the use of internal blogs in corporate environments for SDL. In relation to the issue of introducing blogs in organizations, the study identified that the factors of corporate climate and culture affect the successful implementation of blogs (Baxter & Connolly, 2014).

A study conducted by Stieglitz and Dang-Xuan (2011) indicated that the benefits of using a wiki were not initially evident to staff who had a preference for using more familiar and accustomed types of media in their organization for obtaining knowledge through SDL activities. In comparison, Stocker and Tochhtermann's (2008) blog study revealed the importance of communicating the benefits of using Web 2.0 tools in the workplace to staff that have never been exposed to them. The barrier of staffs' apparent

unwillingness to share information among colleagues by contributing content on a Web 2.0 tool was a theme found in the studies performed by Holtzblatt et al. (2010) and Mansour et al. (2011). In fact, it was the openness of the technology, in this case wikis, that contributed to staff possessing a lack of confidence in sharing knowledge gained through SDL to a wider audience in the workplace (Baxter & Connolly, 2014). In addition to communicating the benefits of using Web 2.0 tools to staff, it is important that management ensure that there is adequate infrastructural support (Stieglitz & Dang-Xuan, 2011) to ease adoption and to reflect on their existing corporate climate and culture (Grudin & Poole, 2010; Kosonen et al., 2007) to assess whether the use of Web 2.0 technologies are an appropriate fit with the mission statements of their organization. To encourage staff to engage with Web 2.0 technologies at work, it is important that incentive mechanisms and guideline policies are put in place (Holtzblatt et al., 2010) and that everyone in the organization has a shared vision in relation to how the technology will be used (Grudin & Poole, 2010; Skeels & Grudin, 2009) otherwise adoption and continued use will not prove to be successful.

In Dean and Ripley's (1997) book, *Performance Improvement Pathfinders*, they describe introducing Gilbert's BEM as part of an experiential group activity called, "Where's my biggest performance block?" (p. 52). This activity provided staff with a direct opportunity to identify what area would have the greatest benefit to their performance (Russell, 2010). Dean and Ripley (1997) stated with "so many participants identifying environmental influences as needing improvement for them to do their jobs" (p. 54) better validates Gilbert's premise that performance improvement can be achieved by addressing the environmental support factors alone. With accurate information, the

manager can further evaluate the barrier to determine an applicable intervention (Russell, 2010). The BEM as a troubleshooting tool opens the manager's mind to explore the possibilities of what factors are causing barriers to performance through a systematic approach. With accurate information, managers can provide the most appropriate coaching to their staff. When managers can isolate the barrier and create a specific intervention that removes the barrier with the least cost and improves performance, their employees will be more likely to be exemplary performers.

These studies provide empirical and qualitative evidence on environmental factors affecting an employee's ability to use Web 2.0 technology to engage in SDL. Also exemplified are Knowles's (1980) assumptions of experience, readiness to learn, and orientation to learning. Adult learners in these studies were unfamiliar with or had no experience with the Web 2.0 technology and, therefore, had no reservoir of experience with its use. Readiness to learn is closely related to the development tasks of the adult learners' social roles, but in these studies, there existed an unwillingness to share information among colleagues by contributing content on a Web 2.0 tool, perhaps because of the organizational culture (Baxter & Connolly, 2014). Further, the organizations in these studies failed to demonstrate an immediacy of application for the Web 2.0 tool (Grudin & Poole, 2010; Skeels & Grudin, 2009) to appeal to the problem-centered rather than subject-centered learning of the adults in the study.

Determination of job performance outcomes resulting from Web 2.0 enhanced SDL opportunities. Research conducted by Zhao and Kemp (2013) concluded that self-directed workplace learning is shared, context-or task-based, organizationally goal-oriented and organizationally culture-bound, and contributes to and is influenced by

organizational learning. Workplace SDL gained through connections and collaborations mediated by Web 2.0 applications were examined, and Zhao and Kemp concluded that SDL is largely neither institutionalized nor controlled by institutions. Zhao and Kemp defined Web 2.0–based workplace learning as SDL that takes place in the workplace through connections and collaborations mediated by Web 2.0 technology and hypothesized Web 2.0–based self-directed informal workplace learning as the dependent variable that may be measured in various ways. For example, Zhao and Kemp quantified the variable by measuring the knowledge gained and shared informally, using Web 2.0 platforms that are relevant to jobs and duties, and to the whole workplace. The improvement in job performance through such knowledge exchange and learning can be another measure of the dependent variable.

Five independent variables were proposed by Zhao and Kemp (2013) in relation to Web 2.0-based workplace learning. According to research conducted by Zhao and Kemp, Self-interest may be measured by perceived benefits from participating in Web 2.0-based workplace learning, such as a boost in reputation, respect, status, social acceptance, and recognition. Self-fulfillment is driven largely by intrinsic motivations, which may be measured by the level of aspiration to take up new challenges and help others. Sense of belonging may be measured by how much one views oneself as part of a team or community and is willing to contribute to it. Trust, as a relational dimension of social capital, may be measured by the extent of trust one has toward other members of a network in deciding to share knowledge with them. Perceived expertise may be measured by one’s perception of the extent of mastery in specialized knowledge and practices.

Research by Zhao and Kemp (2013) found that the mediating variable of Web 2.0 technology may be measured by the level of involvement with the technology in terms of the formation of, and participation in, Web-based communities and hosted services, such as social-networking sites (i.e., LinkedIn and Facebook); video sharing sites (i.e., YouTube); wikis; blogs; performance support tools; performance support systems; search engines such as Bing, Yahoo, and Google; the hardware that supports this technology, including, but not limited to desktop, laptop, or handheld computers, web cams, smartphones, and tablets; and the use of applications (apps), which are accessed from mobile devices. Zhao and Kemp concluded their research by stating, "Organizational support, as a moderator, may be measured in terms of the level of investment in Web 2.0 technologies, providing on-going technical support and training, as well as taking initiatives in nurturing an organizational learning culture" (p. 13).

These studies provide empirical and qualitative evidence of job-performance outcomes resulting from Web 2.0 enhanced SDL opportunities. Also exemplified are Knowles's (1980) self-concept assumptions resonated by the five independent variables of self-interest, self-fulfillment, sense of belonging, trust, and perceived expertise as proposed by Zhao and Kemp (2013) in relation to Web 2.0-based workplace learning.

Methodological Framework

Keeping in mind the study's goals, the research methodology needed to explore the SDL, or knowledge that is constructed by construction managers as they engage in and make meaning of Web 2.0 technology, and it needed to investigate this contemporary phenomenon within its real-life context. The methodological framework also needed to result in a data repository sufficient to answer four research questions posed by the study:

1. What SDL and job performance needs are supported by the use of Web 2.0 technology?
2. What factors are used to identify Web 2.0 technology for use at the individual level to enable SDL tied to specific job performance outcomes?
3. What environmental factors affect a construction manager's ability to use Web 2.0 technology to engage in SDL?
4. How is the success of job performance outcomes resulting from Web 2.0 enhanced SDL opportunities determined?

Two factors characterized the research strategy: qualitative and case study. The following paragraphs provide the literature that defines and supports the use of the selected methodology, outlining its appropriateness related to the design of the study.

A qualitative study. According to Merriam and Tisdell (2016), "Qualitative research is based on the belief that knowledge is constructed by people in an ongoing fashion as they engage in and make meaning of an activity, experience, or phenomenon" (p. 23). This study was based on the belief that construction managers engage in and make meaning of SDL activities and the ensuing job-performance outcomes, mediated by, or as they experience Web 2.0 technology. Merriam and Tisdell state, "A central characteristic of all qualitative research is that individuals construct reality in interaction with their social worlds" (p. 24). In this study, the social worlds, or an organizational setting that encompasses Web 2.0 technology, of individuals (construction managers) interacting with Web 2.0 technology as SDL experiences and behaviors were explored.

Gay, Mills, and Airasian (2011) state, "Qualitative research seeks to probe deeply into the research setting to obtain in-depth understandings about the way things are, why

they are that way, and how the participants in the context perceive them" (p. 12). To achieve the detailed understandings they seek, qualitative researchers must undertake sustained in-depth, in-context research that allows them to uncover subtle, less overt, personal understandings. A central characteristic of qualitative research, according to Merriam and Tisdell (2016), is that individuals construct reality in interaction with their social worlds. Constructivism, thus, underlies what is termed a basic qualitative study. The researcher conducting a qualitative study is interested in understanding the meaning a phenomenon has for those involved. Meaning, however, "is not discovered but constructed. Meaning does not inhere in the object, merely waiting for someone to come upon it.…Meanings are constructed by human beings as they engage with the world they are interpreting" (Crotty, 1998, pp. 42–43). Therefore, qualitative researchers conducting a qualitative study would be interested in how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences (Merriam & Tisdell, 2016). The overall purpose of a qualitative research study is to understand how people make sense of their lives and their experiences. Creswell (2013) describes qualitative research as an approach,

> …in which the inquirer often makes knowledge claims based primarily on constructivist perspectives (i.e., the multiple meanings of individual experiences, meanings socially and historically constructed) with an intent of developing a theory or pattern) or advocacy/participatory perspectives (i.e., political, issue-oriented, collaborative or change oriented) or both. It also uses strategies of inquiry such as narratives, phenomenologies, ethnographies, grounded theory

> studies, or case studies in which the researcher collects open-ended, emerging data with the primary intent of developing themes from the data. (p. 34)

A suitable research approach for the study of the role of Web 2.0 technology in the SDL and job performance in a single organizational setting would move toward an understanding of social processes and focus on both the context and specifics of job performance outcomes. The researcher concluded that a qualitative research approach oriented toward discovery, description, and understanding of processes and activities was an appropriate component of the research strategy. The following list identifies some basic assumptions of a qualitative study and links them to a study of the role of Web 2.0 technology in SDL and job performance in an organizational setting:

1. Focus on meaning and understanding. According to Merriam and Tisdell (2016), "qualitative researchers are interested in how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences" (p. 15). The overall purposes of qualitative research are to achieve an understanding of how people make sense out of their lives, delineate the process of meaning-making, and describe how people interpret what the experience. This study was concerned with what and how questions about the role of Web 2.0 technology in SDL in an organizational setting, including: What SDL and job performance needs are supported by the use of Web 2.0 technology?; What factors are used to identify Web 2.0 technology for use at the individual level to enable SDL tied to specific job performance outcomes?; What environmental factors affect a construction manager's ability to use Web 2.0 technology to engage in SDL?; and How is the success

of job performance outcomes resulting from Web 2.0 enhanced SDL opportunities determined?

2. Researcher as primary instrument. According to Merriam and Tisdell (2016), "The researcher is the primary instrument for data collection and analysis" (p. 16). Since understanding is the goal of this research, the human instrument, which is able to be immediately responsive and adaptive, would seem to be the ideal means of collecting and analyzing data. Other advantages are that the researcher can expand his or her understanding through nonverbal as well as verbal communication, process information (data) immediately, clarify and summarize material, check with respondents for accuracy of interpretation, and explore unusual or unanticipated responses. In this study, the researcher collected data through interviews with participants in the use of Web 2.0 technology, observation of SDL activities, and documents evidencing performance outcomes mediated by Web 2.0 technology.
3. An inductive process. Merriam and Tisdell (2016) describe an inductive process, that is, researchers gather data to build concepts, hypotheses, or theories rather than deductively testing hypotheses. The qualitative research approach to this study was exploratory. It collected data through a variety of techniques and then used an inductive analysis to identify and characterize important categories and interrelationships in the phenomenon.
4. Natural setting. Qualitative researchers often collect data in the field at the site where participants experience the issue or problem under study (Creswell, 2013; Merriam & Tisdell, 2016; Yin, 2014). They do not bring individuals

into a lab (a contrived situation). Instead, qualitative researchers gather up-close information by actually talking directly to people and seeing them behave and act within their context (Merriam & Tisdell, 2016). In the natural setting, the researchers have face-to-face interaction over time. The researcher of this study conducted one-on-one interviews with participants involved with the use of Web 2.0 technology to understand the phenomenon in its natural setting.

5. Richly descriptive. According to Merriam and Tisdell (2016), "Words and pictures rather than numbers are used to convey what the researcher has learned about a phenomenon" (p. 17). Qualitative research focuses on describing and understanding a phenomenon. Description includes a detailed account of the context, the activities, the participants and the process. The goal of this research was to describe the role of Web 2.0 technology in SDL in an organizational setting and have that description assist in understanding it.

Linking these basic assumptions to the specific character of this research demonstrates that a qualitative research approach was appropriate for this study. The study of the role of Web 2.0 technology in SDL and performance outcomes in an organizational setting required:

- a flexible research design to allow the researcher to pursue new directions in data collection as understanding develops during the research;
- an orientation toward detailed description that addresses both the context and specifics of the use of Web 2.0 technology as a mediator of SDL;
- a focus on participants and the process through fieldwork activities; and

- an inductive process that identifies and characterizes categories and patterns in the data and grounds the findings in the data.

This qualitative approach complemented the second factor of the research strategy, using a case study approach.

A case study. Case study research, according to Gay et al. (2011), is "a qualitative research approach in which researchers focus on a unit of study known as a bounded system (e.g., individual teachers, a classroom, or a school)" (p. 426). A number of researchers have addressed the definition of a case, which is a concept that is sometimes difficult to grasp. Merriam and Tisdell (2016) explained the case is "a thing, a single entity, a unit around which there are boundaries" (p. 27). Stake (2005) further pointed out, "Case study is not a methodological choice but a choice of what is to be studied" (p. 443); similarly, Miles and Huberman (1994) described a case study as an investigation of a phenomenon that occurs within a specific context. In other words, if the phenomenon you want to study is not bounded, not identifiable within a specific context, it is not appropriately studied as a case study.

Yin (2014) went beyond the definition to redefine case study research as a research strategy that is an all-encompassing method covering design, data collection techniques, and specific approaches to data analysis. Yin defines a case study in terms of the research process. "A case study is an empirical inquiry that investigates a contemporary phenomenon (the 'case') within its real-life context, especially when the boundaries between phenomenon and context may not be clearly evident" (p. 16). For it to be a case study, one particular program or one particular group of self-directed learners (a bounded system) would be the unit of analysis (Merriam & Tisdell, 2016). In this

study, a sample of construction managers' (a bounded system) behaviors, or SDL activities and job-performance outcomes, mediated by the use of Web 2.0 technology (contemporary phenomenon) in a single organizational setting (real-life context) was explored. The term case study is often used interchangeable with "qualitative research" (p. 37). According to Merriam and Tisdell, "Qualitative case studies share with other forms of qualitative research the search for meaning and understanding, the researcher as the primary instrument of data collection and analysis, an inductive investigative strategy, and the end product being richly descriptive" (p. 37). Taken together, these statements suggest, according to Gay et al. (2011), that case study research is

- a qualitative approach to studying a phenomenon;
- focused on a unit of study, or a bounded system;
- not a methodological choice, but a choice of what to study; and
- an all-encompassing research method.

Case studies can be described as particularistic, descriptive, and heuristic (Merriam & Tisdell, 2016). To say a case study is particularistic means that it is focused on a particular phenomenon, such as a situation of event (Gay et al., 2011). A case study researcher may specifically choose a particular instance of a phenomenon under investigation to understand a specific problem that occurs in everyday practice. To say that a case study is descriptive means that the end result of the case study, the narrative, includes a purposeful description of the phenomenon that was the focus of the case study research. The term heuristic refers to the fact that case studies clarify the reader's understanding of the phenomenon under study beyond the reader's original knowledge (Merriam & Tisdell, 2016). In short, according to Gay et al. (2011):

> One outcome of case study research is a narrative account that provides the researcher (and reader of the case study) with new insights into the ways things are into the kinds of relationships that exist among participants in the study. (p. 427)

According to Gay et al. (2011), "Case study research can also be characterized by the disciplinary orientation the researcher brings to the case study" (p. 427). In other words, different disciplinary fields use case study research for different purposes. Educational researchers frequently rely on the disciplines of anthropology, history, psychology, or sociology for the conceptual frameworks and for techniques for data collection, data analysis, and data interpretation.

The following list identifies some characteristics of case study research and links them to a study of the role of Web 2.0 technology in SDL and job performance in an organizational setting:

1. Focused on a particular phenomenon. The researcher chose to conduct a case study of project managers whose performance involves relationships among their perceptions of the job and setting, and tools in the environment, and SDL activities leading to some new insight affecting on-the-job performance to understand the role of Web 2.0 technology as a mediator in this relationship.
2. The narrative includes purposeful description. The narrative of this study includes many variables and analyses of the participants' interactions with Web 2.0 technology.
3. New insights into the ways things are. This case study aims to bring an understanding to the role of Web 2.0 technology in SDL and job performance of construction managers at the individual level.

4. Disciplinary orientation. The researcher relied on the Knowles's (1980) theory of andragogy and Gilbert's (1996) BEM for the conceptual framework of this study and for techniques for data collection, data analysis, and data interpretation.

Linking these characteristics of case study research to this research demonstrates that a case study approach was appropriate for this study. The study of the role of Web 2.0 technology in SDL and performance outcomes in an organizational setting required:

- a qualitative approach to studying a phenomenon;
- a focus on a unit of study, or bounded system;
- a choice of what to study rather than a methodological choice; and
- an all-encompassing research method.

Summary

Social networking tools have been widely used for different purposes in the workplace, and have been a subject of controversy and debate (Hasan & Pfaff, 2006; Skeels & Grudin, 2009). Nevertheless, Web 2.0 is not only a technological revolution, but also a social revolution. SDL through connection and collaboration on the various platforms of Web 2.0 is happening and growing in the workplace, with or without it being formally recognized or sanctioned (Zhao & Kemp, 2012). This study contributed to the field of HRD by providing a new lens to view the role of Web 2.0 technology in SDL and job performance within an organizational setting, and thereby enabling its integration into a blended learning site. A practical application for the study is to provide HRD professionals and the participants of this study insight into best practices and recommendations for the adoption and application of Web 2.0 technology.

The theoretical and empirical research reviewed in this chapter provided evidence of a strong research framework, based in the theories of andragogy and the BEM, used to guide the analysis and methods for this qualitative case study. In general, andragogy and the BEM provided an analysis framework that has been applied in this study to describe the role of Web 2.0 technology in SDL and job performance in an organizational setting. Table 2 provides a summary of the literature review.

Table 2

Literature Review Summary

Source	Sample-Study Description	Purpose	Results
Boileau (2011). The effect of interactive technology on informal learning and performance in a social setting. Available from ProQuest Dissertations & Theses Global. (UMI No. 3479477).	A total of 25 employees, out of a sample of 30, within the same company participated in this research study from two office locations situated in different major U.S. Midwestern cities.	The purpose of Boileau's (2011) research was to analyze the effect of interactive technology on informal learning and performance in a social setting. Boileau used a qualitative multiple case research study to explore participants' perceptions and behavioral intentions related to interactive technology as a mediator for informal learning and performance activities in a professional work setting.	Boileau (2011) found that interactive technology tools to enable social learning and collaboration are being adopted by employees on their own initiative, rather than waiting for them to become available through the company. Boileau also found that learning organizations in all business sectors are embracing social medial to enable social learning.

(continued)

Source	Sample-Study Description	Purpose	Results
Valencia-García et al. (2012). Informal learning through expertise mining in the social web. *Behaviour & Information Technology, 31*(8), 757–766.	Ten employees within the same company at a shared location were interviewed in this qualitative study.	The purpose of this qualitative study was to develop a semantic platform for companies and users to gather useful information and conduct expertise mining from social web content such as blog posts.	Valencia-García et al. (2012) found that social web content is a useful source for knowledge sharing throughout the company
Milovanovic et al. (2012) Wiki as a corporate learning tool: case study for software development company. *Behaviour & Information Technology, 31*(8), 767–777.	This case study of a software development company involved 12 participants.	The purpose of this case study was to investigate how to use a wiki as a tool for corporate exchange of knowledge	The study found that a wiki did facilitate informal learning and was a useful informal tool for the employees in the company to share knowledge and learn from each other during the process of software development.
Littlejohn, Milligan, & Margaryan (2012). Charting collective knowledge: supporting self-regulated learning in the workplace. *Journal of Workplace Learning, 24*(3), 226–238.	This qualitative study included seven participants.	The purpose was to examine self-regulated learning in a global online social network.	This study demonstrated improved effectiveness in work-based learning where knowledge was created in a global online social network.
Hart (2012). Learning in the social workplace. Internet Time Alliance [online]. Available at: http://internettimealliance.com/wp/wp-content/uploads/2011/11/liswpwp.pdf.	147 participants were surveyed in this quantitative study.	The relationship between self-directed learning and social networking tools was explored.	This study found that many workers are using social networking tools to address their own learning and performance needs in the workplace.

