TEACHING KEY COMPETENCIES OF EFFECTIVE CONSTRUCTION PROJECT

MANAGERS TO ADULTS IN HIGHER EDUCATION

A Dissertation

Presented in Partial Fulfillment of the Requirements for the

Degree of Doctor of Philosophy

with a

Major in Adult and Organizational Learning

in the

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University of Idaho

by

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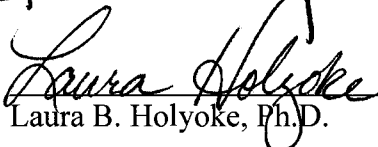
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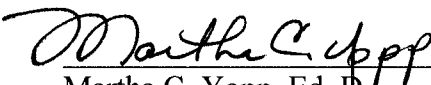
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This dissertation of R. Casey Cline, submitted for the degree of Doctor of Philosophy with a major in Education and titled "Teaching Key Competencies of Effective Construction Project Managers to Adults in Higher Education", has been reviewed in final form. Permission, as indicated by the signatures and dates given below, is now granted to submit final copies to the college of Graduate Studies for approval.

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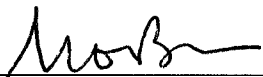James A. Gregson, Ph.D.

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ABSTRACT

The purpose of this mixed method study was first to identify the most significant key

competencies needed to be an effective project manager (PM) in the United States (U.S.)

commercial construction industry and second to identify the teaching perspective most often

used when teaching the identified key competencies to adults in higher education. Quantitative

data concerning key competencies was gathered from commercial construction project managers,

and then specific questions were developed and used during interviews conducted in the

qualitative portion of the study. The questions, developed to work within the five different

perspectives on teaching from Pratt's conceptual framework of teaching adults in higher

education, were used to query current faculty members of U.S. construction management (CM)

colleges to determine which of the five perspectives, or combination thereof, is most often used

when teaching identified key competencies to CM students. The study is significant because by

gaining a greater understanding of what key competencies are needed to effectively manage a

commercial construction project, and the teaching perspective most often used to teach those key

competencies, more effective education and training methods and procedures can be developed

to facilitate the instruction of the defined key competencies, and improve the effectiveness of

future project managers in the commercial construction industry.

ACKNOWLEDGMENTS

I would like to acknowledge all of those individuals that helped and supported me in my quest to complete this journey. I want to thank my committee members, especially Dr. Martha Yopp and Dr. Linda Huglin for their insights, expertise, and encouragement in completing this course of study.

To my friends, thank you for your understanding, and unwavering support.

To my Mother, I thank you for your faith and prayers.

To my Father, I thank you for showing how proud you were of my journey. I am truly glad that you were able to see me reach my goal.

To my Grandfather, Armon H. Bost, I thank you for support that you gave, the role model that you were, and the inspiration to always keep learning.

To my Family, Paige, Kylie, and Kami, I thank you for supporting me in this long journey. Only with your support could it have been accomplished. I hope that we all can share this life's accomplishment.

DEDICATION

This research is dedicated to my wife Paige who supported me through out the process. It is also dedicated to my children Kylie and Kami, from whom I learn every day.

TABLE OF CONTENTS

Chapter I

INTRODUCTION

The construction industry is one of the largest industries in the United States and contributes

significantly to the economic base of the country. Construction disciplines vary widely and

include residential, commercial, industrial, and civil specialties. The scope of projects may range

from medium to large scale, depending upon the size, complexity, and duration of the project

(2003b). Construction project delivery methods vary widely, and include traditional general

contracting, construction management (CM), and design-build methods.

Regardless of the discipline, scope, or delivery method, to effectively manage construction

projects the Project Manager (PM) must have a definable set of key competencies that facilitate

his/her ability to effectively lead administrative personnel, supervisors, foremen, skilled and non-

skilled labor, subcontractors, and suppliers by applying learned skills, knowledge, values, ethics,

and characteristics (Gharehbaghi & McManus, 2003a). However, the specific educational tools

and knowledge needed to be an effective construction project manager have not been extensively

quantified (Fisher, Schluter, & Toleti, 2005).

It was the goal of this study to identify the most significant key competencies needed to be an

effective PM in the U.S commercial construction industry by surveying PMs that, in accordance

to parameters set forth by the study, are effective. The second goal was to identify the teaching

perspective most often used when teaching the identified key competencies to adults in

construction programs by querying current faculty members of CM colleges. By gaining a

greater understanding of the most significant key competencies needed to effectively manage a

commercial construction project, and identifying the teaching perspective most commonly used to teach those key competencies, CM educators will be able to focus on the development of education and training methods and procedures to facilitate the instruction of the identified key competencies and improve the effectiveness of future PMs in the commercial construction industry.