(continued)

Source	Sample-Study Description	Purpose	Results
Holtzblatt, Damianos, & Weiss (2010). Factors impeding Wiki use in the enterprise: A case study. In CHI EA 10 Proceedings of the 28th of the international conference extended abstracts on Human factors in computing systems (pp. 4661–4675). New York: ACM Press.	This study employed the use of unstructured and open-ended interviews.	This investigative study explored whether wikis could be applied effectively to support SDL within a nonprofit organization.	The study uncovered various factors that prohibit the usage of wikis for SDL, namely, a reluctance to share information on the wikis among colleagues as a result of issues of information sensitivity, an unwillingness to share work that is unfinished; and concerns about the openness of information on the wikis. The study also concluded that to ensure successful adoption of wikis, organizations should consider factors such as incentive structures to entice staff to use the wikis in addition to authoring clearer guidelines and policies defining the scope and use of the wikis (Baxter & Connolly, 2014).
Nyaude (2008). Manufacturing challenge: An employee perception of the impact of BEM variables on motivation. Available from ProQuest Dissertations & Theses. (AAI3311268).	Surveys (200) were distributed to hourly employees at an aerospace equipment manufacturing plant in Georgia. A survey return rate of 39% was achieved.	This study examined the impact of Gilbert's (2007) BEM variable on employee perception of motivation.	Nyaude (2008) stated, "Knowledge and skills were perceived as highly motivating, followed by capacity, resources, information, motives and lastly incentive" (p. 86). Nyaude confirmed research findings by Swanson and

(continued)

Source	Sample-Study Description	Purpose	Results
			Holton. Swanson and Holton (2001) suggested, "Work is meaningful, workers are motivated by meaningful goals and participation and those workers should be increasingly self-directed and this self-control will improve efficiency and work satisfaction" (p. 48). Nyaude (2008) concluded that the aerospace equipment manufacturing plant would benefit from implementing the recommendations from this study of building organizational growth by motivated employees who are knowledgeable, skilled, with the capacity to produce results for the business and abundant supply of resources.
Stocker & Tochtermann (2008). Investigating weblogs in small	This empirical study involved a multiple-case study in three Austrian organizations.	The purpose was to explore the use of wikis to support the process of intra-	Through conducting interviews and issuing surveys, it

(continued)

Source	Sample-Study Description	Purpose	Results
and medium enterprises: An exploratory case study, in D. Flejter, S. Grzonkowski, T. Kaczmarek, M. Kowalkiewwicz, T. Nagle, & J. Parkes (Eds.), BIS Workshop Proceedings, pp. 95–107.		organizational knowledge transfer.	was identified that the majority of employees in the respective organizations considered that the wikis were beneficial for the dissemination and accessing of knowledge (Baxter & Connolly, 2014). One interesting point of note derived from the research was that although all three wikis investigated in the studies were implemented via a top-down approach, the content created on the wikis mostly occurred from the bottom up as SDL efforts of various employees within the organization.
Grudin & Poole (2010). Wikis at work: Success factors and challenges for sustainability of enterprise wikis. Proceedings of the 6th International Symposium on Wikis and Open Collaboration. New York: ACM Press.	A qualitative study completed by conducted in three large organizations using interviews.	To explore factors associated with successful wiki deployment.	The study identified common themes in relation to wiki adoption, namely, that there can be on occasion different expectations from management and staff as to what their visions are on how a wiki should be best applied in the workplace, conflict among

(continued)

Source	Sample-Study Description	Purpose	Results
			staff members on how content is organized on wikis and how to introduce wikis into the workplace against potential barriers of an existing information ecology and corporate culture (Baxter & Connolly, 2014).
Mansour, Abusalah, & Askenas (2011). Wiki-based community collaboration in organizations. C&T '11: Proceedings of the 5th International Conference on Communities and Technologies, 29 June-2 July 2011, QUT, Brisbane, Australia, pp. 79-87. Merriam, S. B. (2011). Andragogy and self-directed learning: Pillars of adult learning theory. *New Directions for Adult and Continuing Education, 89*, 3–13.	The research occurred in a large multinational contracting organization, consisting of employees who were regularly engaged in SDL projects (Baxter & Connolly, 2014). The wiki employed by the organization consisted of five distinct communities of practice.	To explore factors that impact the use of a wiki as a tool for sharing knowledge gained from informal learning and aiding in its collaboration within communities in organizations.	Findings of the study revealed that the majority of the users of the wiki found it to be beneficial for collectively formulating and disseminating knowledge (Baxter & Connolly, 2014).

(continued)

Source	Sample-Study Description	Purpose	Results
Stocker & Tochtermann (2008). Investigating weblogs in small and medium enterprises: an exploratory case study, in D. Flejter, S. Grzonkowski, T. Kaczmarek, M. Kowalkiewwicz, T. Nagle, & J. Parkes, (Eds.), BIS Workshop Proceedings, pp. 95–107.	Utilizing the use of surveys, the study explored the use of an internal blog by the manager of the organization to disseminate knowledge to staff members (Baxter & Connolly, 2014).	The study assessed the use of an internal corporate blog for the purposes of sharing knowledge gained from SDL.	Utilizing surveys, the study revealed that communicating the benefits of a blog in an organization is an important prerequisite for its success; employees in an organization will use a blog if the content included on it is relevant to their work; and blogs will be used more by employees if they cannot obtain relevant knowledge from other types of communication channels (Baxter & Connolly, 2014).
Kosonen, Henttonen, & Ellonen (2007). Weblogs and internal communication in a corporate environment: A case from the ICT industry. *International Journal of Knowledge and Learning, 3*(4/5), 437–449.	This study assessed the use of blogs for internal communication in a large engineering organization	Its purpose was to investigate factors that might have an impact on the use of internal blogs in corporate environments for SDL.	In relation to the issue of introducing blogs in organizations the study identified that the factors of corporate climate and culture affect the successful implementation of blogs (Baxter & Connolly, 2014).
Stieglitz & Dang-Xuan (2011). Adoption and use of corporate wikis in German small	This study explored the use of wikis by staff that had a preference for using more familiar	Its purpose was to investigate the ways in which staff prefer to obtain	The results of the study indicated that the benefits of using a wiki were not initially evident

(continued)

Source	Sample-Study Description	Purpose	Results
and medium-sized enterprises. Retrieved from http://aisel.aisnet.org/amcis2011_submissions/235.	and accustomed types of mediums in their organization.	knowledge through SDL activities.	to staff who had a preference for using more familiar and accustomed types of media in their organization for obtaining knowledge through SDL activities.
Zhao & Kemp (2013). Exploring individual, social and organizational effects on Web 2.0-workplace learning: A research agenda for a systematic approach. Research in Learning Technology. *The Journal of the Association for Learning Technology (ALT), 21*(1), 1–12.	Zhao and Kemp (2013) defined Web 2.0-based workplace learning as SDL that takes place in the workplace through connections and collaborations mediated by Web 2.0 technology and hypothesized Web 2.0-based self-directed informal workplace learning as the dependent variable which may be measured in various ways. For example, Zhao and Kemp quantified the variable by measuring the knowledge gained, and shared informally, using Web 2.0 platforms that are relevant to jobs and duties, and to the whole workplace. The improvement in job performance, through such	To examine workplace SDL gained through connections and collaborations mediated by Web 2.0 applications.	This study found that the mediating variable of Web 2.0 technology may be measured by the level of involvement with a the technology in terms of the formation of, and participation in Web-based communities and hosted services, such as social-networking sites (i.e., LinkedIn and Facebook); video sharing sites (i.e., YouTube); wikis, blogs; performance support tools; performance support systems; search engines such as Bing, Yahoo, and Google; the hardware that supports this technology, including, but not limited to desktop, laptop, or handheld computers, web.

(continued)

Source	Sample-Study Description	Purpose	Results
	knowledge exchange and learning, can be another measure of the dependent variable.		cams, smartphones and tablets; and the use of applications (apps), which are accessed from mobile devices

Construction managers have unprecedented access to tools for collaboration and production of new knowledge combined with the ability to interact with like-minded individuals within their organizations (Boileau, 2011). The research findings suggest that further study is needed in understanding the role of Web 2.0 technology in SDL and job performance at the individual and organizational levels. This is achievable in a research design that seeks to uncover the SDL and job-performance needs supported by the use of Web 2.0 technology, factors used to identify Web 2.0 technology for use at the individual level to enable SDL tied to specific job performance outcomes, environmental factors affecting construction manager's ability to use Web 2.0 technology to engage in SDL, and the manner(s) in which the success of job performance outcomes resulting from Web 2.0 enhanced SDL opportunities are determined.

The ensuing research design and principles used in this qualitative case study have been fully developed and derived in Chapter 3.

Chapter 3: Methodology

This chapter is divided into six sections, which describe pertinent aspects of the inquiry: Description of Methodology, Design of the Study, Sample and Population, Instrumentation and Data Collection, Data Analysis Procedure, and Summary. The purpose of this chapter is to explain the methodology and procedures applied during the investigation.

Description of the Methodology

A research method encompasses the overall strategy followed in gathering and examining data (Gay et al., 2011). This study followed a qualitative research approach for several compelling reasons. In general, qualitative research methods are especially useful in discovering the meaning that people give to events they experience (Creswell, 2013; Merriam & Tisdell, 2016). The purpose of this study was to discover the meaning that construction managers give to their self-directed learning and job-performance outcomes, mediated by Web 2.0 technology.

Specifically, a qualitative approach is warranted when the nature of research requires exploration (Gay et al., 2011). This study explored adults who by profession are expected to be self-directed learners, construction managers, and the role of Web 2.0 technology in their self-directed learning activities and job performance. Qualitative research questions often begin with how or what so that the researcher can gain an in-depth understanding of what is going on relative to the topic (Creswell, 2013; Merriam & Tisdell, 2016). For the current study, the researcher explored participants' experiences with self-directed learning and Web 2.0 technology by asking the following how and what questions: (a) What SDL and job performance needs are supported by the use of

Web 2.0 technology?; (b) What factors are used to identify Web 2.0 technology for use at the individual level to enable SDL tied to specific job performance outcomes?; (c) What environmental factors affect a construction manager's ability to use Web 2.0 technology to engage in SDL?; and (d) How is the success of job performance outcomes resulting from Web 2.0 enhanced SDL opportunities determined?

Quantitative research approaches are applied to describe current conditions, investigate relations, and study cause-effect phenomena (Gay et al., 2011). Qualitative research is the collection, analysis, and interpretation of comprehensive narrative and visual (i.e., nonnumerical) data to acquire insights into a specific phenomenon of interest.

Qualitative researchers do not necessarily accept the view of a stable, coherent, uniform world (Gay et al., 2011). They argue that all meaning is situated in a particular perspective or context, and because different people and groups often have different perspectives and contexts, the world has many different meanings, none of which is necessarily more valid or true than another. Qualitative research problems and methods are inclined to develop as understanding of the research context and participants deepens. Consequently, qualitative researchers often steer away from stating hypotheses prior to collecting data, and they may analyze a specific phenomenon absent a guiding statement about what may or may not be true about that phenomenon or its context. Qualitative researchers begin their research with an idea of what they intend to study.

Qualitative research seeks to probe deeply into the research setting to obtain in-depth understandings about the way things are, why they are that way, and how the participants in the context perceive them (Gay et al., 2011). To accomplish the detailed understandings they seek, qualitative researchers must assume sustained comprehensive,

in-context research that permits them to uncover subtle, less explicit, personal understandings. In summary, two characteristics of qualitative research important in describing this research method are the simultaneous study of many aspects of a phenomenon and the attempt to study things as they exist naturally.

The rationale for a qualitative research design in this study is perhaps best synopsized by Merriam and Tisdell (2016) who state, "Qualitative researchers are interested in how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences" (p. 6). The overall purposes of qualitative research are, therefore, to acquire an understanding of how people make sense out of their lives, describe the process of meaning making (rather than the outcome or product), and describe how people interpret what they experience. The focus of this research study was not on a particular outcome. Rather, it was focused on gaining a better understanding of mediating influences in relationship with actions in order to develop a systemic view of the role of Web 2.0 technology in self-directed learning and job performance in an organizational setting.

The qualitative research approach applied to this study was primarily inductive, using empirical data to build concepts, understanding, and theory rather than deductively testing hypotheses (Merriam & Tisdell, 2016). As previously discussed in Chapters 1 and 2, this study was informed by theoretical frameworks grounded in Knowles's (1980) theory of andragogy and Gilbert's (1996) classic BEM, which allowed the researcher to focus on inquiry and data interpretation. A theoretical framework, according to Merriam and Tisdell (2016), is "the underlying structure, the scaffolding or frame of your study" (p. 85). This underlying structure consists of concepts, assumptions, expectations, beliefs,

and theories that inform the study (Maxwell, 2013). This study did not test the theories of andragogy and the BEM. Instead, these theoretical frameworks provided an underlying structure for framing the research questions and for data collection.

The next section describes how the phenomenon was directed for examination and evaluation. The phenomena in the study have been operationalized (directed) for examination and evaluation in several phases.

Design of the Study

The research methodology provided a framework for designing a systematic study that addressed the study's goals, objectives, and questions. This section summarizes the overall design of the study, activities, and the extent of data resulting from this approach.

The basic characteristics for qualitative study design included focus on meaning, understanding, and process; a purposeful sample; data collection via interviews, observations, documents; data analysis that is inductive and comparative; and findings that are richly descriptive and presented as theme or categories (Creswell, 2013; Merriam & Tisdell, 2016; Yin, 2014). Qualitative case study brings further focus to this paradigm as a means of achieving in-depth description and analysis of a bounded system (Gay et al., 2011; Merriam & Tisdell, 2016). This definition seems to suggest both the process for case study and the unit of study have equal bearing on the design and methodology (Boileau, 2011).

Case study research is also an appropriate choice of research method if the researcher is interested in studying process (Gay et al., 2011). Case studies are useful when describing the context of the study and the extent to which a particular program or innovation has been implemented. They are also useful for researchers interested in

providing causal explanations, such as describing the process by which a particular innovation had a particular effect on the participants in the setting. This case study examined the processes used by construction managers in selecting and using Web 2.0 technology, the context in which the Web 2.0 technology was implemented, and the process by which Web 2.0 technology had a particular role in the construction managers' natural workplace setting.

According to Creswell (2013), "Types of qualitative case studies are distinguished by the size of the bounded case, such as whether the case involves an individual, several individuals, a group, an entire program, or an activity" (p. 99). They may also be distinguished in terms of the intent of the case analysis. There are three variations in terms of intent: the single instrumental case study, the collective or multiple case study, and the intrinsic case study. In a single instrumental case study (Stake, 1995), the researcher is focused on an issue or concern, and then selects one bounded case to illustrate this issue. In a collective case study (or multiple case study), the one issue or concern is again selected, but the researcher selects multiple case studies to illustrate the issue (Creswell, 2013). The intrinsic case study focuses on the case because the case presents an unusual or unique situation. The single instrumental case study design was determined most relevant to this research study since the intent was to explore a purposefully selected sample of construction managers' perceptions and behaviors related to Web 2.0 technology as a mediator for self-directed learning and job-performance outcomes in a specific organizational setting. The self-directed learning experiences of participants with Web 2.0 technology constituted the case, which is bounded within a single organization.

Figure 3 presents the study's design. The study design reflects the logical flow from the identification of a research topic that initiated the study and the review of literature through selecting participants, collecting data, analyzing and interpreting data, and the reporting and evaluating of the research:

1. Identifying a research topic. Often the initial topic is narrowed to be more manageable (Gay et al., 2011). To initiate the study, the researcher incorporated the researcher's knowledge and assumptions about self-directed learning and Web 2.0 technology, conducted a preliminary literature review of related studies, and worked with the dissertation chair to narrow the topic into a manageable research study.
2. Reviewing the literature. The researcher examines existing research to identify useful information and strategies for carrying out the study (Gay et al., 2011). To justify the study, the researcher conducted an extensive literature review of writings on the role of Web 2.0 technology in self-directed learning, theoretical frameworks, and models appropriate to the research. The review validated the need for this research and provided support for the initial conceptual model.
3. Selecting participants. Participants were purposefully selected (i.e., not randomly selected) and were fewer in number (three) than in quantitative samples (Gay et al., 2011).
4. Collecting data. Qualitative data was gathered from interviews, observations, and documents.
5. Analyzing and interpreting data. The researcher analyzed the themes and general tendencies and provided interpretations of the data (Gay et al., 2011).

6. Reporting and evaluating the research. The researcher summarized and integrated the qualitative data in narrative and visual form (Gay et al., 2011).

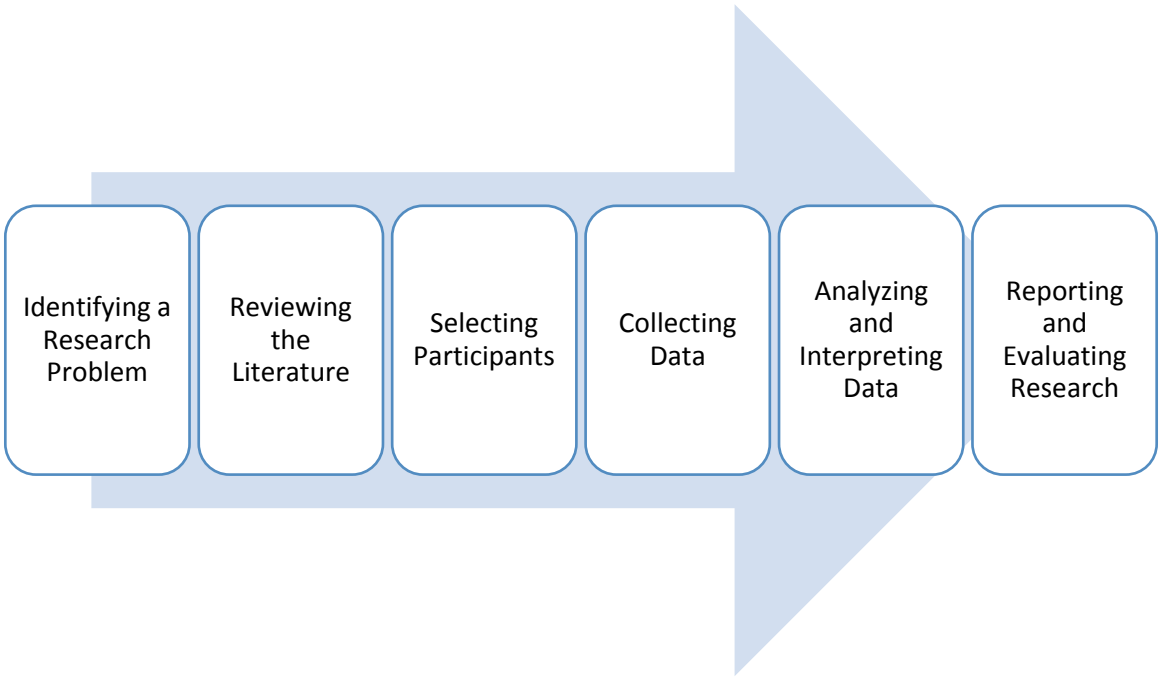

Figure 3. Study design. Adapted from *Educational Research: Competencies for Analysis and Applications* (p. 15), by L. R. Gay, G. E. Mills, & P. Airasian, 2011, Upper Saddle River, NY: Pearson Education, Inc. Adapted with permission.

The next section describes the population about which inferences were made and the intended subset of the population examined in this study.

Sample and Population

This section describes the population about which inferences were made and the population examined in this study. Data was only collected after producing a letter of invitation sent to participants, an appropriate informed consent form, and Institutional Review Board approval. Participants were asked to return the signed informed consent form before a live interview and observation took place. The signed informed consent form was obtained and a copy returned to the participants before the data were published.

Participants were also provided with a copy of the findings to inform on the manner in which the data were used. This gave participants an opportunity to recall their data, respecting the rights of human subjects in research.

Within every study there are numerous sites that could be visited, events or activities that could be observed, people who could be interviewed, documents that could be read (Merriam & Tisdell, 2016). Therefore, the researcher needed to choose what, where, when, and who to observe or interview. Fortunately, there were no barriers to locating a suitable site to conduct this study. With more than 4,000 construction companies in the Midwestern state of Illinois where this study took place, gaining access was a relatively simple procedure of telephoning Associated General Contractors of America for a listing of construction companies in the area. The construction companies the researcher contacted were very interested because the nature of the study was to determine the role of Web 2.0 technology in the self-directed learning and job-performance outcomes of construction managers. In addition, this study resulted in benefits for the researcher as well as professionals in the field of HRD. As an educator and HRD practitioner, the researcher was interested in the overall results of the study to develop further the curricula for the HRD program for which she teaches and to teach organizations how they can improve individual and organizational performance. In general, the findings contributed significantly to professionals in the field of HRD as they work toward developing individuals within an organization and the organization as a whole.

The site for this study was a licensed, Chicago-based general contractor founded in 1939. The company is family owned and operated. The company maintains four office

locations and completes projects throughout the country. It supports the development needs of clients by providing design-build, general contracting, and construction management.

Participants in this study were construction managers who coordinate and oversee construction projects of the types listed in the preceding paragraph. Their duties included, but are not limited to, the planning and budgeting process, the selection of materials, the securing of all permits and licenses, and the hiring of workers and subcontractors. In addition to overall supervision of the project, their other responsibilities included coordination with architects, engineers, and other professionals; maintaining budgets and timelines; and ensuring safety practices on the job site. Construction managers may work in a field office or on job sites, which may be residential or commercial. On-the-job experience is one major requirement for this position, the other being a bachelor's degree from a four-year college or university. The nature of work and corresponding expectations for individual as well as organizational performance in the workplace are very different for construction managers as compared to laborers in manufacturing and service industry jobs, for example, because construction managers get paid for applying what they learned in school, rather than for their physical strength or manual skill (Moore, 2015).

A purposeful sampling procedure was used in the selection of participants for this qualitative case study. As discussed in the previous paragraphs, this study was site-specific, and the bounded system under study consisted of a small number (three) of construction managers. According to Gay et al. (2011), "Qualitative sampling is the process of selecting a small number of individuals for a study in such a way that the

individuals chosen were able to help the researcher understand the phenomenon under investigation" (p. 429). The participants selected for the study were employees of the company at the time of their participation. Criteria for selecting the interview sample included employees who are construction managers, have earned a college degree, have been with the company at least five years, and were between the ages of 25 and 40. In addition, all participants selected have basic skills using Web 2.0 technology, including, but not limited to, Web-based communities and hosted services such as social-networking sites (i.e., LinkedIn and Facebook); video sharing sites (i.e., YouTube); wikis; blogs; performance support tools; performance support systems; and search engines such as Bing, Yahoo, and Google; the hardware that supports this technology, including, but not limited to desktop, laptop, or handheld computers, web cams, smart phones, and tablets; and the use of applications (apps), which are accessed from mobile devices.

The intent in this study was to describe a particular context in depth rather than to generalize findings to another setting or population, thus providing the rationale for purposeful sampling (Patton, 2002). "The logic of purposeful sampling lies in selecting information-rich cases, with the objective of yielding insight and understanding of the phenomenon under investigation" (Bloomberg & Volpe, 2008, p. 69). In case study research, the most common form of sample is purposeful sampling "based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned" (Merriam & Tisdell, 2016, p. 117). There are several strategies for purposeful sampling summarized by Merriam and Tisdell and others that are relevant to this study. The sampling strategy that was used in this study was criterion sampling, which required that all participants meet

one or more criteria as predetermined by the researcher. The preliminary set of criteria that were used for this study include:

1. Participants are classified as construction managers,
2. Participants have earned a (four-year) college degree,
3. Participants have been with the company at least five years,
4. Participants are between the ages of 25 and 40,
5. Participants have basic skills using Web 2.0 technology including, but not limited to Web-based communities and hosted services such as social-networking sites (i.e., LinkedIn and Facebook); video sharing sites (i.e., YouTube); wikis; blogs; performance support tools; performance support systems; search engines such as Bing, Yahoo, and Google; the hardware that supports this technology, including, but not limited to desktop, laptop, or handheld computers; web cams, smart phones, and tablets; and the use of applications (apps), which are accessed from mobile devices, and
6. Participants are engaged in self-directed activities directly related to job performance outcomes.

One delimiting factor that narrowed the scope of the study was that it was restricted to a particular group in a single organization, examining only construction managers in one Chicago-based construction company. However, in case study research, it is more valuable to obtain opinions from a small number of participants. Creswell (2003) recommends that three to five participants be used for case study research, along with other types of data. This was considered to be a minimal sample to provide reasonable coverage of the phenomenon given the purpose of the study.

The researcher arranged a meeting with the company owner's representative to review the purpose of the study as described in the call for participation, included in Appendix A. The owner's representative was asked to recommend construction managers for participation based on the criteria that were defined in the preceding paragraphs and are included in the call for participation. The researcher then made initial telephone contact with each recommended participant, and invited each recommended participant to participate in the study. The researcher then reviewed the informed consent letter included in Appendix B with those who agreed to participate and delivered a copy of the informed consent letter to each participant in hardcopy, asking for their signatures.

There were three categories of information that were considered necessary in order to answer the four research questions posed in this qualitative, single instrumental case study: contextual, perceptual, and theoretical.

First, the contextual information provided insight into the way construction managers construct the reality in which their self-directed learning activities transpire. Cultural, environmental, and personal factors conflate to influence behavior that is tied to context (Boileau, 2011). Environmental factors (data, resources, and incentives) and personal factors (motives, capacity, and knowledge) were addressed by Gilbert's (1996) BEM. Contextual information was collected for this study primarily through in-depth interviews with participants and observation of visual documents.

Second, construction managers' perceptions were explored in this research study via interviews conducted individually with participants. The perceptions of construction managers helped to explain self-directed learner experiences with Web 2.0 technology leading to surfacing patterns to address the research questions posed by the study.

Performance of construction managers involves relationships among their perceptions of the job and setting, tools in the environment, and SDL activities leading to some new insight affecting on-the-job performance (Boileau, 2011). The tools for knowledge development and SDL activities engaged in by construction managers tend to be situated more closely to the environment in which the work is performed. In this context, the focus is on immediate transfer to affect improvements or enhancements to performance. Perceptions of self-concept, experience, readiness to learn, and orientation to learning were addressed by Knowles's (1980) theory of andragogy. Knowles's theory of andragogy and Gilbert's (1996) BEM brought focus to the interplay among the SDL activities mediated by Web 2.0 technology, the work environment, and the perceptions of the construction project managers that affect performance (Boileau, 2011).

Finally, this qualitative research study was informed by an ongoing review of the literature providing theoretical framework for the study. The theoretical framework was introduced and reviewed in Chapter 2. The theoretical framework included Knowles's (1980) theory of andragogy and Gilbert's (1996) BEM. This framework was consistently applied, providing support for data interpretation, analysis, and synthesis of the research questions posed by this study.

Instrumentation and Data Collection

This section describes the means by which data related to the phenomena under study were collected. It includes a description of each instrument or measure, its norming data, validity and reliability statistics, results of field tests conducted to determine validity, reliability, or appropriateness of the instrument. This section also describes the procedures (detailed description of steps that were taken to implement methods) for the

following methods: sampling, protection of participants, data collection (including data organization and management), data analysis, and presentation of findings.

According to Merriam and Tisdell (2016), "The researcher is the primary instrument for data collection and analysis" (p. 16). Since understanding is the goal of this research, the human instrument, which is able to be immediately responsive and adaptive, would seem to be the ideal means of collecting and analyzing data. Other advantages are that the researcher can expand his or her understanding through nonverbal as well as verbal communication, process information (data) immediately, clarify and summarize material, check with respondents for accuracy of interpretation, and explore unusual or unanticipated responses.

Creswell (2013) states:

> Case study research is a qualitative approach in which the investigator explores a bounded system (a case) over time, through detailed, in-depth data collection involving multiple sources of information (e.g., observations, interviews, audio-visual material, and documents and reports) and reports a case description and case-based themes. (p. 97)

These multiple sources of evidence ensure that the study is as robust as possible (Yin, 2014). In case study research, it was important to converge sources of data, also known as triangulation, as a means to ensure comprehensive results that reflect the participants' understandings as accurately as possible (Merriam & Tisdell, 2016; Yin, 2014).

Multiple methods of data collection were used in this single-instrumental qualitative case study to provide triangulation of data sources for strengthening internal validity, or credibility. With regard to the use of multiple methods of data collection,

what someone tells you in an interview, for example, can be checked against what you observe on site or what you read about in documents relevant to the phenomenon of interest (Merriam & Tisdell, 2016). Qualitative data consist of direct quotations from people about their experiences, opinions, feelings, and knowledge obtained through interviews; detailed descriptions of people's activities, behaviors, and actions recorded in observations; and excerpts, quotations, or entire passages extracted from various types of documents (Patton, 2015). The qualitative data collection methods that were used in the study are interview, observation, and documents, with the researcher as the primary instrument for data collection and analysis. These methods were fully aligned with the research questions and information needed as detailed in Table 1, Chapter 1.

Interview. In most types of qualitative research, some and occasionally all of the data are collected via interviews (Merriam & Tisdell, 2016). The most familiar form of interview is the person-to-person encounter, in which one person prompts information from another. The main purpose of an interview, according to Merriam and Tisdell, is "to obtain a special kind of information" (p. 108). The researcher wants to find out what is "in and on someone else's mind" (Patton, 2015, p. 426). As Patton explains:

> We interview people to find out from them those things we cannot directly observe.…We cannot observe feelings, thoughts, and intentions. We cannot observe behaviors that took place at some previous point in time. We cannot observe situations that preclude the presence of an observer. We cannot observe how people have organized the world and the meanings they attach to what goes on in the world. We have to ask people questions about those things. The purpose

> of interviewing, then, is to allow us to enter into the other person's perspective. (p. 426)

For the most part, interviewing in qualitative investigations is more open-ended and less structured (Merriam & Tisdell, 2016). Less-structured formats assume that individual respondents define the world in unique ways, and questions thus need to be more open-ended. In the semistructured interview, according to Merriam and Tisdell, "either all of the questions are more flexibly worded or the interview is a mix of more and less structured questions" (p. 110). Usually, specific information is desired from all the respondents, in which case there is a more structured section to the interview, but most of the interview is guided by a list of questions or issues to be explored, and neither the exact wording nor the order of the questions is determined ahead of time. This format allows the researcher to respond to the situation at hand, to the emerging worldview of the respondent, and to new ideas on the topic.

Person-to-person semistructured interviews, as described by Merriam and Tisdell (2016), were conducted with three purposefully selected participants within the bounded system comprising the single-instrumental qualitative case study research. The interview guide included a "mix of more and less structured questions" (p. 110) linked to the research questions for this study. Questions were used flexibly, allowing the participants to propose their own insights into specific occurrences and experiences. The person-to-person semistructured interview type was selected because it encouraged the participants to serve as informants as opposed to respondents in a more conversational manner.

Information gained from the interview process provided insight into all four of the research questions listed in Table 1. According to Merriam and Tisdell (2016), "The key

to getting good data from interviewing is to ask good questions" (p. 117). An interviewer can ask several types of questions to stimulate responses from an interview. Patton (2015) suggests six types of questions, which were included in the interview guide:

1. Experience and behavior questions. This type of question gets at the things a person does or did, his or her behaviors, actions, and activities.
2. Opinion and values questions. Here the researcher is interested in a person's beliefs or opinions, what he or she thinks about something.
3. Feeling questions. These questions "tap the affective dimension of human life. In asking feeling questions, the interviewer is looking for adjective responses: anxious, happy, afraid, intimidated, confident, and so on" (p. 444).
4. Knowledge questions. These questions elicit a participant's actual factual knowledge about a situation.
5. Sensory questions. These are similar to experience and behavior questions but try to elicit more specific data about what is or was seen, heard, touched, and so forth.
6. Background/demographic questions. All interviews contained questions that referred to the particular demographics (age, income, education, number of years on the job, and so on) of the person being interviewed as relevant to the research study.

Overall, good interview questions, according to Merriam and Tisdell (2016), "are those that are open-ended and yield descriptive data, even stories about the phenomenon" (p. 120).

***Instrument validation*.** Three colleagues who hold doctor of philosophy degrees and the company owner's representative reviewed and validated the interview protocol questions. Changes were made as necessary. The transcription process began after the first interview. To ensure transcript accuracy, the researcher reviewed each transcript while listening to the digital recording. Additionally, the transcripts were presented to each interview participant for his or her review to ensure further accuracy.

***Instrument procedure*.** The researcher made consistent use of the interview guide when conducting the interviews. The interview guide was not distributed to the participants. Appropriate use of follow-up questions was employed to add clarity and understanding, providing flexibility for the participant to share his or her own insights in relating perceptions and experiences.

As a first step in the interview process, the researcher reminded participants of the purpose of the study, research procedures, expected benefits, their right to withdraw from the study at any time, and protection of confidentiality. The researcher asked participants if they had any questions about the research study or research procedures. The researcher also provided information about herself to establish rapport and gain their trust (Merriam & Tisdell, 2016).

The time allocated for the interviews was 45 to 75 minutes. Data collection during the interviews was accomplished through digital recording and field notes taken by the researcher during the interview. According to Merriam and Tisdell (2016), "The most common way to record interview data by far is to audio record the interview" (p. 131). This practice ensured that everything said was preserved for analysis. Some researchers like to take written notes in addition to recording the session. The researcher recorded her

reactions to things the informants said to signal the informants of the importance of what was being said or to pace the interview. The identity of participants were kept confidential, and pseudonyms (Participant 1, Participant 2, and Participant 3) were provided for all participants. After the interview was completed and transcribed, the researcher followed up with the participants by telephone to clarify any points or ideas that may have come up during the transcript review. Participants were not compensated for their time-participation.

The format of the interview transcript was set up to enable analysis. As suggested by Merriam and Tisdell (2016), identifying information as to when, where, and with whom the interview was conducted was listed at the top of the first page. Line numbering down the left-hand side of the page was added to aid in subsequent analysis and reference to verbatim comments, as recommended by Merriam and Tisdell. The transcription was single spaced with double space between speakers. The interviewer questions appeared in bold font, which further enabled ease of reading. Finally, a wide margin was included on the right-hand side of the pages to accommodate researcher notes or codes as the transcript was analyzed.

Observation. Interviews are a principal source of data in qualitative research; so too are observations (Merriam & Tisdell, 2016). Observations can be differentiated from interviews in two ways. First, observations take place in the setting where the phenomenon of interest naturally occurs rather than a location designated for the purpose of interviewing; second, observational data represent a firsthand encounter with the phenomenon of interest rather than a secondhand account of the world obtained in an interview. The informal interviews of participants and conversations were interwoven

with observation. According to Merriam and Tisdell, "The terms fieldwork and field study usually connote observation and informal interviews and may also include the study of documents and artifacts" (p. 147). For this reason, the researcher decided upon observation and the study of documents to complement the data collection from the informal interviews that were conducted. In the following paragraphs, the use of observation as a research tool, what was observed, and the means for recording observations are discussed.

There are several reasons the researcher chose to gather data through observation. As an outsider, the researcher noticed things that have become routine to the participants, things that may lead to understanding the context (Merriam & Tisdell, 2016). In this research study, it was important to gather data on the organization contextual factors that influence use of Web 2.0 technology in learning activities and organizational contextual factors that influence job performance as a result of using Web 2.0 technology in learning activities. Data obtained from observation of these organizational contextual factors helped to answer Research Questions 3 and 4. Observations also triangulated emerging findings; that is, they were used in conjunction with interviewing and document analysis in interpreting what was observed rather than relying on once-removed accounts from interviews. Using observation as a data-collection method made it possible to record behavior as it was happening. Data obtained from the observation of participants' behavioral factors that influence identification of performance improvement, implementation of Web 2.0 technology in learning activities, use of Web 2.0 technology in learning activities, and job performance as a result of using Web 2.0 technology in learning activities helped to answer the four research questions.

Another reason the researcher conducted observations was to provide some knowledge of the context and to provide specific incidents and behaviors that were used as reference points for subsequent interview questions. Merriam and Tisdell (2016) refer to this type of interview as anchored interviewing as the interview questions are "anchored" (p. 139) to what was observed.

Finally, participants may not feel free to talk about or may not want to discuss all topics (Merriam & Tisdell, 2016). Observation is the best technique to use when an activity, event, or situation can be observed firsthand; when a fresh perspective is desired; or when participants are not able or willing to discuss the topic under study. The researcher used observation in addition to interviews to gain a fresh perspective on data that helped answer the research questions.

The researcher observed the following list of things as suggested by Merriam and Tisdell (2016):

1. The physical setting. What is the physical environment like? What is the context? What kinds of behavior is the setting designed for? How is space allocated? What objects, resources, technologies are in the setting?
2. The participants. Describe who is in the scene, how many people, and their roles. What brings these people together? Who is allowed here? Who is not here who you would expect to be here? What are the relevant characteristics of the participants? What are the ways in which the people in this setting organize themselves?
3. Activities and interactions. What is going on? Is there a definable sequence of activities? How do the people interact with the activity and with one another?

How are people and activities connected? What norms or rules structure the activities and interactions? When did the activity begin? How long does it last? Is it a typical activity, or unusual?

4. Conversation. What is the content of conversations in this setting? Who speaks to whom? Who listens?
5. Subtle factors. Less obvious to the observation were
    - Informal and unplanned activities
    - Symbolic and connotative meanings of words
    - Nonverbal communication such as dress and physical space
    - Unobtrusive measures such as physical clues
    - "What does not happen" (Patton, 2015, p. 379)…especially if "certain things ought to happen or are expected to happen" (p. 379).
6. The researcher's own behavior. The researcher is as much a part of the scene as participants. How is the researcher's role affecting the scene being observed? What does the researcher say and do? What thoughts are the researcher having about what is going on? (p. 141)

***Observation procedure*.** The researcher collected data through observations in three stages: entry, data collection, and exit (Merriam & Tisdell, 2016). Gaining entry into the site began with gaining the confidence and permission of the owner's representative and the participants. Data collection through observation occurred simultaneously with the participant interviews. The researcher asked participants if they had any questions about the research study or research procedures. The researcher also provided information about herself to establish rapport and gain their trust. After the

observation was completed and recorded, the researcher followed up with the participants by telephone to clarify any points or ideas that came up during the transcript review.

***Recording observations*.** The researcher recorded detailed notes during an observation, and full notes in a narrative format were typed within 24 hours. Conversations were quoted directly, paraphrased, and summarized. Silences and nonverbal behavior that added meaning to the exchange were noted (Merriam & Tisdell, 2016). The format of the field notes included the time, place, and purpose of the observation. The researcher listed and described the participants present as well as others present in the setting in meaningful ways to the research. A description of the setting's physical aspects is included, indicating where participants and the researcher were situated. A wide margin on the right side of the page was included in the field notes for purposes of adding later notes; segments of activity have double spaces between them for ease of reading and data analysis; and quotation marks were used when someone was directly quoted. Consecutive line numbering down the left side of the page was included to enable the researcher to locate easily significant passages when analyzing the observational data.

The field notes are highly descriptive. They describe the participants, the setting, the activities, behaviors of the participants, and what the observer did (Merriam & Tisdell, 2016). There is also a reflective component to the field notes. The reflective component was captured in the observer's commentary, indicated by being set apart from the description in the right margins. Reflective comments included such things as the researcher's feelings, reactions, hunches, initial interpretations, and speculations.

Documents. Interviewing and observing are two data collection strategies designed to gather data that specifically address the research questions (Merriam & Tisdell, 2016). Documents that are part of the research setting are also sources of data in qualitative research. The researcher chose documents as a third data collection method because these are most typically a natural part of the research setting and do not intrude upon or alter the setting in the ways that the presence of the investigator might when conducting interviews or observations. These types of data sources can exist in both a physical setting and an online setting.