Research Context

The management of construction projects has evolved into a complex process that requires a project manager to have substantial knowledge of business practices, expertise in the construction processes for which he or she is responsible, and the ability to lead a diverse group of skilled and non-skilled personnel in daily operations. Interestingly, the business practices, construction processes, and daily operations on construction projects are rarely the same from day-to-day, let alone project-to-project. In contrast to other manufacturing industries that fabricate a large number of products, the construction industry is generally focused on the production of a single and unique product. In addition, the construction industry differentiates itself from other industries in that the life span of most projects is exceptionally long, is characterized by high cost and high risk, usually includes multiple entities both large and small, and requires significant information handling needs (Goodman & Chinowsky, 2000). Fittingly, construction projects have been described as the on-site, mass production of a one of a kind item, and are cited by Glibly, Hendrickson and Tung (2003) as "any collection of vaguely related activities that are ninety percent complete, over budget and late." Therefore, as construction projects become increasingly complex, the more critical the overall management function becomes, and the more the need for the management of the project to be conducted by an effective project manager increases (Udo & Koppensteiner, 2004).

Therefore, this study was conducted to gain a greater understanding of the most significant key competencies that a project manager must possess to be effective in the U.S. commercial construction industry. The researcher undertook this study because of his belief that by identifying the key competencies commercial construction project managers need to be effective in the U.S. construction industry, educators and trainers would be able to more aptly provide future and current project managers with the tools they will need to be effective.

Statement of the Problem

Commercial construction project managers in the U.S. construction industry are charged with the task of completing construction projects on time and on budget. This task is required even though construction projects vary greatly from project to project, and the personnel they are required to lead have diverse education, skill, and knowledge levels. Towards this end, the commercial construction project manager must possess key competencies that enable him/her to effectively lead a complex mix of personnel in accomplishing the set goals of the construction project. At question is what key competencies are needed for U.S. commercial construction project managers to effectively manage a construction project, and what is the teaching perspective most often used when teaching those key competencies?

Purpose of the Study

The purpose of this mixed method study was first to identify the most significant key competencies needed to be an effective project manager (PM) in the United States (U.S.) commercial construction industry and then to identify the teaching perspective most often used when teaching the identified key competencies to adults in higher education. In addition, the study gathered demographic data to determine the age, gender, educational level, and educational focus of effective project managers to provide a comparison of beliefs among groups.

Rational / Justification / Significance

The research topic is of significance to the construction industry, to construction education

programs, and to the researcher personally. The increase in the complexity of construction

projects has created greater demand for management-level personnel within the construction

industry. Technological advances and ever increasing standards for buildings and construction

materials, worker safety, energy efficiency, and environmental protection set forth by

government and industry has complicated the construction process. New developments in

construction materials and methods, the need to replace the nation's infrastructure; and the

growing popularity of energy-efficient structures has further added to the demand for more

construction managers. Additional opportunities for construction managers have also increased

due to the need for greater cost control and financial management of projects (U.S. Department

of Commerce, 2005).

Construction education programs are charged with providing an education that will result in a

leadership role in construction. Standards and criteria for accredited construction education

programs set forth by the American Association of Cost Engineers (ACCE) (2004) state that CM

curricula should be responsive to technical developments and should reflect the application of

evolving knowledge in the construction industry. The ACCE further charges CM programs to

regularly evaluate and develop curricula that reflect changing construction technologies and

management trends.

The researcher is a professor in the Department of Construction Management at Boise State

University, and believes that much of construction education must follow a behavioral

viewpoint, in that specific learning objectives involving key competencies must be determined.

The identified key competencies must then be used to develop specific courses, programs, and

learning activities with an end goal of developing best practices that facilitate a learner's mastery

of CM knowledge, and the development of specific skills and competencies. This study was

guided by literature and research on educational theory, input by construction industry

professionals, standards and criteria of CM educational programs.

Research Questions

This study will address the following research questions:

1. What are the most significant key competencies needed to be an effective project

   manager in the U.S commercial construction industry?

2. What are the teaching perspectives most often used when teaching the identified key

   competencies to adults in higher education construction programs?

Demographic data gathered in the study was used to answer the following questions:

1. What is the age segmentation of construction project managers that, within the

   parameters set forth by the study are deemed to be effective?

2. What is the gender segmentation of construction project managers that, within the

   parameters set-forth by the study are deemed to be effective?

3. What is the educational level segmentation of construction project managers that, within

   the parameters set-forth by the study are deemed to be effective?

4. What is the educational degree segmentation of construction project managers that,

   within the parameters set-forth by the study are deemed to be effective?

Limitations

Limitations for the study were identified as follows:

1. Participants in the quantitative portion of the study make up a convenience sample of employees of commercial construction entities that have agreed to participate in the study and were not randomly selected.

2. The survey instrument used in the quantitative portion of the study to gather data was electronically distributed; thus the participants had to have access to a computer and the internet to participate in the survey.

3. Participants in the qualitative portion of the study were a representative convenience sample of current faculty members of CM colleges.

4. The success of interviews conducted in the qualitative portion of the study was dependent upon the interviewing skills of the researcher (IDRC, 2007).

Delimitations

Delimitations for the study were identified as follows:

1. Participants in the quantitative portion of the study were employees of construction entities that agreed to participate in the study. All of the construction entities were located within the West Coast and Pacific Northwest regions of the United States.

2. All of the construction entities that agreed to participate in the study were in the top 400 U.S. construction entities ranked by 2005 construction revenue, and as reported by Engineering News Record (ENR) (2005).

3. Participants in the qualitative portion of the study were current faculty members of geographically diverse CM colleges accredited by the ACCE.

4. The Likert scale survey instrument used in a previous study to determine the key competencies of construction project managers was modified slightly for the study. To confirm the validity of the revised instrument a pilot study was conducted.

Assumptions

A formal hypothesis was developed for the quantitative portion of the study. The basis of the hypothesis was the belief of the researcher that distinct and specific key competencies must be acquired and possessed to be an effective project manager in the U.S. commercial construction industry. No explicit statement of a research problem was developed for the qualitative portion of the study; however, like any worthwhile research design, an implicit issue or problem, both intellectual and practical was identified. Specifically, that a dominate use of a teaching perspective used to teach the identified key competencies to adults in higher education construction programs could be identified. Other identified assumptions for the study were as follows:

1. The review of literature was complete and accurate.

2. The participants in the quantitative portion of the study were effective because of their position of authority in companies ranked within the ENR Top 400 companies by revenue in 2005.

3. The survey responses by participants were honest and accurate.

4. The quantitative sample was a representative sample of the population.

5. The qualitative sample was a representative sample of the population.

6. The teaching perspectives used to teach the identified key competencies to adults in higher education construction programs work within the five qualitatively different perspectives on teaching that form Pratt's (1998) conceptual framework of teaching adults in higher education.

Definition of Terms

Construction. Assembled or complete part of construction works that result from work on site (ISO - 6707, 2004).

Construction Management. The engagement of an experienced Contractor whose responsibility is to provide an organization for the purpose of:

- assisting in the preliminary planning relative to the design requirements for the project.

- advising on schedules, budgets, and economics of various methods, material selection and detailing during the design phase.

- advising on and arranging for all services and all Trade Contractors for carrying out the various phases of work.

- planning, scheduling, coordinating and supervising the activities of all Trade Contractors.

- providing technical and clerical services in the administration of the project (CCA, 1974).

Construction Project Management. The process of planning, organizing and administering control and result assessment of a construction project (ISO - 12006, 2006).

Project. Unique process, consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including the constraints of time, cost and resources (ISO - 1006, 1997).

Project Management. The utilization of skills and knowledge in coordinating the organizing, planning, scheduling, directing, controlling, monitoring and evaluating of prescribed activities

to ensure that the stated objectives of a project, manufactured product, or service, are achieved (AACE, 1990).

Project Manager. The person that shall have definite authority to enter into contracts and make commitments on behalf of the client, and have responsibility for all day-to-day decisions. The extent of this authority and responsibility shall be within limits prescribed in his/her contractual agreement with the client. He/she shall act as the agent as thus defined (CCA, 1974).