Most documents exist prior to commencing the research study at hand and include records, organizational promotional materials, letters, newspaper accounts, poems, songs, corporate records, government documents, historical accounts, diaries, autobiographies, and blogs or Web sites, or both (Merriam & Tisdell, 2016). Photographs, film, various forms of video including YouTube, and vlogs (video with blogs) also can be used as data sources (Lee, 2000; Snelson, 2015; Webb, Campbell, Schwartz, & Sechrest, 2000).

Visual documents are the types of documents that were reviewed in this study. According to Merriam and Tisdell (2016), “One can use visual materials that are already available online or in the physical setting that one is studying” (p. 169). Among the visual materials available online or in the physical setting that were reviewed included, but are not limited to, Web-based communities and hosted services such as social-networking sites (i.e., LinkedIn and Facebook); video sharing sites (i.e., YouTube); wikis; blogs; performance support tools; performance support systems; search engines such as Bing, Yahoo, and Google; the hardware that supports this technology, including, but not limited to desktop, laptop, or handheld computers, web cams, smart phones, and tablets; and the

use of applications (apps), which are accessed from mobile devices. It is anticipated that review of these documents helped to answer the research questions, especially concerning the determination of job-performance outcomes.

Using documentary material as data is not much different from using interviews or observations (Merriam & Tisdell, 2016). Finding relevant materials, according to Merriam and Tisdell, is the first step in the process. Once documents were located, their authenticity was assessed. The author, the place, and date of writing-authoring were verified. In addition, the conditions under which the document was produced was ascertained. Determining the authenticity and accuracy of written documents, or visual documents, was accomplished using the following list of questions suggested by Merriam and Tisdell:

1. What is the history of the document?
2. Is the document complete, as originally constructed?
3. Under what circumstances and for what purposes was it produced?
4. Who was-is the author?
5. What was the author trying to accomplish?
6. For whom was the document intended?
7. What were the author's sources of information/technological resources?

Data Analysis Procedure

This section describes the techniques used for examination and evaluation of data. The researcher's role and responsibility in the study was to communicate the findings of the project in ways that meet the standards of the scientific research community. In general, the preferred approach to data analysis in a qualitative research study is to begin

rudimentary analysis simultaneously with data collection (Merriam & Tisdell, 2016). The researcher began analyzing data following the first interview to begin identifying patterns and to facilitate subsequent data collection because qualitative research studies involve a continuous interplay between data collection and analysis.

In this qualitative research study, multiple data sources were used, including interviews, observations, and review of documents. Given the multitude of data, even with the comparatively small sample size, data management and organization beginning at the onset of data collection was key to analysis. Data management was facilitated by the appropriate use of database, spreadsheet, and word processing software. Organization of data was managed using a coding system. The process began with reading the first interview transcript, the first set of field notes, and the first document collected in the study (Merriam & Tisdell, 2016). As the researcher read through the transcripts, she jotted down notes, comments, observations, and queries in the margins. These notations were relevant for answering the research questions and are also called coding or tagging. These initial codes or tags were applied and iteratively refined with each subsequent interview transcript and set of field notes and developed a set of categorical themes to address the research questions.

Because the type of qualitative research is a case study, conveying an understanding of the case is the paramount consideration in analyzing the data (Merriam & Tisdell, 2016). Data were derived from interviews, observations, and documents. In addition to a tremendous amount of data, this range of data sources presented disparate, incompatible, even apparently contradictory information. Therefore, to begin the more intensive phase of data analysis required for this case study, all the information about the

case was brought together—interview logs or transcripts, field notes, reports, records, the investigator's own documents, and reflective memos. All this material was organized so that data were easily retrievable. Yin (2014) calls this organized material the case study database—a "systematic archive of all the data…from a case study" (p. 238).

This research study followed Creswell's (2013) five-step process of data analysis. According to Creswell, "The processes of data collection, data analysis, and report writing are not distinct steps in the process—they are interrelated and often go on simultaneously in a research project" (p. 182). Although these steps are described in linear order, to analyze qualitative data, the researcher engaged in the process of moving in analytic circles rather than using a fixed linear approach.

Step 1: Organizing the data. During this step, the researcher reviewed digital recordings from interviews and transferred them into Word document transcripts. Field notes from observations and review of documents were also transferred into Word document transcripts during this step of the process.

Step 2: Reading and memoing. In this step, the researcher reflected on the overall meaning to gain a general sense of the information and ideas that the participants conveyed. This step also aligns with Merriam and Tisdell's (2016) directive "there is also an important reflective component of field notes" (p. 151). The reflective component was captured in the observer's commentary, indicated by being set apart from the description either in the right or left margins or in brackets in the commentary. Reflective comments included such things as the researcher's feelings, reactions, hunches, initial interpretations, and speculations.

Step 3: Describing, classifying, and interpreting data into codes and themes. The researcher followed Merriam and Tisdell's (2016) procedure of applying codes or tags and iteratively refining with each subsequent interview transcript and set of field notes to develop a set of categorical themes to address the research questions. The researcher then analyzed the themes that emerged and gave a general description for this bounded case.

Step 4: Interpreting the data. Creswell (2013) recognizes that interpretation of the data based on hunches, insights, and intuition plays just as important a part of the meaning-making process as the formation of themes from codes. During this step, the researcher abstracted out beyond the codes and themes to gain a larger meaning for the data. During the researcher's interpretation process, her own experience as a HRD professional informed her understanding of the participants' stories.

Step 5: Representing the data. For this step, the researcher depicted the emergent themes into narrative passages, tables, and figures to create a visual image of the information.

***Data storage*.** With extensive use of computers in qualitative research, more attention was given to how qualitative data (field notes, transcripts, or rough jottings) are organized and stored (Creswell, 2013). Storing of data for this qualitative research study followed the following five principles as set forth by Creswell, with sole access granted to the researcher:

1. The researcher developed backup copies of computer files.
2. The researcher used a high-quality digital recording device during interviews.
3. The researcher developed a master list of types of information gathered.

4. The researcher protected the anonymity of participants by masking their names in the data.
5. The researcher developed a data collection matrix as a visual means of locating and identifying information for a study.

***Protection of participants*.** Throughout this single-instrumental qualitative case study research, utmost consideration was given to protection of the participants. As Stake (2005) observes, "Qualitative researchers are guests in the private spaces of the world. Their manners should be good and of ethics strict" (p. 459). Interviewing brings with it both threats and benefits to the informants (Merriam & Tisdell, 2016). As the primary instrument for data collection and analysis, the researcher took personal and professional responsibility for both informing and protecting participant-respondents. The research processes used necessitated voluntary cooperation from the participants and followed the basic supposition that participants were informed about the study's purpose, threats and benefits, data storage to protect confidentiality, and how the results of the study would be used. This case study did not pose any serious ethical threats or harm to participants' well-being.

First, the researcher gained informed consent using the call for participation (Appendix A) and informed consent letter (Appendix B). Second, participants who agreed to participate in this research study were assured anonymity by keeping names and other identifying characteristics of participants and the organization confidential. Finally, security measures were employed for storage of research-related records and data, with sole access granted to the researcher.

Goodness and trustworthiness. According to Denzin and Lincoln (2011), "Terms like credibility, transferability, dependability, and confirmability replace the usual positivist criteria of internal and external validity, reliability, and objectivity" (p. 13). To be credible, qualitative researchers must be good and trustworthy because qualitative research entails the researcher taking an active role in the collection and interpretation of participants' meaning making (Merriam & Tisdell, 2016). In case study research, it is important to converge sources of data, also known as triangulation, as a means to ensure comprehensive results that reflect the participants' understandings as accurately as possible (Merriam & Tisdell, 2016; Yin, 2014).

To enhance the trustworthiness of this study's findings, the researcher used strategies recommended by prominent qualitative researchers. To decrease threats to credibility (Denzin & Lincoln, 2011), the researcher triangulated data (i.e., the researcher used multiple sources of data to confirm emerging findings; Merriam & Tisdell, 2016; Yin, 2014); performed member checks (Merriam & Tisdell, 2016) by sending participants a copy of their interview transcript and asking them to verify the accuracy of the content; and requested peer (or colleague) review of the findings as they emerged. To increase dependability and to enable other researchers to make decision about transferability (Denzin & Lincoln, 2011), the researcher used rich, thick description (Merriam & Tisdell, 2016).

Presentation of findings. According to Merriam and Tisdell (2016), "The most common way findings are presented in a qualitative report is to organize them according to the categories, themes, or theory derived from the data analysis" (p. 278). The researcher began Chapter 4 (Results and Discussion) with a brief overview of the

findings, followed by presentation of each separate finding supported by quotes from interviews or field notes or references to documentary evidence. The researcher included enough data to be convincing, but not so much that the reader becomes buried. The researcher also discussed the findings and told the reader what conclusions (Chapter 5: Conclusions and Recommendations) are drawn from the findings overall and made recommendations for areas of additional research.

Summary

This section provided an encapsulation of the research, analysis, and reporting methodology that was utilized in the study. The single instrumental case study design was determined most relevant to this research study since the intent was to explore a purposefully selected sample of construction managers' perceptions and behaviors related to Web 2.0 technology as a mediator for self-directed learning and job-performance outcomes in a specific organizational setting. The self-directed learning experiences of participants with Web 2.0 technology constitute the case, which is bounded within a single organization. The sample and setting for the research study have been defined, as have the data collection methods and methods that were used for data analysis and synthesis. Protection of participants and issues of goodness and trustworthiness have been addressed using strategies recommended by prominent qualitative researchers.

Chapter 4: Results and Discussion provides an in-depth analysis and presentations of findings from the research data that were collected in this study. Rich, thick descriptions of the findings are provided for the reader, with sufficient facts supporting the findings of the study, thus enabling transferability (Denzin & Lincoln, 2011).

Chapter 4: Results and Discussion

The purpose of this study was to explore a sample of construction managers' behaviors, or SDL activities and job-performance outcomes, mediated by the use of Web 2.0 technology in a single organizational setting. The principal theoretical framework used in the design of this research study was the theory of andragogy and its resulting set of four assumptions about the adult self-directed learner presented by Knowles (1980). The second theoretical construct central to this study was the BEM. Gilbert's (1996) BEM provided a framework for taking the role of environmental and individual factors tied to information, instrumentation, and motivation.

The single-instrumental case study design was determined most relevant to this research study. The SDL experiences of participants with Web 2.0 technology constituted the case, which is bounded within a single organization. A purposeful sampling procedure was used in the selection of participants for this qualitative case study. As discussed in Chapter 3, this study was site specific, and the bounded system under study consisted of three construction managers. The qualitative data collection methods that were used in the study were interview, observation, and visual documents, with the researcher as the primary instrument for data collection and analysis. These methods were fully aligned with the research questions and information needed as detailed in Table 1, Chapter 1.

This chapter provides the completed analyses of the semistructured interview, observation, and visual document data that were collected as part of this single-instrumental qualitative case study. The remainder of this chapter is organized into three sections: Study Results, Discussion, and Summary of Analyses.

Study Results

This section discusses the findings relative to the four research questions and seven interview questions that have indirectly addressed the central question—What is the role of Web 2.0 technology in the SDL activities and job performance of construction managers in one Chicago-based construction company?—to be investigated in the study.

The purpose of these analyses is to provide an understanding of social processes and behaviors, and focus on both the context and specifics of job-performance outcomes by answering the research questions:

Question 1: What SDL and job-performance needs are supported by the use of Web 2.0 technology?

Question 2: What factors are used to identify Web 2.0 technology for use at the individual level to enable SDL tied to specific job-performance outcomes?

Question 3: What environmental factors affect a construction manager's ability to use Web 2.0 technology to engage in SDL?

Question 4: How is the success of job-performance outcomes resulting from Web 2.0 enhanced SDL opportunities determined?

The participants. Three employees within the same Chicago-based construction company participated in this research study from one office location. All participants in this study were construction managers who coordinate and oversee construction projects. Their duties included, but were not limited to, the planning and budgeting process, the selection of materials, the securing of all permits and licenses, and the hiring of workers and subcontractors. In addition to overall supervision of the project, their other

responsibilities included coordination with architects, engineers, and other professionals; maintaining budgets and timelines; and ensuring safety practices on the job site.

All participants were between the ages of 25 and 35, and had been with the company at least five years. One participant reported having been with the company nine years. All participants were male. Participant sample demographic information is summarized in Table 3. In-depth person-to-person, semistructured interviews were conducted by the researcher, using the Semistructured Interview Guide (Appendix C).

Table 3

Summary of Participant Demographic Information

Method of Data Collection	Number of Participants	Age Range				Number of Years with Company			Gender	
Person-to-person semistructured interview	3	25-30	31-35	36-40	41-45	0-2	3-5	6+	Male	Female
		2	1	0	0	0	2	1	3	0

The physical setting. The company is a third-generation, family-owned general contractor whose focus in on multiunit residential, senior living, hospitality, retail, commercial, and health care. The Chicago office is one of four office locations in the U.S. The Chicago office of this construction company, where data collection took place, is located on Chicago's far north side. The approximately 5,000 square feet office space includes a 20-person conference room, reception and administrative support area, plan room, employee lunch area equipped with five four-person lunch tables and full kitchen, six semiprivate offices, and four private offices. The four private offices are occupied by the company's four chief executive officers. The six semiprivate offices are occupied by accountants, estimators, and construction managers.

The three construction managers interviewed shared one of these semiprivate offices. These construction managers share the same roles and responsibilities. They coordinate and oversee construction projects, create and maintain budgets, select and secure materials, obtain permits and licenses, and hire subcontractors. They coordinate with architects, engineers, and other professionals; create and maintain project timelines; and ensure safety practices on the job site.

The approximately 800 square feet of office space of the three construction managers who participated in this study were divided into three cubicles and a plan table area. Each of the three cubicles contained a desk and chair, eight-drawer filing cabinet, desktop computer with external speakers, two monitors, keyboard, mouse, color ink-jet printer, and landline telephone. During each interview, two of the construction managers stepped out of the office to allow for privacy. Each of the three construction managers interviewed also had available to them an iPad and iPhone. The iPad was company issued while the iPhone was the personal property of each construction manager. The company reimbursed the construction managers each month for the entire amount of their cellular phone plan.

Interview process description. In-depth semistructured interviews for this instrumental qualitative case study research were conducted on Monday, March 21, 2016. Interviews were arranged via telephone and were scheduled in advance using Google Calendar, which is the standard calendar application used by the participants' company. An appointment time of 75 minutes was reserved for each participant for purposes of conducting the interviews in accordance with the call for participation. At the beginning of each interview, the call for participation and informed consent letter were reviewed

with the participant to reiterate confidentiality and the intended use of the information shared. All three in-depth semistructured interviews were conducted within the company's business hours, between 7:00 a.m. and 5:00 p.m. The company established a cost code for this research study and allowed participants to charge their time to the cost code for purposes of reconciling time spent away from their regularly scheduled activities. The actual time spent in each interview ranged between 49 and 71 minutes.

All interviews were conducted in the company's office in each of the participants' semiprivate offices rather than on a job site. This interview location was selected by the participants to ensure confidentiality of the information being shared, as well as provide privacy for the participants and a comfortable environment for sharing perspectives on the interview questions that were asked.

For each interview, the researcher was equipped with a hard copy of the semistructured interview guide; an informed consent letter, which was presented to and signed by each participant; an Android phone with a voice recorder application for digitally recording the interview; a Dictaphone cassette recorder used as a backup recording device; and a lined pad of paper and pen for writing field notes. The voice recorder application and Dictaphone cassette recorder ensured that everything said by each participant was preserved for analysis. The written notes taken in addition to the digital recording allowed the researcher to record reactions to participants' responses, to signal the informant of the importance of what was being said, and to pace the interview. The hard copy of the semistructured interview guide was not given to the participants. Prior to proceeding with each interview, the researcher received permission from each participant to record digitally the interview. None of the participants objected to the use

of the recording devices. The researcher explained to each participant that the lined pad of paper would be used to record written notes during the interview for purposes of further analysis and review.

The research database. The research database, consisting of a set of spreadsheets created in Microsoft Word, allowed the researcher to keep track of categorical themes. The research database was created at the onset of the data collection process. The database was used to capture, organize, and enable initial category determination for the interview data analysis. Copies of all interview transcripts in Microsoft Word format were retained, along with verbatim comments, and stored in the research database. Field notes from each interview were catalogued by the date of the interview and the pseudonyms provided for the participants. A research journal was maintained throughout the data collection and early analysis that included a personal diary for unplanned observation and early discernments. The researcher developed backup copies of computer files.

Data encoding. Each interview was transcribed within 48 hours after being conducted. The researcher replayed each digital recording and read the field notes as the initial step in the analysis process. Audio recordings for each of the three participants were transcribed using Microsoft Word, replacing each participant's name with the identifiers of Participant 1, Participant 2, and Participant 3. The format for the interview transcripts included the code name of the participant, and the place and date the interview was conducted at the top of the first page of the transcript. The transcripts included line numbering down the left-hand margin of the page to provide reference for verbatim comments used in conclusions and recommendations (Chapter 5). Participant comments

within each transcript were organized by question number as the first level of categorization. An example excerpt of an interview transcript with line numbering down the left-hand margin of the page to provide reference for verbatim comments is represented in Table 4.

Table 4

Example Excerpt of an Interview Transcript

	Monday, March 21, 2016 Participant 1 Chicago, Illinois
1	**Q1. Think about the kinds of Web 2.0 technology that you use, such as such**
2	**networking sites (i.e. LinkedIn and Facebook), video sharing sites (i.e.**
3	**blogs, performance support tools, performance support systems, and search**
4	**as Bing®, Yahoo®, and Google®, and the hardware that supports this**
5	**including, but not limited to desktop, laptop, or handheld computers, web**
6	**smartphones and tablets and the use of applications (apps), which are being**
7	**mobile devices. What factors would you consider in determining which Web**
8	**of technologies is/are appropriate for achieving the best performance**
9	It depends on what my task is as far as which of these technologies I use. Myself
10	you'll talk today have different roles on a daily, weekly, monthly basis. The hour
11	technologies that I would use if information that I need to understand isn't
12	owner, subcontractor, or architect have given me already, my first go to would be
13	myself if it is a terminology I don't understand or a new technology, I would
14	Through google I would try to find some reputable sites or resources there. I
15	Google is my go to search engine. I also, not technology wise, but other
16	superiors, so I have them that I ask questions if I don't understand something.
17	really don't use it as a resource at all for anything work related aside from
18	there, but beyond that I don't use it. Maybe there are useful things that I'm
19	use LinkedIn for my work related stuff. Facebook I don't use either. I don't use
20	work related although I do have a Facebook account. I don't use YouTube for
21	However, I don't think this is applicable to your question, I do a lot of home
22	own house, and I use YouTube as far as how to do it yourself kind of stuff. That
23	personal level. I suppose through google I find various blogs. I take that back.

The researcher then used the Review Toolbar to add a margin on the right column of the transcript. By adding a new comment within this margin, the researcher notated self-definable and self-delimiting expressions in the words of the participants. Based on

these expressions, categories were assigned. These categorical themes represented the essence of the participants' self-definable and self-delimiting expressions. An example excerpt with notated categorical themes is represented in Table 5.

Table 5

Example Excerpt with Notated Categorical Themes

	Monday, March 21, 2016 Participant 1 Chicago, Illinois	
1	**Q1. Think about the kinds of Web 2.0 technology that you use, such as such as**	
2	**networking sites (i.e. LinkedIn and Facebook), video sharing sites (i.e. YouTube),**	
3	**blogs, performance support tools, performance support systems, and search**	
4	**as Bing®, Yahoo®, and Google®, and the hardware that supports this technology,**	
5	**including, but not limited to desktop, laptop, or handheld computers, web cams ,**	
6	**smartphones and tablets and the use of applications (apps), which are being**	
7	**mobile devices. What factors would you consider in determining which Web 2.0**	
8	**of technologies is/are appropriate for achieving the best performance outcome?**	
9	It depends on what my task is as far as which of these technologies I use. Myself	Tasks and roles determine technology need
10	you'll talk today have different roles on a daily, weekly, monthly basis. The hour by	Web search: Google
11	technologies that I would use if information that I need to understand isn't provided to	Reputation of sites or resources
12	owner, subcontractor, or architect have given me already, my first go to would be to	Peers or superiors
13	myself if it is a terminology I don't understand or a new technology, I would research it	YouTube for home improvement tutorials
14	Through google I would try to find some reputable sites or resources there. I don't use	Laptop for travel
15	Google is my go to search engine. I also, not technology wise, but other resources are	Personal phones are used for work
16	superiors, so I have them that I ask questions if I don't understand something. I'm on	Text for internal communication
17	really don't use it as a resource at all for anything work related aside from keeping my	Phones for taking photos and videos for documentation purposes
18	there, but beyond that I don't use it. Maybe there are useful things that I'm missing out	iPads on jobsites for safety audits with safety audit app
19	use LinkedIn for my work related stuff. Facebook I don't use either. I don't use	Pdf provided on how to use safety audit app
20	work related although I do have a Facebook account. I don't use YouTube for anything	Manufacturer's websites contain reputable pdfs and videos
21	However, I don't think this is applicable to your question, I do a lot of home	Downloadable pdfs from manufacturer's websites
22	own house, and I use YouTube as far as how to do it yourself kind of stuff. That is a	
23	personal level. I suppose through google I find various blogs. I take that back. Work	

As each subsequent interview data set was added to the research database, the researcher compared new, emerging categorical themes to the existing categorical themes for each question. These comparisons were made throughout the data-collection process in order to identify specific emergent patterns in the data.

Interview data analysis. Seven questions were consistently asked during each interview in the same sequential order, which provided the initial structure for organization and categorization of the data. The seven interview questions were developed from the four research questions posed in this study. The analysis of the interview data was predominantly inductive and comparative. A process was developed as an iterative framework for inductive analysis and to provide organization and synthesis of the significant amount of data collected. This framework allowed for initial coding of categories from each interview. Each stage of the framework supported the development and refinement of patterns based on the categorical themes that emerged. This analytical process is graphically illustrated in Figure 4.

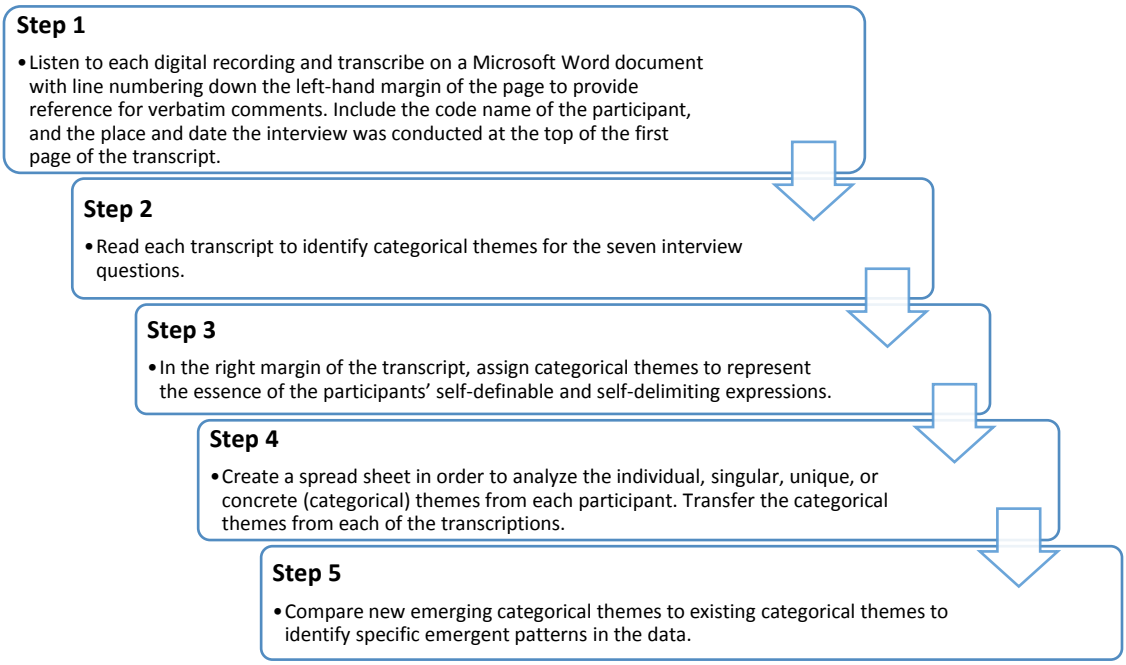

Figure 4. Analytical process.

As each interview data set was entered into the research database, a unique identifier assigned to the interviewee and the interview question number provided initial coding. Inductive analysis was applied to each question response to derive a set of

categorical themes related to the question, which were then recorded in the database. New emerging categorical themes were compared to the existing categorical themes as each interview data set was added to the research database. These comparisons were continued throughout the data collection period in order to identify specific emergent patterns in the data.

Research question 1. What SDL and job performance needs are supported by the use of Web 2.0 technology?, asks what factors are considered by construction managers in determining which Web 2.0 technology is or technologies are appropriate for achieving the best performance outcomes. The categorical themes emerging from this interview question 1 (Figure 5) as principal factors used for the selection of Web 2.0 technology and cited by the three participants were reputation of sites or resources, Google Web search results, need for convenience, ease of accessibility, available technology, speed and efficiency, compliance with IT, IT support, and project needs and complexity (Table 6).

1. Think about the kinds of Web 2.0 technology that you use, such as such as social-networking sites (i.e., LinkedIn and Facebook); video sharing sites (i.e., YouTube); wikis; blogs; performance support tools; performance support systems; search engines such as Bing, Yahoo, and Google; the hardware that supports this technology, including, but not limited to desktop, laptop, or handheld computers, web cams, smart phones, and tablets; and the use of applications (apps), which are accessed from mobile devices. What factors would you consider in determining which Web 2.0 technology is or technologies are appropriate for achieving the best performance outcome?

Figure 5. Interview Question 1

Table 6

Research Question 1 Categorical Themes

Research Question 1
Interview Question 1
Reputation of sites or resources
Google Web search results
Need for convenience
Ease of accessibility
Available technology
Speed and efficiency
Compliance with IT
IT support
Project needs and complexity

***Observation*.** In general, participants reported that they regularly use Google as a search engine to direct them to reputable sources of information. The three participants reported that convenience and ease of accessibility are major factors in determining which Web 2.0 technologies are appropriate for achieving the best performance outcome. Participant 2 summed up the consensus among participants stating the following:

> We look for convenience first and the things we have available at hand. If we're at our desks, we have our computers; if we're in the field, we have our iPads; and wherever we go, we have our iPhones. Google is available to us whether we are on our computers, iPads, or iPhones. (personal communication, March 21, 2016)

During the interviews, all three participants had their iPhones in close proximity to them. Participant 1 checked his iPhone twice during the interview. Participant 2 checked his iPhone once during the interview, and Participant 3 received a telephone call during the interview but quickly muted the call and said he would respond to the caller at a later time.

***Visual documents*.** Participant 1 gave an example of a the process he uses in determining which Web 2.0 technologies would achieve the performance outcome he is looking for. He used Google on his desktop computer to search for a roofing product. One of the searches returned was a manufacturer's Web site. Participant 1 stated that he believed manufacturer's Web sites are reputable sources. Once on the manufacturer's Web site, Participant 1 located a downloadable Portable Document Format of a roofing product installation sheet. He explained that if he needed to know how to install this roofing product, he would rely on this installation sheet and its step-by-step instructions because it came from a reputable source. Participant 1 explained the following:

> If I need to print it, the printer in my office is wireless so I would be able to do that from my PC, iPad, or iPhone. If I just need to look at it, I prefer my PC if I am in the office or my iPad if I am in the field because the screen in my iPhone is just too small. (personal communication, March 21, 2016)

In summary, expected performance, adequacy of performance, immediacy of application, tools, resources, and time to match performance needs all emerged as principal factors affecting behavior as evidenced by the categorical themes identified for research question 1.

Research question 2. What factors are used to identify Web 2.0 technology for use at the individual level to enable SDL tied to specific job performance outcomes?, asks what factors are considered by construction managers in determining which Web 2.0 technologies to use when working alone to answer a question, solve a problem, or researching to learn something new at work verses outside of work. The categorical themes emerging from this interview question 2 (Figure 6) as principal factors used to

determine which technologies to use at work verses outside of work cited by the three participants were past levels of success, available technologies, reputation and credibility of source (with reputation and credibility more relaxed at home), and accountability (Table 7).

2. How do you determine which Web 2.0 technologies (e.g., LinkedIn, Facebook, YouTube, wikis, blogs, performance support tools, performance support systems, and search engines such as Bing, Yahoo, and Google, and the hardware that supports this technology, including, but not limited to desktop, laptop, or handheld computers, web cams, smart phones and tablets, and the use of applications (apps), which are accessed from mobile devices) to use when you're working by yourself to answer a question, solve a problem, or researching to learn something new?
3. What factors would you use in identifying Web 2.0 technologies for completing tasks that you are directly responsible for in your job?
4. Explain the differences that you perceive in identifying Web 2.0 technologies at work versus outside of work.

Figure 6. Interview Questions 2–4

Table 7

Research Question 2 Categorical Themes

Research Question 2		
Interview Question 2	Interview Question 3	Interview Question 4
Past levels of success	Google as primary source	Certain videos are restricted at work
Available technologies	How quickly information you need is revealed	Reputable sources must be used for work
YouTube videos to learn quickly	Appropriateness	YouTube is okay for at home to get home improvement jobs done
Dependent upon what needs answered, solved, or researched	Ease of access	Blogs are okay at home
If it's a procedure, videos are preferred	Location at time of need: Field vs. Office	There is a stigma to watching videos at work
Forums offer realistic opinions		Watching videos at home is the norm
Reputation and credibility of source		There are no restrictions on what to use at home

(continued)

Research Question 2		
Interview Question 2	Interview Question 3	Interview Question 4
Smartphone to access videos on YouTube		Reputation is less of a concern for technologies used at home
		Home offers privacy
		No differences
		Videos are preferred but some are restricted at work
		Credibility of source is more relaxed at home
		Less accountability for content at home

***Observation*.** In general, participants reported that the task that needs to be completed, or the question that needs to be answered are the determining factors in which technologies are used to get the job done. Participant 2 explained that if it's a procedure, videos are preferred. Participant 2 gave the example of learning how to tie a tie and explained that there are just some things that he knows he is not going to be able to learn unless he is watching a video. Participant 2 then reached for his iPhone and searched the topic via a Google search. He explained that he was using his iPhone for this search because if he chooses a YouTube video to watch, YouTube is restricted at work even though YouTube will get the job done for him. Participant 2 readily found a YouTube video on how to tie a tie. He pressed play and the video demonstration began. Participant 2 explained:

> What's great about a video for learning procedures is that you can start and stop the video as you follow along. I would definitely choose the video if I were learning something like this at home. Sometimes step-by-step written directions with images to support the directions are what I use if I am in the office…I have

> dual monitors so if I'm interested in a Microsoft Excel procedure, for example, I can look at the directions on one monitor and perform the action on the other. (personal communication, March 21, 2016)

In summary, expected performance, adequacy of performance, experience, consequences for poor performance, immediacy of application, tools, resources, and time to match performance needs all emerged as principal factors affecting behavior as evidenced by the categorical themes identified for research question 2.

Research question 3. What environmental factors affect a construction manager's ability to use Web 2.0 technology to engage in SDL?, asks what kinds of work rules (formal or informal) are in place governing the use of these technologies when construction managers are working on a project or task, and how do they feel about having rules in place governing the use of Web 2.0 technologies at work. Participants stated they are not aware of any unequivocal written rules in place or written policies restricting the use of Web 2.0 technology in the workplace. The categorical themes emerging from this interview question 3 (Figure 7) as principal factors used to determine the kinds of work rules in place governing the use of these technologies cited by the three participants were that anything provided by work is supposed to be used for work, efficiency is expected, and the access to certain sites are prohibited. The participants' feelings about these rules included an understanding of the need for rules although they are annoying, a hassle, and a disappointment when work is hindered because of them (Table 8).

5. Think about the different Web 2.0 technology tools that you can access at work such as LinkedIn, Facebook, YouTube, wikis, blogs, performance support tools, performancesupport systems, and search engines such as Bing, Yahoo, and Google, and the hardware that supports this technology, including, but not limited to desktop, laptop, or handheld computers, web cams, smart phones and tablets and the use of applications (apps), which are accessed from mobile devices. What kinds of work rules (formal or informal) are in place governing the use of these technologies when you are working on a project or task?

6. How do you feel about having rules in place governing the use of Web 2.0 technologies at work?

Figure 7. Interview Questions 5 and 6

Table 8

Research Question 3 Categorical Themes

Research Question 3	
Interview Question 5	Interview Question 6
Anything provided by company is expected to be used for work	Understand the need for rules
Certain YouTube videos are restricted	Deterrent to contact IT
Don't waste time	Feel we're being watched
Certain technologies are frowned upon	They're a hassle
Facebook and LinkedIn are restricted sites	Unsettling when trying to find an answer
Firewalls	Appropriate
YouTube and Facebook are restricted sites	Hinders ability to perform job
If it's not for work, you shouldn't be doing it	It's deflating
	It's annoying
	It's a let down
	It's disheartening
	Firewalls are annoying
	Firewalls are there for a reason
	Some people abuse the rules
	If I need to do my job, I will go to YouTube even if the company disagrees with it
	I use my Smartphone to access any of the restricted sites I need to in order to get my job done

***Observation*.** All three participants were of the general consensus that some of the rules in place impede their ability to get their jobs done. Participant 1 demonstrated this to the researcher by attempting to access a Web site called lumberjack.com on his desktop computer. Access to this Web site was denied. Participant 1 explained that lumberjack.com has a lot of useful information and videos, and their videos are published on YouTube, which is also a restricted access site. He felt that it's just a little unsettling when that red screen pops up at him because he is truly trying to find an answer to a question and the answer might be there, but he is unable to access it.

In summary, self-concept, immediacy of application, expected performance, and consequences for poor performance emerged as principal factors affecting behavior as evidenced by the categorical themes identified for research question 3.

Research question 4. How is the success of job performance outcomes resulting from Web 2.0 enhanced SDL opportunities determined?, asks what factors determined that the work on a project or task was successful, the question was answered, the problem solved, or something new was learned. The categorical themes emerging from this interview question 4 (Figure 8) as principal factors used to determine success of a project or task cited by the three participants were acceptance of information, ability to perform, ability to produce or communicate results, and social role (Table 9).

7. Think about a time when you used Web 2.0 technologies to work on a project or task, answer a question, solve a problem, or conducted research to learn something new. What factors determined that the work on a project or task was successful, the question was answered, the problem solved, or something new was learned?

Figure 8. Interview Question 7

Table 9

Research Question 4 Categorical Themes

Research Question 4
Interview Question 7
Able to take that information and answer others' questions to solve discrepancy
Architect accepts response
Able to perform a software function or other task
Able to produce or communicate what I wanted to
Question is answered
Superiors approve my response
I double check my sources
Team player

***Observation*.** In general, participants reported that they determine the success of job performance outcomes by whether the question answered or task performed is acceptable to them, and in many circumstances, to others (superiors, architects, and project owners, for example). The three participants reported that the ability to take information and answer others' questions to solve a discrepancy is a good determination of a positive performance outcome. Participant 1 summed up the consensus among participants saying:

> We need to educate ourselves. So we have a conflict on a jobsite or products aren't compatible with each other on a certain detail. And so the question comes into the office from the superintendent what do you want me to do here. If I use Google to get to a resource which gives me the information that I need to first educate myself on the product, figure out the proper way to coordinate the materials, I guess to confirm that the information solved the problem would be that I was able to take that information and answer the superintendent's questions and reply to him. I might even attach the resources I used to substantiate my

> answer. So I would say that I would feel that 100% answered the question or solved the problem. (personal communication, March 21, 2016)

Visual documents. The three participants showed the researcher a company database that construction managers can access when they need to learn about processes and procedures on a project or task, have a question that needs answered, or have a problem that needs solved. Participant 1 explained:

> If something new was learned, we have a process where we can go to our company's Web site, click on a link, and we are directed to the database. It's companywide whether you are a construction manager, an accountant, or the vice president; everybody has the ability to submit something that they learned for others to learn from, too. So things that we troubleshoot or learn throughout a project that are not typical or unique and could be used on a future project whether it's because a future project might have the same city where that city might have a goofy code requirement, or whether it's the same client that we have other work or future potential work with, and they have intricacies that could relate to other projects, we would want to share that information but the process is there through the Web site to share that knowledge. And then once a committee approves the contribution being made from the thing that was learned and it's posted, the documents and information are right there on the Web site so if people take the initiative to visit this data base weekly, they'll keep up with all of this information that people are sharing. (personal communication, March 21, 2016)

Participant 2 documents questions answered and problems solved through writing follow-up e-mail. He showed the researcher e-mail he had written to confirm questions he

had answered from an architect concerning a specific detail on a project drawing. He explained that if it's a request for information or an answer to an architect, superintendent, or subcontractor's question, he always summarizes whatever the resolution was so it's documented via e-mail. He explained:

> A lot of times even if I'm answering questions or talking through things with the superintendent on the phone, I'll sometimes more often than not follow up the answers to those questions with an e-mail because an hour from now or two weeks from now we all have so much in our heads it's hard to keep track of. So I guess I document things via e-mail, through the [request for information] process which is retrievable because it's a trackable system. (personal communication, March 21, 2016)

Participant 2 then showed the researcher how the company database worked. He typed in the company's web address in the address bar of Google Chrome, the browser he was using on his desktop computer. He then signed into the Web site as an employee with his credentials. From there he clicked on a link to the database, and it displayed in the browser. The database has a search feature, allowing users to type in a keyword or phrase to begin the processes of obtaining the data sought. Participant 2 explained:

> You can search by client, which is helpful because for example one client I'm working with right now I have completed one job with them and have two active jobs going with them, our Dallas group is working on one project with them, we have the potential to be working on at least two more projects this year. So that's great because you can search by client and hopefully people are posting information they have learned and we can all learn not just from our experiences,

> but from others' learning experiences as well. And then you can search by city, you can search by product type, so you can search by a big box retailer, you can search by hospitality, hotels. You can search by senior living, commercial, residential. If we have a new senior living client we've never done work for, we can search by all senior living projects to learn what we might need to be aware of on any senior living project. (personal communication, March 21, 2016)

Participant 2 clarified how he determined he learned something new and solved a problem involving a recently implemented scheduling software. He explained the following:

> We use Microsoft Excel and Excel spreadsheets and there was something I wanted to do specifically and I was working on a spreadsheet that I had to give to an appliance manufacturer. Appliances on certain floors were missing and I wanted to communicate three different pieces of information all on the same line item whether it was present or not, how many we were supposed to have, and what units needed what. I had never done this before and there was a conditional formatting function. On older versions of Microsoft Excel I could do it, but on this newer version of Excel there was a stoplight red, green, and yellow where depending on the value of the cell you could have a split. In the cell itself you had a green, red, or yellow light for an extra piece of information. (personal communication, March 21, 2016)

Participant 2 then turned to his desktop computer, opened Microsoft Excel, and opened the spreadsheet he had created. He continued:

> I found that through Google and spending some time in the Help function, I use the Help function I'd say a little more than the average person, I found the help I needed to perform the task I was trying to do. For a determination of success, I was able to produce or communicate what I wanted to the individual and it seemed to work, they seemed to get the message. (personal communication, March 21, 2016)

Participant 2 then showed the researcher a Microsoft Word document with step-by-step procedures on how to perform this task in Microsoft Excel and stated:

> I ended up writing up a Word document that said this is what it was and this is how you can do it now in the new software. I spent 10 hours of my time figuring this out and I went back and forth with IT and they asked the researcher to write something out to give a guide to some other people to move the process along. (personal communication, March 21, 2016)

Participant 3 stated that local discussion plays a role in determining job performance outcomes. He explained that the offices work very closely with each other, stating:

> You might swing by and ask hey, you did this before, and how did you resolve it? What did you do here? How did you go about it? People in the construction industry like bullet points, you state your problem and state your solution. (personal communication, March 21, 2016)

Participant 3 showed the researcher a three-ring binder of information he had printed from the company database. He was working on a type of project that had been completed in the past, and other construction managers had documented processes and

procedures they learned about the project. Participant 3 explained that he refers to this binder of learned processes and procedures nearly every day and said:

> I can see who posted the information, so if I have further questions I can always find out more from who posted it, and I know this information will help me solve a problem or perform a task. The performance outcome success has already been determined. (personal communication, March 21, 2016)

In summary, self-concept, social role, immediacy of application, expected performance, adequacy of performance, and individual knowledge emerged as principal factors affecting behavior as evidenced by the categorical themes identified for research question 4.