Summary

Chapter I presented a cursory study of the U.S. construction industry, and the necessity to identify the most significant key competencies needed to be an effective project manager in the U.S. commercial construction industry. The research questions attempted to identify the most significant key competencies needed to be an effective project manager in the U.S construction industry, and the most effective way to teach those identified key competencies to adults in higher education. The need to gather demographic data of the participants in the quantitative portion of the study was also indicated. By gaining an understanding of the most significant key competencies needed to be an effective project manager, more effective education and training methods can be determined. Subsequently, Chapter II provides the literature that supports the rationale for this study.

Chapter II

REVIEW OF RELATED LITERATURE AND RESEARCH

Introduction

According to census data released by the U.S. Department of Commerce (2005), in 2002 the

construction industry was made up of approximately 710,307 construction companies that

employed approximately 7,193,069 individuals, with a payroll expenditure of about $2,542.00

billion dollars. This annually adjusted number represents about 6.7 percent of the total private

sector employment in the United States. In addition, the construction industry had expenditures

of an adjusted annual rate of $1,196.00 billion, which was nearly 11% of the total U.S. Gross

Domestic Product. The census data, which is gathered at five-year intervals, illustrates the

significant contribution the construction industry plays in the economy of the U.S. Yet, in spite

of being the single largest contributor to the gross domestic product, the largest industry in the

nation, and the largest employer in the nation, individual construction entities continue to

struggle to survive.

The construction industry is a project-based industry where individual projects are usually

built to specifications unique to each project (Bresnen, 1990). It is highly susceptible to

economic fluctuations and thus the number, size, and type of projects undertaken by a

construction company may vary greatly over time (Raidén & Dainty, 2006). The

unpredictability of the construction industry, coupled with high risk stemming from reduced

construction durations demanded by project owners, the ever-growing complexity of projects,

and the fact that construction projects have overlapping construction phases require a

multidisciplinary approach to the construction process (Shohet & Frydman, 2003). A global construction market that is seeing ever-increasing competition, customer demands for higher quality, and shrinking profit margins has driven constructors to look for ways to remain competitive and maintain reasonable profit margins (McCullough, 1997). However, many times construction entities often focus narrowly on improving the productivity of field operations to remain competitive and profitable, and fail to focus on improving the effectiveness of the project management personnel. It is a goal of this study to identify the most significant key competencies needed to be an effective PM and to identify the teaching perspective most often used when teaching the identified key competencies so that CM educators can focus on the development of education and training methods and procedures to facilitate instruction and improve the effectiveness of future PMs in the commercial construction industry.

The Construction Industry

The construction industry is generally separated into five construction types: 1) Commercial; 2) Industrial; 3) Utility; 4) Highway; and 5) Residential (Blankenbaker, 1985). Commercial buildings include stores, offices, schools, churches, gymnasiums, libraries, museums, hospitals, clinics, warehouses, and jails (Teach Me Finance, 2007). Industrial construction includes buildings that are used for manufacturing or the production of a commercial building. The construction of these structures is highly technical in nature and they are frequently built by specialized construction firms. Utility construction includes the installation of gas, water, sewer, storm drain, electrical, and communications systems. Highway construction includes paving, drainage structures, bridges, traffic signs, lighting systems, and other similar items. Residential construction includes the building of single-family homes; condominiums and townhouses; and apartments (Blankenbaker, 1985). These five construction types are differentiated by work

processes and final finished product, but according to Mincks and Johnston (2003) all have

similar attributes that set construction apart from projects performed by other industries. These

attributes include:

- Each project is a unique assembly with specific durations, quality, budget, assembly

  team and location.

- Projects have finite durations with specific starting and completion dates.

- Projects are usually geographically located away from company management.

- Each project requires a separate management team having a single source of

  responsibility to upper management.

- Each project is a separate cost accounting element; thus the effectiveness of each

  management team is measurable.

- Projects are assembled from thousands of parts ordered from multiple suppliers and

  manufacturers.

- Projects include the work of many subcontractors that perform up to 70 to 80 percent

  of the work on a commercial project.

It is the intent of this study to identify the most significant key competencies of effective

project managers in the commercial construction industry. However, it is the belief of the

researcher that many of the competencies that are found to be needed in the commercial

construction industry will be similar to skills needed to effectively manage projects in other

types of construction.

Project Management

A project is a set of coordinated and controlled activities with predetermined start and finish

dates, undertaken to achieve an objective conforming to specific requirements, including the

constraints of time, cost and resources (Or Equal Online, 2005). Management is the act, manner, or practice of managing, handling, supervising, and/or controlling (American Heritage College Dictionary, 2002). The management of a project in construction is defined as the utilization of skills and knowledge in coordinating the organization, planning, scheduling, directing, controlling, monitoring and evaluation of prescribed activities to ensure that the stated objectives of a project or service, are achieved (Or Equal Online, 2005). These definitions known, how did the project management process develop, and why is project management needed?