Discussion

This section discusses the researcher's analysis of the findings based upon the person-to-person semistructured interview, observation, and visual document methodologies, as well as an ongoing review of the literature providing theoretical framework for the study.

The process of identifying categorical themes that began in Step 2 of the analytical process continued through Step 4. At the end of Step 4, an exhaustive list of categorical themes was created, which was aligned with the research questions posed by this study, using the seven interview questions that were asked. In this final step of analysis, these categorical themes have been applied to the four research questions, extending the deductive analysis with appropriate support from the empirical data. Tables 10 and 11 provide a summary of the research categorical themes aligned with the four

research questions and according to the theoretical constructs of Knowles's (1980) theory of andragogy and Gilbert's (1996) BEM.

Table 10

Summary of the Categorical Themes Aligned With Andragogy

Research Questions	Immediacy of application Orientation to learning	Experience	Self-concept	Social role Readiness to learn
Question 1. What SDL and job performance needs are supported by the use of Web 2.0 technology?	• Need for convenience • Speed and efficiency			
Question 2. What factors are used to identify Web 2.0 technology for use at the individual level to enable SDL tied to specific job performance outcomes?	• YouTube videos to learn quickly • How quickly information you need is revealed	• Past levels of success • Forums offer realistic opinions		
Question 3. What environmental factors affect a construction manager's ability to use Web 2.0 technology to engage in SDL?	• Hinders ability to perform job • I use my Smartphone to access any of the restricted sites I need to in order to get my job done		• It's deflating • It's a let down • If I need to do my job, I will go to YouTube even if the company disagrees with it	
Question 4. How is the success of job performance outcomes resulting from Web 2.0 enhanced SDL opportunities determined?	• Able to perform a software function or other task		• Able to produce or communicate what I wanted	• Superiors approve response • Team player

Table 11

Summary of the Categorical Themes Aligned With BEM

Research Questions	Expected performance Environmental factor (data)	Adequacy of performance Environmental factor (data)	Tools, resources, and time to match performance needs Environmental factor (resources)	Consequences for poor performance Environment-al factor (incentives)	Individual knowledge Individual factor (knowledge)
Question 1. What SDL and job performance needs are supported by the use of Web 2.0 technology?	• Reputation of sites or resources • Compliance with IT	• IT support • Project needs and complexity	• Google Web search results • Ease of accessibility • Available technology		
-Question 2. What factors are used to identify Web 2.0 technology for use at the individual level to enable SDL tied to specific job performance outcomes?	• Reputation and credibility of source • Appropriate-ness • Reputable sources must be used for work • Watching videos at home is the norm • Credibility of source is more relaxed at home	• Dependent upon what needs answered, solved, or researched • YouTube is okay for at home to get home improve-ment jobs done • Blogs are okay at home	• Available technologies • If it's a procedure, videos are preferred • Smartphone to access videos on YouTube • Google as primary source • Ease of access • Location at time of need: Field vs. Office • Home offers privacy • Videos are preferred but some are restricted at work	• Certain videos are restricted at work • There is a stigma for watching videos at work • There are no restrictions on what to use at home • Reputation is less of a concern for technolo-gies used at home • No differences • Less account-ability for content at home	

(continued)

Research Questions	Expected performance Environmental factor (data)	Adequacy of performance Environmental factor (data)	Tools, resources, and time to match performance needs Environmental factor (resources)	Consequences for poor performance Environment-al factor (incentives)	Individual knowledge Individual factor (knowledge)
Question 3. What environ-mental factors affect	Anything provided by the company is expected to be used for work • Don't waste time • If it's not for work, you shouldn't be doing it • Firewalls are there for a reason Some people abuse the rules			• Certain YouTube videos are restricted • Certain technolo-gies are frowned upon • Facebook and LinkedIn are restricted sites • Firewalls • YouTube and Facebook are restricted sites • Understand the need for rules • Deterrent to contact IT • Feel we're being watched • They're a hassle • Unsettling when you're trying to find an answer • Appropriate • It's dishearten-ing Firewalls are annoying	

(continued)

Research Questions	Expected performance Environmental factor (data)	Adequacy of performance Environmental factor (data)	Tools, resources, and time to match performance needs Environmental factor (resources)	Consequences for poor performance Environment-al factor (incentives)	Individual knowledge Individual factor (knowledge)
Question 4. How is the success of job performance outcomes resulting from Web 2.0 enhanced SDL opportunities determined?	• Architect accepts response • Double check sources • Question is answered	• Information is reviewed by a committee			• Able to take that informa-tion and answer others' questions to solve discrep-ancy

The general categorical themes of self-concept, experience, readiness to learn, and orientation to learning resulting from Knowles's (1980) theory of andragogy brought together the concepts of SDL as a type of informal learning, extended rich resources for learning beyond the context of the workplace, brought the motivation of the adult learner into view in relationship to workplace roles and responsibilities, and helped bring into focus the ways in which Web 2.0 technology was utilized by the participants to solve problems, answer questions, and achieve desired job performance outcomes.

Additionally, the environmental factors of available data, resources, and incentives, as well as the knowledge, capacity, and motives of the individual derived from Gilbert's (1996) BEM represented of a set of general categorical themes impacting SDL and the resulting performance in the context of this study.

Research question 1. Research question 1 examined the factors considered in determining which Web 2.0 technologies are appropriate for achieving the best

performance outcome. Orientation to learning from Knowles's (1980) theory of andragogy, and available data and resources from Gilbert's (1996) BEM were factors that emerged.

The set of categorical themes linked with research question 1 are:

- Expected performance (environmental, data, BEM)
- Adequacy of performance (environmental, data, BEM)
- Immediacy of application (orientation to learning, andragogy)
- Tools, resources, and time to match performance needs (environmental, resources, BEM)

Expected performance refers to the work-related activities expected of construction managers while adequacy of performance refers to how well the work-related activities were performed. Categories supporting the theme of expected performance are *reputation of sites or resources*; and *compliance with IT*. Categories supporting the theme of adequacy of performance are *IT support*; and *project needs and complexity*.

Immediacy of application refers to taking a problem-centered approach to rather than future application of knowledge. Thus, immediacy of application is an orientation to learning in which a problem-centered rather than a subject-centered approach to learning is characteristic of construction managers. Categories supporting the theme of immediacy of application are *need for convenience*; and *speed and efficiency*.

Tools, resources, and time to match performance needs are environmental instrumentation available to construction managers, including Web 2.0 technologies used by construction managers such as such as social-networking sites (i.e., LinkedIn and

Facebook); video sharing sites (i.e., YouTube); wikis; blogs; performance support tools; performance support systems; search engines such as Bing, Yahoo, and Google; the hardware that supports these technologies, including, but not limited to desktop, laptop, or handheld computers, web cams, smart phones, and tablets; and the use of applications (apps), which are accessed from mobile devices. Categories supporting the theme of tools, resources, and time to match performance needs are *Google web search results*, *ease of accessibility*, and *available technology*.

The first insight gained in this analysis is that environmental factors and orientation to learning have an impact on the selection of Web 2.0 technologies related to achieving a performance outcome. In the context of this study, two environmental factors, data and resources, were identified from Gilbert's (1996) BEM as impacting SDL and the resulting performance. Construction managers are concerned with the performance expected of them, in addition to how well they perform their work-related activities, indicating that organizations should provide guidelines on the use and expected outcomes of SDL in addition to providing the tools, resources, and time to match performance needs. Holtzblatt et al. (2010) found that to ensure successful adoption of wikis, organizations should consider factors such as incentive structures to entice staff to use the wikis in addition to authoring clearer guidelines and policies defining the scope and use of the wikis. Grudin and Poole (2010) identified that there can be on occasion different expectations from management and staff as to what their visions are on how a wiki should be best applied in the workplace. Baxter and Connolly (2014) found that employees in an organization will use a blog if the content included on it is relevant to their work, and blogs will be used more by employees if they cannot obtain relevant

knowledge from other types of communication channels. This study, along with the studies of Holtzblatt et al. (2010), Baxter and Connolly (2014), and Grudin and Poole (2010), provide empirical and qualitative evidence on factors used to identify Web 2.0 technology for use at the individual level to enable SDL tied to specific job performance outcomes.

Furthermore, findings from this study exemplify Knowles's (1980) assumption that immediacy of application is an orientation to learning in which a problem-centered rather than a subject-centered approach to learning is characteristic of construction managers. There are various factors that prohibit the usage of Web 2.0 technology for SDL, factors that entice use of Web 2.0 technology, factors associated with successful Web 2.0 deployment, and evidence that employees in an organization will use Web 2.0 technology if the content is relevant to their work.

Research question 2. Research question 2 examined the factors considered in determining which Web 2.0 technologies to use to answer a question, solve a problem, research something new to learn, and complete a task at work versus outside of work.

The set of categorical themes linked with research question 2 are:

- Expected performance (environmental, data, BEM)
- Adequacy of performance (environmental, data, BEM)
- Experience (andragogy)
- Consequences for poor performance (environmental, incentives, BEM)
- Immediacy of application (orientation to learning, andragogy)
- Tools, resources, and time to match performance needs (environmental, resources, BEM)

Expected performance refers to the work-related activities expected of construction managers while adequacy of performance refers to how well the work-related activities were performed. Categories supporting the theme of expected performance are reputation and credibility of source, appropriateness, reputable sources must be used for work, watching videos at home is the norm, and credibility of source is more relaxed at home. Categories supporting the theme of adequacy of performance are *dependent upon what needs answered, solved, or researched*; *YouTube is okay for at home to get home improvement jobs done*; and *blogs are okay at home.*

Experience refers to the growing reservoir of knowledge, skills, and abilities that construction managers have accumulated and continue to accumulate that offers a rich resource for learning. Categories supporting the theme of experience are *past levels of success,* and *forums offer realistic opinions*.

Consequences for poor performance refers to motivational factors in the environment of construction managers providing some sort of incentive for completing a task. Categories supporting the theme of consequences for poor performance are *certain videos are restricted at work*, *there is a stigma for watching videos at work*, *there are no restrictions on what to use at home, reputation is less of a concern for technologies used at home, no differences,* and *less accountability for content at home*.

Immediacy of application refers to taking a problem-centered approach to rather than future application of knowledge. Thus, immediacy of application is an orientation to learning in which a problem-centered rather than a subject-centered approach to learning is characteristic of construction managers. Categories supporting the theme of immediacy of application are *YouTube videos to learn quickly,* and *how quickly information you need*

is revealed.

Tools, resources, and time to match performance needs are environmental instrumentation available to construction managers, including Web 2.0 technologies used by construction managers such as such as social-networking sites (i.e., LinkedIn and Facebook); video sharing sites (i.e., YouTube); wikis; blogs; performance support tools; performance support systems; search engines such as Bing, Yahoo, and Google; the hardware that supports these technologies, including, but not limited to desktop, laptop, or handheld computers, web cams, smart phones, and tablets; and the use of applications (apps), which are accessed from mobile devices. Categories supporting the theme of tools, resources, and time to match performance needs are *available technologies*; *if it's a procedure, videos are preferred*; *smart phone to access videos on YouTube*; *Google as primary source*; *ease of access*; *location at time of need*: *Field vs. Office; home offers privacy*; and *videos are preferred but some are restricted at work*.

Three environmental factors, data, incentives, and resources, were identified from Gilbert's (1996) BEM as impacting SDL and the resulting performance in the organizational setting of this study. The second insight gained in this analysis is that construction managers feel that expected performance, adequacy of performance, and consequences for poor performance at work are more of a determining factor in selecting Web 2.0 technologies than at home. This finding might best be supported by Gilbert's (2007) first leisurely theorem. This theorem is deemed by Gilbert as providing the basic dimensions of competence (valuable performance and costly behavior; Chyung, 2005). Furthermore Gilbert (2007) stated, "In performance, behavior is a means; its consequence is the end" (p. 16). Swanson and Holton (2001) stated, "According to Gilbert, this

theorem tells us that having large amounts of work, knowledge and outcomes without accomplishments is not worthy performance" (p.186). According to Theorem 1, human competence is a function of worthy performance which is a function of the ratio of valuable accomplishments to costly behavior (Gilbert, 2007).

Additionally, findings from this study exemplify Knowles's (1980) assumptions that immediacy of application is an orientation to learning in which a problem-centered rather than a subject-centered approach to learning is characteristic of construction managers, and construction managers have a growing reservoir of knowledge, skills, and abilities that offers a rich resource for learning.

Research question 3. Research question 3 examined the work rules (formal or informal) that are in place governing the use of these technologies when working on a project or task and the construction managers' feelings about having rules in place governing the use of Web 2.0 technologies at work. Rules were observed by construction managers as embargoes on behavior or as a limitation on the use of certain Web 2.0 technologies. The research setting for this study provides open access to construction workers to most areas of Web 2.0 technologies with the exception of social networking sites and certain forms of social media.

The set of categorical themes linked with research question 3 are:

- Self-concept (andragogy)
- Expected performance (environmental, data, BEM)
- Immediacy of application (orientation to learning, andragogy)
- Consequences for poor performance (environmental, incentives, BEM)

Self-concept refers to construction managers' ability to reflect on their own skills,

knowledge, and abilities in diagnosing their own learning needs. Categories supporting the theme of self-concept are *it's deflating*; *it's a let-down*; and *if I need to do my job, I will go to YouTube even if the company disagrees with it*.

Expected performance refers to the work-related activities expected of construction managers. Categories supporting the theme of expected performance are *anything provided by the company is expected to be used for work*; *don't waste time*; *if it's not for work, you shouldn't be doing it*; *firewalls are there for a reason*; and *some people abuse the rules*.

Immediacy of application refers to taking a problem-centered approach to rather than future application of knowledge. Thus, immediacy of application is an orientation to learning in which a problem-centered rather than a subject-centered approach to learning is characteristic of construction managers. Categories supporting the immediacy of application are *hinders ability to perform job*, and *I use my smart phone to access any of the restricted sites I need to in order to get my job done*.

Consequences for poor performance refers to motivational factors in the environment of construction managers providing some sort of incentive for completing a task. Categories supporting the theme of consequences for poor performance are *certain YouTube videos are restricted, certain technologies are frowned upon, Facebook and LinkedIn are restricted sites, firewalls, YouTube and Facebook are restricted sites, understand the need for rules, deterrent to contact IT, feel we're being watched, they're a hassle, unsettling when you're trying to find an answer, appropriate, it's disheartening,* and *firewalls are annoying*.

The third insight gained in this analysis is that while construction managers

understand the need for rules restricting the use of Web 2.0 technologies in performing their jobs, they feel these rules do not impact their performance. Two environmental factors, data and incentives, were identified from Gilbert's (1996) BEM as impacting SDL and the resulting performance in the organizational setting of this study. Gilbert's (2007) leisurely theorem three demonstrates this third insight. For any given accomplishment, a deficiency in performance always has at its immediate cause a deficiency in a behavior repertory, or in the environment that supports the repertory, or in both. But its ultimate cause will be found in a deficiency of the management system. The analysis of the data for this research question found that a deficiency in the environment, which in this case study are Web 2.0 technologies, may cause a deficiency in performance if construction managers are not able to access the Web 2.0 technologies they need to answer a question, solve a problem, or conduct research to learn something new. However, compensating for this apparent deficiency in the environment caused by the barriers put in place by the organization and adding support to this third insight was the theory of andragogy. Knowles's (1980) assumptions that immediacy of application is an orientation to learning in which a problem-centered rather than a subject-centered approach to learning is characteristic of construction managers, and construction managers have the ability to reflect on their own skills, knowledge, and abilities in diagnosing their own learning needs. Despite the environmental deficiency, construction managers applied their knowledge of hardware to access the Web 2.0 technologies needed to take a problem-centered approach to learning.

Research question 4. Research question 4 was intended to gain insight into the factors perceived by construction managers in determining that the work on a project or

task was successful, the question was answered, the problem solved, or something new was learned.

The set of categorical themes linked with research question 4 are:

- Expected performance (environmental, data, BEM)
- Adequacy of performance (environmental, data, BEM)
- Immediacy of application (orientation to learning, andragogy)
- Self-concept (andragogy)
- Social role (readiness to learn, andragogy)
- Individual knowledge (information, BEM)

Expected performance refers to the work-related activities expected of construction managers while adequacy of performance refers to how well the work-related activities were performed. Categories supporting the expected performance theme are *architect accepts response, double check sources,* and *question is answered.*

A category supporting the theme of adequacy of performance is information is *reviewed by a committee.*

Immediacy of application refers to taking a problem-centered approach to rather than future application of knowledge. Thus, immediacy of application is an orientation to learning in which a problem-centered rather than a subject-centered approach to learning is characteristic of construction managers. A category supporting the theme of immediacy of application is *able to perform a software function or other task.*

Self-concept refers to construction managers' ability to reflect on their own skills, knowledge, and abilities in diagnosing their own learning needs. A category supporting the theme of self-concept is *able to produce or communicate what I wanted.*

Social role refers to the role construction managers take in a work group situation to conform to expected performance behaviors of others as well as expectations they have set for themselves. Categories supporting the theme of social role are *superiors approve response,* and *team player*.

Individual knowledge refers to learning that has been internalized and matches the requirements of exemplary performance. A category supporting the theme of individual knowledge is *able to take that information and answer others' questions to solve discrepancy*.

The fourth insight gained in this analysis is that successful performance outcomes are determined by compliance to expected performance behaviors of others, as well as expectations construction managers have set for themselves. One environmental factor, data, and one individual factor, knowledge, were identified from Gilbert's (1996) BEM as impacting SDL and the resulting performance in the organizational setting of this. According to research conducted by Zhao and Kemp (2013), self-interest may be measured by perceived benefits from participating in Web 2.0-based workplace learning, such as a boost in reputation, respect, status, social acceptance, and recognition. In this case study, construction managers determined successful performance outcomes mediated by Web 2.0 technology when recognized and accepted socially by others within and beyond the organization. Self-fulfillment is driven largely by intrinsic motivations, which may be measured by the level of aspiration to take up new challenges and help others. Construction managers in this case study determined successful performance outcomes when they were able to produce or communicate what they had set out to produce or communicate. Sense of belonging may be measured by how much one views

oneself as part of a team or community and is willing to contribute to it. This independent variable was demonstrated by construction managers' contributions to the company's data base. This study along with Zhao and Kemp's findings provide empirical and qualitative evidence of job performance outcomes resulting from Web 2.0 enhanced SDL opportunities.

Additionally, findings from this study exemplify Knowles's (1980) assumptions that immediacy of application is an orientation to learning in which a problem-centered rather than a subject-centered approach to learning is characteristic of construction managers; construction managers have the ability to reflect on their own skills, knowledge, and abilities in diagnosing their own learning needs; and construction managers conform to expected performance behaviors in a work-group situation as well as conforming to expectations they have set for themselves.

Summary of Analyses

Analysis of the interview, observation, and visual document data provided a set of themes initially used to increase internal reliability of the study. These themes were subsequently refined with each subsequent interview transcript and set of field notes to develop a set of categorical themes to address the research questions. These categorical themes yielded a final set of mutually exclusive, empirically derived categories surrounding the seven interview questions, thereby providing necessary context and specifics of job performance outcomes to answer the research questions asked in this study: expected performance; adequacy of performance; immediacy of application; tools, resources, and time to match performance needs; experience; consequences for poor performance; self-concept; social role; and individual knowledge.

Four insights were gained in this analysis: environmental factors and orientation to learning have an impact on the selection of Web 2.0 technologies related to achieving a performance outcome; construction managers feel that expected performance, adequacy of performance, and consequences for poor performance at work are more of a determining factor in selecting Web 2.0 technologies than at home; while construction managers understand the need for rules restricting the use of Web 2.0 technologies in performing their jobs, they feel these rules do hinder their performance; and successful performance outcomes are determined by compliance to expected performance behaviors of others as well as expectations construction managers have set for themselves.

The next chapter (Chapter 5: Conclusions and Recommendations) presents an overall analysis and interpretation of the findings in the study and recommends areas for additional research.