The traditional management structure is characterized by a complex "matrix" structure where many departments execute a project at the same time, the goal being the more efficient use of common resources (Bent, 1996). Traditional management principles and methods work well for classical functioning organizations comprised of multiple managers that have responsibility over work, and for organizations involved in ongoing, repetitive operations. However, traditional, "matrix" structure management methods are not effective when used in the management of projects because projects are temporary endeavors with finite durations. Projects are comprised of diverse tasks that cut across traditional functional organizational lines (Archibald, 2004); thus the manager of a project requires greater decision-making authority than that allowed in the traditional management structure.

The project management discipline developed in response to a need to manage complex civil and building works. Project management achieved greater prominence in the 1950s when new planning and control techniques were used to manage military and space projects (Shenhar, Renier, & Wideman, 1996). The management of a project is a composite activity of multiple dimensions that requires the assessment of complex variables, and involves dealing with a certain degree of uncertainty (El-Choum, 2000). In construction, the project management

approach can be applied at every level of the construction process with only the scope and size of the activity changing. This approach allows large projects to be subdivided into 'sub-projects' each of which is managed as a project (Wideman, 2003).

Project management has emerged as the management approach of choice for dealing with an ever-shifting business environment and rapid changes in technology (Shenhar, Renier, & Wideman, 1996). According to Cooke-Davies (1990),

> Growth, change and projects go together. We face an increasingly turbulent world in which business becomes faster paced, more complex, and more competitive. In this environment the rewards will go to those organizations which are more flexible, more in tune with their customers' wants, more focused on their main product or service, and more professional in every aspect of their business (p. 119).

However, a project can be well conceived and adequately financed, and the project participants may be highly experienced; but if the efforts of all the participants are not skillfully coordinated and managed, the project may fail to be successful (Udo & Koppensteiner, 2004).

Management vs. Leadership

The terms "management" and "leadership" are often used interchangeably; however they are quite different. Management, according to Covey (1989), deals with speed, coordination, and logistics, and involves gaining control of time and events that relate to the mission. It is the focus on the bottom line. Covey contends that, "we manage things but we lead people."

Leadership deals with the setting of direction, defining a mission, setting a goal, and in the end focusing on the top line. According to Senge (1994), leaders are typically thought of as the manager of a company, but there are two problems with this assumption. First, Senge contends

that by assuming the manager of a company is the leader, innovation and new ideas are stifled because thoughts and/or actions may be contrary to the manager's plan and may be seen negatively. Second, according to Senge, when a top manager assumes the role as leader by rights of the position, the very definition of a leader might be changed to fit the appointed role.

Top managers are typically sought by companies to heroically lead employees in new directions. They are brought in to "right the ship" and set a new course to success (Senge, 1990). However, the leadership in a company must share a picture of the future it seeks to create with the goal of becoming an organization that encourages people to enhance their capabilities and inspire them to achieve and succeed. Senge (1990) contends that a leader must assume the roles of designer, steward, and teacher. The "Designer" focus is on the development of the purpose, vision and core values of the company and of its employees, helping to build a shared vision of success. The "Steward" is responsible for and committed to managing the vision of a company. The "Teacher" uses events, patterns of behavior, and systemic structures to influence and inspire people to see the big picture and to understand and foster an understanding of what the organization is seeking to become.

Taking into account the roles of designer, steward, and teacher this study will attempt to determine not only "Hard Skill" key competencies, those transferable skills specific to the construction industry, but soft skills, those skills that focus on the qualities of personal relationships and leadership.

Project Manager

The construction project manager, while responsible to upper management, organizes and manages the construction project team. The PM is responsible for completing a project to an owner's required parameters and standards while at the same time implementing time, schedule,

cost, quality, and safety to ensure a profit for the construction company (Minicks & Johnston, 2003). Project managers must be good planners, motivators, communicators, and business people (Bent, 1996). However, despite the best made plans and the management abilities of the construction project manager, construction projects may not be successful because construction projects tend to be plagued with unforeseen problems. Project managers spend a great deal of time "fire fighting" problems that need to be addressed rapidly, which tests the ability of the project manager to effectively manage the construction project. The construction project manager's ability to effectively manage a construction project is dependent upon the leadership qualities of the project manger, in combination with technical knowledge and expertise. However, the identification of these leadership qualities, technical knowledge, and expertise, which are collectively known as key competencies, is particularly problematic (Dainty, Cheng, & Moore, 2005). The intent of this study was to attempt to identify the most significant key competencies to allow educators to focus on teaching adults in higher education construction programs the leadership qualities, technical knowledge, and expertise they will need to succeed.