Chapter 5: Conclusions and Recommendations

This study followed a qualitative research approach for several compelling reasons. In general, qualitative research methods are especially useful in discovering the meaning that people give to events they experience (Creswell, 2013; Merriam & Tisdell, 2016). The purpose of this study was to discover the meaning that construction managers give to their self-directed learning and job-performance outcomes, mediated by Web 2.0 technology.

A purposeful sampling procedure was used in the selection of participants for this qualitative case study. This study was site specific, and the bounded system under study consisted of a small number of construction managers. There were three categories of information that were considered necessary in order to answer the four research questions posed in this qualitative, single-instrumental case study: contextual, perceptual, and theoretical. First, the contextual information provided insight into the way construction managers construct the reality in which their self-directed learning activities transpire. Contextual information was collected for this study primarily through in-depth interviews with participants and observation of visual documents. Second, construction managers' perceptions were explored in this research study via interviews conducted individually with participants. The perceptions of construction managers helped to explain SDL experiences with Web 2.0 technology leading to surfacing patterns to address the research questions posed by the study. Perceptions of self-concept, experience, readiness to learn, and orientation to learning were addressed by Knowles's (1980) theory of andragogy. Knowles's theory of andragogy and Gilbert's (1996) BEM brought focus to the interplay among the SDL activities mediated by Web 2.0 technology, the work

environment, and the perceptions of the construction project managers that affect job performance.

Analysis of the interview, observation, and visual document data provided a set of themes initially used to increase internal reliability of the study. These themes were subsequently refined with each subsequent interview transcript and set of field notes to develop a set of categorical themes to address the research questions. These categorical themes yielded a final set of mutually exclusive, empirically derived categories surrounding the seven interview questions, thereby providing necessary context and specifics of job performance outcomes to answer the research questions asked in this study: expected performance; adequacy of performance; immediacy of application; tools, resources, and time to match performance needs; experience; consequences for poor performance; self-concept; social role; and individual knowledge.

Four insights were gained in this analysis: environmental factors and orientation to learning have an impact on the selection of Web 2.0 technologies related to achieving a job performance outcome; construction managers feel that expected performance, adequacy of performance, and consequences for poor performance at work are more of a determining factor in selecting Web 2.0 technologies than at home; while construction managers understand the need for rules restricting the use of Web 2.0 technologies in performing their jobs, they feel these rules do hinder their performance; and successful performance outcomes are determined by compliance to expected performance behaviors of others as well as expectations construction managers have set for themselves.

This chapter is divided into three sections: Conclusions, Recommendations, and Summary. The purpose of this chapter is to present an overall analysis and interpretation of the findings in the study and to recommend areas for additional research.

Conclusions

This section highlights the findings reported in Chapter 4, drawing a correlation between the results and the contention of the investigation, attempting to place the findings within the two theoretical constructs, andragogy and the BEM, considered central to this study to support its purpose.

History of the research topic. The purpose of this study was to explore and thickly describe job-performance outcomes based upon the manner in which SDL activities of a sample of construction managers are conducted, mediated by the use of Web 2.0 technology in a single organizational setting. In an effort to expand further the knowledge base of adult learning and SDL, this study was focused on the role of Web 2.0 technology in construction managers' engagement in SDL. Construction managers' preferences in relation to the emergence of Web 2.0 technology, learning environments that construction managers engage in, and the motivation behind their engagement were explored. The objective was to gain a better understanding of the role Web 2.0 technology plays in the SDL activities and job performance of construction managers to provide a more collective view of the role that Web 2.0 technology has in self-directed workplace learning and job-performance outcomes to benefit construction managers, organizations, and HRD professionals.

Web 2.0 technology has been shown to have a mediating effect on activity through the use of symbols for linguistic communication, and artifacts for externally

managed collective knowledge (Boileau, 2011). Web 2.0 has been heralded as having the potential to enhance learning and performance because it presents a dynamic social platform where members can share, participate, interact, create, and learn (Lucas & Moreira, 2009).

Gilbert's BEM. Research shows that cultural, environmental, and personal factors conflate to influence behavior that is tied to context (Boileau, 2011). Environmental factors (data, resources, and incentives) and personal factors (motives, capacity, and knowledge) were addressed by Gilbert's (1996) BEM. Contextual information was collected for this study primarily through in-depth interviews with participants. The contextual information provided insight into the way construction managers construct the reality in which their SDL activities transpire.

Knowles's theory of andragogy. Construction managers' perceptions were explored in this research study via interviews conducted individually with participants. The perceptions of construction managers helped to explain SDL experiences with Web 2.0 technology leading to surfacing patterns to address the research questions posed by the study. Performance of construction managers involves relationships among their perceptions of the job and setting, tools in the environment, and SDL activities leading to some new insight affecting on-the-job performance (Boileau, 2011). The tools for knowledge development and SDL activities engaged in by construction managers tend to be situated more closely to the environment in which the work is performed. In this context, the focus is on immediate transfer, to affect improvements or enhancements to performance. Perceptions of self-concept, experience, readiness to learn, and orientation to learning were addressed by Knowles's (1980) theory of andragogy.

Conclusions to research question 1. What SDL and job performance needs are supported by the use of Web 2.0 technology? The first research question was an inquiry into the factors considered in determining the selection of Web 2.0 technologies in order to understand the role of Web 2.0 technology in SDL activities linked to job performance. A study conducted by Hart (2012) found that many workers are using social networking tools to address their own learning and performance needs in the workplace. It is concluded through the analysis of this study that construction managers consistently turn to the Web 2.0 technologies that support project needs and are reputable, in compliance and supported by IT, available, easily accessed, convenient, and efficient.

Environmental factors shown to affect behavioral intentions toward the use of Web 2.0 technologies were evident in the data analysis for research question 1, namely, data and resources. Perceptions of orientation to learning shown to affect construction managers' initiative to identify material resources (Web 2.0 technology) for learning in diagnosing their learning needs were also evident in the data analysis for research question 1, namely, immediacy of application. Absent were incentives, self-concept, readiness to learn, experience, and knowledge.

Participant 1 (personal communication, March 21, 2016) stated, "I think convenience is the first thing that comes to mind for me. What do I have readily at hand? If I'm at my desk, I've got my computer. If I'm in the field, I've got my iPad." Participant 2 added:

> It depends on what my task is as far as which of these technologies I use. The hour-by-hour tasks as far as technologies that I would use if information that I need to understand isn't provided to me through an owner, subcontractor, or

> architect have given me already, my first go to would be to Google it and train myself if it is a terminology I don't understand or a new technology, I would research it that way. Through Google I would try to find some reputable sites or resources there. (personal communication, March 21, 2016)

Each of these verbatim statements adds support to the conclusion that Web 2.0 technology must be situated in the work environment to facilitate SDL experiences resulting in job performance.

Conclusions to research question 2. What factors are used to identify Web 2.0 technology for use at the individual level to enable SDL tied to specific job-performance outcomes? The second research question examined how construction managers determined which Web 2.0 technologies to use when working by themselves to answer a question, solve a problem, or researching to learn something new, what factors were used by construction managers in identifying Web 2.0 technologies for completing tasks that they are directly responsible for in their jobs, and the differences perceived by construction managers in identifying Web 2.0 technologies at work verses outside of work.

Environmental factors shown to affect behavioral intentions toward the use of Web 2.0 technologies were evident in the data analysis for research question 2, namely, data, resources, and incentives. A study conducted by Nyaude (2008) examined the impact of Gilbert's (2007) BEM variable on employee perception of motivation. Nyaude (2008) stated, "Knowledge and skills were perceived as highly motivating, followed by capacity, resources, information, motives and lastly incentive" (p. 86). This study confirms Nyaude's research findings as well as findings by Swanson and Holton (2001).

Swanson and Holton suggested, "Work is meaningful, workers are motivated by meaningful goals and participation and those workers should be increasingly self-directed and this self-control will improve efficiency and work satisfaction" (p. 48). Perceptions of orientation to learning shown to affect construction managers' initiative to identify material resources (Web 2.0 technology) for learning in diagnosing their learning needs were also evident in the data analysis for research question 2 namely, immediacy of application. Experience was also perceived. Absent were self-concept, readiness to learn, and knowledge.

> Participant 1 had this to say about technologies at work verses outside of work:
>
> I do a lot of home improvement stuff at my own house, and I use YouTube as far as how to do it yourself kind of stuff. That is a resource I use on a personal level. I don't use YouTube to learn how to do something work related because YouTube is blocked from work. Work-related stuff I don't really refer to blogs or anything that would be informal or not be able to be justified as a reputable resource. At home though, I don't worry so much about reputable resources. I am only accountable to me at home, so if I mess up on a project, I don't worry about consequences. (personal communication, March 21, 2016)
>
> Participant 2 added:
>
> So past level of success is one thing I use to determine which technology to use. And as far as Facebook, I don't use that for anything work-related. I keep that strictly as a social personal thing. I would never in a work setting use Facebook. If it's a particular process on a computer like a software package and you want to do a particular action, I have been known to look for YouTube videos that maybe

> sum it up because it is sometimes quicker to learn something when you can just sum it up and watch how one person does it. I watch the YouTube on my phone while I perform the action on my desktop computer. It's easier that way. I have been known to peruse forums once in a while. I'll find that something I'm working on is work related and I kind of read through that. Searching forums for using Excel I remember specifically. As far as the hardware, it's what I have at hand and what's been issued to me. (personal communication, March 21, 2016)

Participant 3 had this to say:

> It depends on the base of the question. If I'm looking to change a tire, I would probably try YouTube, a video demonstration is much easier to learn than reading it on the Internet. But Google can teach me a lot if it's just information I'm looking for. They give you some rank, and you can see which Web site they're from. Some of them are reputable by previous experience and some of them are new. I tend to get a variety actually. I usually click two or three links and get a brief summary of what I'm looking at. I typically look for forums through Google. Forums I feel like I'm getting realistic opinions. It's not something that went through an editor or writer and is being made for the Internet. It's someone like you and I posting a response to a question. That's usually what I look for. (personal communication, March 21, 2016)

Incentives were additional environmental factors that emerged in the data of this research question, specifically, consequences for poor performance. Experience was an additional perception that emerged. Participants' past level of success with Web 2.0 technology was an important factor in determining which Web 2.0 technology

construction managers used in diagnosing their learning needs. Participants were concerned that certain videos were restricted at work even though they readily used videos at home to answer a question, solve a problem, or research to learn something new. Participant 1 explained:

> I probably use the videos more at home than I do at work. I think if you're found sitting at your desk watching a video at work there is a bit of a stigma to that. You're goofing off. Whereas at home in your privacy you have a much more luxury to sit down. I can think specifically of using YouTube videos to figure out how to repair a carburetor in my snow blower this past winter. I don't think I would sit at work watching videos as much unless they were really on topic. Looking for the ones that really give me the information, or you need to compile. It's like a honing in process. You watch one and it kind of talks about what you're looking for but not exactly. Maybe they used one or two words in the video that then narrowed your search for the second video. They used a description, I had no idea what the process was and maybe this guy used the name of the process in the video. You Google that and all of a sudden you get seven videos that are specifically about that process. And you start with fixing the carburetor and later in the video they talk about rebuilding the carburetor or cleaning out this part or rebuild kit. So then you refine how you are describing it in your searches off of what you learned in the first couple of videos. And then you get some more targeted videos to watch. The amount of detail when they talk in generalities for the things I was looking at, if they didn't delve into the details or really show you the different steps, it didn't serve my purpose. And so the ones that give you more

> detail and break the steps down more and kind of display their knowledge of a particular topic, I tend to give more value and credence to and accept them as reputable. There was definitely some back and forth with the video as I was performing the task. I would begin the work and go back and watch the video a second time. I would start it, stop it, go back over the video a second time, and then start again. (personal communication, March 21, 2016)

Each of these verbatim statements adds support to the conclusion that Web 2.0 technology must be not only be situated in the work environment, but it must also be informative and intuitive; construction managers must have prior experience using it in order for them to be perceive it as reputable; and consequences for poor performance must be removed to facilitate SDL experiences resulting in job performance.

Conclusions to research question 3. What environmental factors affect a construction manager's ability to use Web 2.0 technology to engage in SDL? The third research question examined how construction managers perceive the rules governing the use of Web 2.0 technologies. Environmental factors shown to affect behavioral intentions toward the use of Web 2.0 technologies were evident in the data analysis for research question 3, namely, data and incentives. Perceptions of orientation to learning shown to affect construction managers' initiative to identify material resources (Web 2.0 technology) for learning in diagnosing their learning needs were also evident in the data analysis for research question 3 namely, immediacy of application. Self-concept was also perceived. Absent were resources, experience, readiness to learn, and knowledge.

Personal perceptions of rules guide construction managers' behavior intention toward selection and use of Web 2.0 technology. An interesting finding from the data of

this research question was that although construction managers perceived informal rules in place governing the use of certain Web 2.0 technologies, they continued to use it when working by themselves to answer a question, solve a problem, or when researching to learn something new. Construction managers did not perceive any formal rules in place governing the use of Web 2.0 technologies for SDL experiences resulting in job performance.

Participant 1 had this to say when asked how he felt about having rules in place governing the use of Web 2.0 technologies at work:

> I guess I understand the need for rules, but I think that the rules that are in place that post access denied or caution you're entering a site that can't be entered…I just close it. I don't need the hassle or whatever which is probably an inappropriate way of handling because the answer might be within that Web site that you're looking for. But it's kind of a deterrent for me to contact IT or go take the step to actually click through it because now I think they're watching me for whatever reason. So as far as that goes it's just a little unsettling when that red screen pops up at me because here I am truly trying to find an answer to a question and the answer might be there but beyond that I'll click the back button and click on one of the other links instead. (personal communication, March 21, 2016)

Participant 2 added:

> The only initial reaction or feeling that I get sometimes…I am an adult. I know when I'm screwing around and when I'm not. When I am honestly and earnestly trying to pursue and solve a work problem and some restriction pops up…I can't

> watch this video or I can't access this Web site or I'm not allowed to install this piece of software on my computer, that just irks me that I'm being hindered from working on my job. That's the only workplace rule that I feel I'm honestly pursuing my job and I run into a roadblock that's a corporate restriction or workplace rule…it's deflating. I'm trying to do my job and you're trying to stop me. When you're honestly pursuing your job and you get stopped, it's annoying or a bit of a letdown or a bit disheartening. (personal communication, March 21, 2016)

Because construction managers at this organization have personal iPhones with no rules or restrictions, Participant 3 had this to say:

> If I really need to go to YouTube, I can get there to do my job. I feel that if I need to do my job, I will go to YouTube even if the company disagrees with it. I have challenged the company on restrictions. Our company has an issue with Dropbox, but I still use it. There are certain security concerns with Dropbox, but there are certain ways to be secure. I use it web-based rather than installing the software on my computer. I don't want to say I'm being smart about it because I'm not a computer genius by any means. There are certain things I don't know. But I do it because I need to get my job done, and the alternative is way too time consuming and not efficient. (personal communication, March 21, 2016)

Each of these verbatim statements adds support to the conclusion that Web 2.0 technology must be informative, intuitive, and situated in the work environment, and consequences for poor performance must be removed to facilitate SDL experiences resulting in job performance.

Conclusions to research question 4. How is the success of job-performance outcomes resulting from Web 2.0 enhanced SDL opportunities determined? The fourth research question examined what factors determined that the work on a project or task was successful, the question was answered, the problem solved, or something new was learned. The environmental factor shown to affect behavioral intentions toward the use of Web 2.0 technologies evident in the data analysis for research question 4 was data, specifically expected performance and adequacy of performance. Absent were resources and incentives. Perceptions of orientation to learning shown to affect construction managers' initiative to determine the success of job-performance outcomes resulting from Web 2.0 enhanced SDL opportunities were also evident in the data analysis for research question 4, namely, orientation to learning, self-concept, readiness to learn, and knowledge. Absent was experience.

An interesting finding from the data of this research question was that construction managers generally determined the success performance outcomes at home differently than at work. This was the only research question in which social role emerged as a categorical theme. Social role refers to the role construction managers take in a work-group situation to conform to expected performance behaviors of others as well as expectations they have set for themselves. Expected performance and adequacy of performance were found to be determined by the construction manager himself in an at home situation where Web 2.0 technology was used to enhance SDL opportunities. In the work context, the success tended to be determined by others (superiors, architects, and project owners). In the work context, Participant 1 explained:

> I guess to confirm that the information solved the problem would be that I was able to take that information and answer the superintendent's questions and reply to him. In the context of home. I figured out how to repair a carburetor in my snow blower this past winter by watching several YouTube videos. The performance outcome was a success when I was able to start my snow blower. (personal communication, March 21, 2016)

Participant 2 (personal communication, March 21, 2016) added his commentary about the work context, "For success I was able to produce or communicate what I wanted to the individual and it seemed to work; they seemed to get the message." Participant 2 added these comments for the context of home:

> I do a lot of home improvement stuff at my own house, and I use YouTube as far as how to do-it-yourself kind of stuff. I have a certain table saw and I was able to replace the blade by learning how to on YouTube. I know I replaced it correctly because it works just like it did when it was new. (personal communication, March 21, 2016)

Participant 3 had this to say:

> Apart from me getting the answer that I knew I needed, the approval by my superiors that something gets done. It's foregoing the discussion that I was preparing for by researching. If the conversation doesn't go well and they say it's wrong, then obviously I've failed. (personal communication, March 21, 2016)

Each of these verbatim statements adds support to the conclusion that self-interest and self-fulfillment are associated with Web 2.0 technology to facilitate SDL experiences resulting in job performance.

Other conclusions. Web 2.0 technology has been shown to have a mediating effect on activity through the use of symbols for linguistic communication and artifacts for externally managed collective knowledge (Boileau, 2011). Rossett and Schafer (2007) view this effect in terms of performance support, as a repository for information, processes, and perspectives that inform and guide planning and action. The Web 2.0 solutions that support employees during the performance of a task are termed sidekicks. One example of a sidekick emerging from the data analysis of this study is the Microsoft Word document that Participant 2 created with step-by-step procedures on how to perform a function in a newer version of Microsoft Excel. The tutorial provided the steps to follow while completing this specific task.

Relevance ensures support, enabling a self-directed learner to accomplish his or her goals in a specific context, and personalization adjusts information and guidance according to a set of individualized needs in a specific context (Rossett & Schafer, 2007). A study conducted by Milovanovic et al. (2012) found that a wiki did facilitate informal learning and was a useful informal tool for the employees in the company to share knowledge and learn from each other during the process of software development. The wiki analyzed in the study conducted by Milovanovic et al. is comparable to the company database described by the participants in this study. The majority of studies seem to focus on the context of use of the Web 2.0 tools as opposed to how and why the Web 2.0 tools were implemented (Baxter & Connolly, 2014). For example, Holtzblatt et al. (2010) assumed an investigative study to explore whether wikis could be applied effectively to support SDL within a nonprofit organization. Employing unstructured and open-ended interviews the study uncovered various factors that prohibit the usage of wikis for SDL

namely a reluctance to share information on the wikis among colleagues because of issues of information sensitivity, an unwillingness to share work that is unfinished, and concerns about the openness of information on the wikis (Baxter & Connolly, 2014). The study also concluded that to ensure successful adoption of wikis, organizations should consider factors such as incentive structures to entice staff to use the wikis in addition to authoring clearer guidelines and policies defining the wikis' scope and use.

It is concluded that the company database represents significant Web 2.0 technology that has a mediating effect on the SDL activities of construction workers in this organizational setting. It is a repository for information, processes, and perspectives that have been accepted by the company and is, therefore, deemed a reputable source. The database informs and guides the SDL activities of construction managers, resulting in job-performance outcomes acceptable to construction managers as well as others. In most organizations, the flow of communication moves downward, or via a top-down approach—from someone of higher authority to someone of lower authority (Ober, 2009). Upward, or bottom-up communication is the flow of information from lower-level employees to upper-level employees. One interesting point of note derived from the research was that although the contribution to the company database must first be approved by a committee, the content created on the database occurred from the bottom. This finding exemplifies SDL as a type of employee development where employees were given an opportunity to be heard.

Recommendations

This section includes suggestions for further research as developed from the data. The findings of this qualitative case study exemplify that Web 2.0 technology plays an

important role in SDL and performance outcomes of today's construction managers. Organizations should recognize the role Web 2.0 technology plays and the influence it has on SDL and performance outcomes in order to manage successfully, train, and cultivate their workforce. The findings of this study point to four recommendations for addressing and improving the role of Web 2.0 technology in SDL and performance in organizational settings: (a) identify Web 2.0 technology, (b) build a code of conduct with employees, (c) create internal collaboration, and (d) communicate expectations of adequate performance.

Recommendation 1: Identify Web 2.0 technology. It has been established through this study that Web 2.0 technology must be situated in the work environment to facilitate SDL experiences resulting in job performance. A recommendation for this finding is that organizations identify the Web 2.0 tools they feel are most beneficial to the organization and endorse them as workplace friendly learning resources. If employees know that Google is considered a work-friendly workplace tool, for example, but LinkedIn or Facebook are not, then employees have guidelines for their SDL choices.

Recommendation 2: Build a code of conduct with employees. Personal perceptions of rules guide construction managers' behavior intention toward selection and use of Web 2.0 technology. Boileau (2011) found that interactive technology tools to enable social learning and collaboration are being adopted by employees on their own initiative, rather than waiting for them to become available through the company. An interesting finding from the data of this research question was that although construction managers perceived informal rules in place governing the use of certain Web 2.0 technologies, they continued to use it when working by themselves to answer a question,

solve a problem, or when researching to learn something new. Employees and employers alike are still learning how to learn with Web 2.0 technology. It is recommended that organizations work in collaboration with employees to define how Web 2.0 technology can and should be used in the workplace for SDL purposes. The collaboration process may be enhanced by incorporating learning teams, employees, and management into the collaboration process to establish what rules should be in place, and what consequences for any infringements should be. Organizations should also find out from employees how Web 2.0 technologies are enhancing their productivity. The goal here is to encourage more SDL and job-performance outcomes resulting from the use of Web 2.0 technology while maintaining focus and security integrity.

Recommendation 3: Create internal collaboration. Web 2.0 technology must be informative, intuitive, situated in the work environment, and consequences for poor performance must be removed to facilitate SDL experiences resulting in job performance. In the interest of supporting the performance of employees, many organizations employ strategies that attempt to extend key messages and create mantras to influence more effectively learning and performance. Through print and online materials, such as job aids or performance support, documentation and help systems, organizations, along with their HRD professional counterparts are able to break the physical and temporal boundaries associated with training experiences (Bernardez, 2012; Rossett & Sheldon, 2001). Some circumstances merit the use of information support rather than training. These approaches should be pursued when a task is performed infrequently; when it involves many steps and decisions; when the consequences of making a mistake would be grave; when knowledge is changing, vast, and complex; and when resources are tight.

Boileau (2011) found that learning organizations in all business sectors are embracing social media to enable social learning. According to Boileau, "Social media allows individuals and organizations to embrace the needs of changing workplace demographics and enables people of all ages to learn in ways that are comfortable and convenient for them" (p. 151).

Organizations should create internal collaboration and Web 2.0 technology that encourages information and knowledge sharing while minimizing security and confidentiality risks. Web 2.0 technologies should be aligned with the organization's industry to guide employees to the resources that offer the most learning potential.

Recommendation 4: Communicate expectations of adequate performance. This study found that expected performance and adequacy of performance are environmental factors affecting behavioral intentions toward the use of Web 2.0 technologies. Organizations should begin the process of expectations for use of and proficiency with Web 2.0 technology by explicitly communicating those expectations to employees. Employees should be given of list of Web 2.0 technologies that the organization uses and reasons for using each. It may not be enough for an organization to identify, implement, and communicate expectations of adequate performance for Web 2.0 technologies. Organizations need to be sure their employees adopt the technology and use it. This study has established that Web 2.0 technology needs to be intuitive if it is to mediate SDL. Web 2.0 technology should require minimal training and guide the employee to a desired performance outcome. Technology changes rapidly, and more and more tools are being introduced. Employees need to see the benefit of newly introduced Web 2.0 technologies because they may resist the change and continue performing tasks

in a method that is more familiar to them, especially if employees fail to see immediacy of application in how the new technology solves problems. Involving employees in the change that new Web 2.0 technology brings about will help them realize the problem-solving applications of the new technology and allow organizations to promote early successes with it. Communicated in this way, employees realize the value of the technology to the company as well as to themselves.

Other recommendations.

***Recommendations for HRD professionals*.** To keep up with the rapid changes in Web 2.0 technology, HRD professionals need to (a) determine barriers that are preventing employees from accessing the tools that could enhance their SDL and job performance outcomes, (b) make available to employees Web 2.0 technologies that connect SDL with job performance, and (c) encourage employees to learn continuously using mobile and digital tools. To enable the integration of Web 2.0 technology into a blended learning site, HRD professionals can provide employees with a myriad of learning options, such as workshops, seminars, and even webinars that offer employees the opportunity to tailor their learning according to their performance needs. To cultivate SDL facilitated by Web 2.0 technologies, organizations should provide adequate time, opportunities, resources, and incentives to develop competencies in using Web 2.0 technologies to solve problems and perform tasks.

Employees may face challenges if they do not receive guidance in using Web 2.0 technologies. SDL facilitated by Web 2.0 technologies requires a set of skills for effective implementation. These skills include literacy with using Web 2.0 technology, time management, self-evaluation of learning outcomes, and the ability to work

independently. HRD professionals should be responsible in guiding and training employees to support their learning experiences. Employees face a number of challenges such as retrieving misleading information or information that lacks credibility. HRD professionals should play a critical role supporting and mentoring employees to uncover and work together to alleviate these challenges.

Recommendations for future research. Further research is needed for understanding and documenting the role of Web 2.0 technologies, emerging technologies in SDL, and job-performance outcomes in other organizations, learning contexts, and with other learners, providing broader insight to practice and policy recommendations. This could be accomplished using the research design and associated constructs developed for this study, serving as a qualitative research framework for future case studies involving different audience segments. An interesting finding from the data was that construction managers generally determined the success of performance outcomes at home differently than at work. Investigating the role of Web 2.0 technologies in SDL and performance outcomes could offer investigation into a different learning context. Additionally, this study was restricted to a particular group in a single organization, examining only male construction managers between the ages of 25 and 40 in one Chicago-based construction company, although the construction company maintained offices in three other U.S. cities. A similar study could be expanded to include the collective individualized experiences bounded by the four U.S.-based locations within the single organization. Further, a similar study could be expanded to include female construction managers and construction managers older than the age of 40. The findings reported in this study may provide a baseline for such future research.

Summary

The manner in which Web 2.0 technologies are used by construction managers who share the same roles and responsibilities and expected job-performance outcomes within the same organizational setting is conflicting. This study's purpose was to contribute insight into this phenomenon to bring about a collective understanding.

The intent in this study was to describe a particular context in depth rather than to generalize findings to another setting or population, thus providing the rationale for purposeful sampling. The qualitative research approach applied to this study was primarily inductive, using empirical data to build concepts, understanding, and theory rather than deductively testing hypotheses. There were three categories of information that were considered necessary in order to answer the four research questions posed in this qualitative, single-instrumental case study: contextual, perceptual, and theoretical.

First, the contextual information provided insight into the way construction managers construct the reality in which their SDL activities transpire. Cultural, environmental, and personal factors conflate to influence behavior that is tied to context (Boileau, 2011). Environmental factors (data, resources, and incentives) and personal factors (motives, capacity, and knowledge) were addressed by Gilbert's (1996) BEM. Contextual information was collected for this study primarily through in-depth interviews with participants and observation of visual documents.

Second, construction managers' perceptions were explored in this research study via interviews conducted individually with participants. The perceptions of construction managers helped to explain SDL experiences with Web 2.0 technology leading to surfacing patterns to address the research questions posed by the study. Performance of

construction managers involves relationships among their perceptions of the job and setting, tools in the environment, and SDL activities leading to some new insight affecting on-the-job performance (Boileau, 2011). The tools for knowledge development and SDL activities engaged in by construction managers tend to be situated more closely to the environment in which the work is performed. In this context, the focus is on immediate transfer, to affect improvements or enhancements to performance. Perceptions of self-concept, experience, readiness to learn, and orientation to learning were addressed by Knowles's (1980) theory of andragogy. Knowles's theory of andragogy and Gilbert's (1996) BEM brought focus to the interplay among the SDL activities mediated by Web 2.0 technology, the work environment, and the perceptions of the construction project managers that affect performance (Boileau, 2011).

Finally, the theoretical and empirical research reviewed provided evidence of a strong research framework, based in the theories of Knowles's (1980) andragogy and Gilbert's (1996) BEM, which were used to guide the analysis and methods for this qualitative case study. In general, Knowles's (1980) theory of andragogy and Gilbert's (1996) BEM provided an analytical framework applied in this study to describe the role of Web 2.0 technology in SDL and job performance in a single organizational setting.

This study contributed to the field of HRD by providing a new lens to view Web 2.0 technology's role in SDL and job performance within a single organizational setting thereby enabling its integration into a blended learning site. A practical application for the study is to provide insight to HRD professionals and this study's participants into best practices and recommendations for the adoption and application of Web 2.0 technology.

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APPENDIX A

Call for Participation—Web 2.0 Technology Project

Greetings, Construction Managers,

My name is Shirley Caruso, and I am a graduate student in the Doctor of Education Program with a concentration in Educational Technology and Leadership at William Howard Taft University. I am interested self-directed learning, job performance, and Web 2.0 technology, and have previously worked in various human resource development (HRD) capacities in both small and large organizations. HRD practitioners play a very important role in developing employees in an organization. I am interested in ***conducting research that specifically examines the role of Web 2.0 technology in self-directed learning and performance of construction managers in an organizational setting***.

If you are a construction manager who: 1) has earned a four-year college degree; 2) has been with the company at least five years; 3) is between the ages of 25 and 40; and 4) has basic skills using Web 2.0 technology including, but not limited to Web-based communities and hosted services, such as social-networking sites (i.e. LinkedIn and Facebook), video sharing sites (i.e. YouTube), wikis, blogs, performance support tools, performance support systems, and search engines such as Bing®, Yahoo®, and Google®, and the hardware that supports this technology, including, but not limited to desktop, laptop, or handheld computers, web cams , smartphones and tablets and the use of applications (apps), which are being accessed from mobile devices, then I would like to request your participation in this study.

If you agree to participate, you will engage in one person-to-person 45-75 minute interview in which you will be asked to explain: 1) the self-directed and job performance needs that are supported by the use of Web 2.0 technology; 2) factors are used to identify Web 2.0 technology for use at the individual level to enable SDL tied to specific job performance outcomes; 3) the environmental factors that affect your ability to use Web 2.0 technology to engage in self-directed learning; and 4) how is the success of job performance outcomes resulting from Web 2.0 enhanced self-directed learning opportunities determined. The interview will be digitally recorded.

The interview will take place ***during the month of March, 2016***. If you would like to participate and this timeline does not work for you, I can work around your schedule. After the interview has been completed and transcribed, I will follow up with you by telephone to clarify any points or ideas that may have come up during the transcript review.

Your identity will be kept confidential, and pseudonyms will be provided for all participants.

It is my hope that participation in this study will not only benefit you as you reflect on

your experiences, but also contribute more broadly to understanding the role of Web 2.0 technology in the self-directed learning literature base. Moreover, it may also provide HRD practitioners with ways in which to incorporate Web 2.0 technology into organizational training and development initiatives. Participants will not be compensated for their time/participation.

If you would like to participate or have any questions about the study, please contact me at [redacted] Thank you in advance for your time and consideration.
Best regards,

Shirley J. Caruso

APPENDIX B

Informed Consent Letter

TOWARD UNDERSTANDING THE EFFECT OF WEB 2.0 TECHNOLOGY IN SELF-DIRECTED LEARNING AND JOB PERFORMANCE IN A SINGLE ORGANIZATIONAL SETTING: A QUALITATIVE CASE STUDY

Prospective Research Subject

Please read this consent form carefully and ask as many questions as you like before you decide whether you want to participate in this research study. You are free to ask questions at any time before, during, or after your participation in this research.

You are invited to participate in a research study designed to investigate the effect of Web 2.0 technology on self-directed learning and job performance in a single organizational setting.

Shirley Caruso, a doctoral student at William Howard Taft University is conducting this study.
You were selected as a possible participant because you engage with a variety of Web 2.0 technologies in the daily course of performing your job. These Web 2.0 technologies include, but not limited to Web-based communities and hosted services, such as social-networking sites (i.e. LinkedIn and Facebook), video sharing sites (i.e. YouTube), wikis, blogs, performance support tools, performance support systems, and search engines such as Bing®, Yahoo®, and Google®, and the hardware that supports this technology, including, but not limited to desktop, laptop, or handheld computers, web cams, smartphones and tablets and the use of applications (apps), which are being accessed from mobile devices.

Please read this form and ask any questions you may have before agreeing to participate.

Background Information

This investigation seeks to expand the knowledge base of adult learning self-directed learning and is focused on Web 2.0 technology and its effect on characteristics associated with adult learners' ability to engage in self-directed learning. Part of the discussion focuses on learners' preferences in relation to the emergence of Web 2.0 technology. In this discussion of learner preferences, learning environments that participants engage in and the motivation behind their engagement will be explored.

Procedures

APPENDIX B: INFORMED CONSENT LETTER AND FORM/TEMPLATE (CONTINUED)

Participation entails engaging in a person-to-person interview. If you agree to participate in this study, you will be contacted to schedule a time that is convenient for you. The interview will last between 45 and 75 minutes and will take place during February 2016. You will be asked to explain: 1) the self-directed and job performance needs that are supported by the use of Web 2.0 technology; 2) factors are used to identify Web 2.0 technology for use at the individual level to enable SDL tied to specific job performance outcomes; 3) the environmental factors that affect your ability to use Web 2.0 technology to engage in self-directed learning; and 4) how job performance outcomes resulting from Web 2.0 enhanced self-directed learning opportunities are measured. The interview will be digitally recorded.

You would be asked to provide a pseudonym to replace your personal name. Only anonymous demographics would be used in this study. Providing your address or e-mail would make the findings of the study available to you once documented.

The results of this study would be used to provide insight to human resource development professionals and the participants of this study into best practices and recommendations for the adoption and application of Web 2.0 technology.

Confidentiality

The records of this study would be considered private information. Private information herein means information ascertained by the investigator and constitutes research involving human subjects. Private information includes information about behavior that occurs in a context in which an individual can reasonably expect that no observation or recording is taking place, and information which has been provided for specific purposes by an individual and which the individual can reasonably expect would not be made public.

In any sort of report that might be published, no information would be included that would make it possible to identify a participant. Only the candidate/researcher would keep and safeguard the research records.

Voluntary Nature of this Study

Your decision whether to participate would not affect your current or future relationship with the candidate/researcher or the associated University. If you decide to participate, you are free to withdraw at any time without prejudice. You will also be provided with a copy of the concluded dissertation so that you have an opportunity to examine the manner in which the data is being applied.

Participation in this study is completely voluntary. You would not receive monetary compensation/reward for your participation. The personal benefits of your participation are as mentioned in the following section.

APPENDIX B: INFORMED CONSENT LETTER AND FORM/TEMPLATE (CONTINUED)

Benefits of Participating in this Study

This study may contribute to the field of human resource development by providing a new lens to view the role of Web 2.0 technology in SDL and job performance within an organizational setting thereby enabling its integration into a blended learning site. A practical application for the study is to provide insight to human resource development professionals and the participants of this study into best practices and recommendations for the adoption and application of Web 2.0 technology.

Risks of Participating in this Study

There is minimal risk to participating in this study, meaning that the risks of harm anticipated in the proposed research are not greater than those ordinarily encountered in daily life. If you experience some emotional discomfort after your participation, you are invited to contact the student/researcher at the telephone number or e-mail address listed in the following section to discuss your reactions.

Contacts and Questions

You may ask any questions you have by contacting the researcher by telephone at [redacted]

Statement of Consent

I have read the information herein, I have asked questions and received answers, and I have received a copy of this form. I consent to participate in this study.

[redacted] March 21, 2016

Participant/Subject Date

Candidate/Researcher Statement

All information contained herein is accurate. I have provided the participant with a copy of this form.

_____ March 21, 2016

Candidate/Researcher Date

APPENDIX C

Semistructured Interview Guide

Q1: What SDL and job performance needs are supported by the use of Web 2.0 technology?

1. Think about the kinds of Web 2.0 technology that you use, such as such as social-networking sites (i.e. LinkedIn and Facebook), video sharing sites (i.e. YouTube), wikis, blogs, performance support tools, performance support systems, and search engines such as Bing®, Yahoo®, and Google®, and the hardware that supports this technology, including, but not limited to desktop, laptop, or handheld computers, web cams , smartphones and tablets and the use of applications (apps), which are being accessed from mobile devices. What factors would you consider in determining which Web 2.0 technology or technologies is/are appropriate for achieving the best performance outcome?

Q2: What factors are used to identify Web 2.0 technology for use at the individual level to enable SDL tied to specific job performance outcomes?

2. How do you determine which Web 2.0 technologies (e.g., LinkedIn, Facebook, YouTube, wikis, blogs, performance support tools, performance support systems, and search engines such as Bing®, Yahoo®, and Google®, and the hardware that supports this technology, including, but not limited to desktop, laptop, or handheld computers, web cams , smartphones and tablets and the use of applications (apps), which are being accessed from mobile devices) to use when you're working by yourself to answer a question, solve a problem, or researching to learn something new?

3. What factors would you use in identifying Web 2.0 technologies for completing tasks that you are directly responsible for in your job?

4. Explain the differences that you perceive in identifying Web 2.0 technologies at work versus outside of work.

Q3: What environmental factors affect construction manager's ability to use Web 2.0 technology to engage in SDL?

5. Think about the different Web 2.0 technology tools that you can access at work such as LinkedIn, Facebook, YouTube, wikis, blogs, performance support tools, performance support systems, and search engines such as Bing®, Yahoo®, and Google®, and the hardware that supports this technology, including, but not limited to desktop, laptop, or handheld computers, web cams, smartphones and tablets and the use of applications (apps), which are being accessed from mobile devices. What kinds of work rules (formal or informal) are in place governing the use of these technologies when you are working on a project or task?

APPENDIX C – SEMI-STRUCTURED INTERVIEW GUIDE (CONTINUED)

6. How do you feel about having rules in place governing the use of Web 2.0 technologies at work?

Q4: How is the success of job performance outcomes resulting from Web 2.0 enhanced SDL opportunities determined?

7. Think about a time when you used Web 2.0 technologies to work on a project or task, answer a question, solve a problem, or conducted research to learn something new. What factors determined that the work on a project or task was successful, the question was answered, the problem solved, or something new was learned?

Notes for interview questions:

1. Interview questions for this study are shown in bold and represent the top level category (i.e., Q1, Q2, Q3, and Q4) for coding interview data. Sub-categories will be established and refined during analysis and interpretation of the data.
2. Numbered questions (i.e., 1-7) will be asked of the participants in a semi-structured interview format with follow-up questions used to render clarity based on the responses received.

APPENDIX D

Permission To Conduct Research Study

[redacted]

[redacted]

March 7, 2016

Ms. Shirley J. Caruso

[redacted]

RE: Permission to Conduct Research Study

Dear Ms. Caruso:

I am writing to approve your request to conduct a research study using construction managers of [redacted] as participants. I understand you are currently enrolled in the EdD program at William Howard Taft University and are in the process of writing your doctoral dissertation. The study is entitled **TOWARD UNDERSTANDING THE ROLE OF WEB 2.0 TECHNOLOGY IN SELF-DIRECTED LEARNING AND JOB PERFORMANCE IN A SINGLE ORGANIZATIONAL SETTING: A QUALITATIVE CASE STUDY**.

[redacted] will allow you to complete semi-structured interviews with three construction managers while simultaneously observing them in their natural work setting and reviewing visual documents. Due to the nature of the study, all identifying information must either be anonymous, or renamed. The researcher will give interested project managers, who volunteer to participate, a consent form to be signed and returned to the researcher at the beginning of the interview process.

The interview/observation process should take no longer than 75 minutes (for each participant) to complete. The data collection results will be coded for the dissertation study, and individual results of this study will remain absolutely confidential and anonymous. Should the study be published, only coded results will be documented. No costs will be incurred by either [redacted] or the individual participants. [redacted] approval to conduct this study is contingent upon the conditions specified in this approval.

I would be happy to answer any questions or concerns that you may have at this time. You may contact me at [redacted]

Sincerely,

[redacted]