Key Competencies

A key competency is the knowledge, trait, skill, motive, attitude, value or other personal characteristic essential in performing a job (Bratton, 1998). A key competency can be a hard skill, where a technical ability or proficiency is needed, or a soft skill that focuses on the interpersonal relationships and workplace productivity (Rigolosi, 2001). It is a merging of characteristics, behaviors, and traits for successful job performance (Abraham, Karns, Shaw, & Mena, 2001). Latham (1994) found that it is paramount for construction personnel to possess the "right" skills and knowledge base if they are to be efficient and productive. It has also been found that because projects are characterized by change, the project manager must be flexible

and adaptive in any situation, allowing knowledge and skill levels to continuously change (Udo & Koppensteiner, 2004). In a study undertaken to determine the key competencies needed by construction project managers, Souder and Gier (2006) found that effective project managers must possess fundamental construction management skills, project administration skills, business writing and communication skills, and soft skills, such as negotiation, leadership, and teamwork. Specifically, they found that the most significant skills were:

1. Negotiation

2. Ethics

3. Leadership

4. Business Writing

5. Management Organization

These findings indicate that a project manager must possess specific key competencies to be effective; thus it was is the intent of this study to identify the most significant key competencies needed to be an effective project manager in the commercial construction industry and then to identify the teaching perspective most often used when teaching the identified key competencies to adults in higher education.

Education vs. Training

The terms "education" and "training" are frequently used incorrectly because people are unsure of the difference between the two. The American Heritage College Dictionary (2002) defines education as: 1) "The act or process of educating or being educated"; 2) "The knowledge or skill obtained or developed in the learning process"; 3) "An instructive or enlightening experience" (p. 445). Education is a learning process that involves subject matter experts,

instructional designers, or deliverers of instruction that facilitate learning (Rouda & Kusy, 1996).

In a work environment, education is used to prepare people for upward mobility or to assume

emerging and challenging new roles, but is not necessarily for the purpose of allowing the

learner to do their current job better, and can only be evaluated when the learner moves to future

jobs or tasks (Clark, 1995).

Training is a learning process tied to specific situational results, and the focus is usually

based on improving individual and/or group behavior and performance. The performance of an

employee is improved by showing the learner how to master a new task or job (Nadler, 1984).

Usually required by an employer, training is undertaken to prepare new personnel to perform

their job, introduce new technologies, and/or bring an employee up to a specific standard. Two

approaches most companies use for training are the reactive approach and the proactive

approach. The reactive approach is used as a vehicle to solve problems, with the focus on the

performance of personnel and the results of the organization. The training is often applied in an

effort to correct problems. The proactive approach involves training as a continuous

improvement process. It is not an intervention to correct a problem, but rather a function to

prevent problems and promote organizational improvement (Rouda & Kusy, 1996). Though both

approaches can be effective, construction industry participants are many times reluctant to

undertake focused training programs that would foster the managing and controlling of

construction activities because during good times there is no time to train, and during bad times

training is too expensive.

Construction Education and Training

The construction industry in the United States has chronically been behind other industries in

its adoption of modern management techniques. It has failed to be progressive in the use of

technical innovations and modern methods of accomplishing work. Further, training and development for managerial positions has not been a priority within construction organizations (Raidén & Dainty, 2006). Historically, the industry has failed to see the benefit of human resource development (HRD), and in particular it has failed to provide proper training to its employee base. This lack of emphasis on HRD may stem from a belief that training is expensive, is best accomplished "on-the-job", and that training within a traditional classroom clashes with production objectives. In addition, it may be believed that developing employees will make them more attractive to other companies, thus leading to lower employee retention rates (Loosemore, Dainty, & Lingard, 2003). However, Raidén, Dainty and Neale (2004) have found that in contrast to historic education and training practices, large construction entities are beginning to demonstrate a significant commitment toward strategic human resource development to retain employees and improve organizational performance. This change may be the result of the realization by the construction industry that education and training is one way to recruit and retain reliable and productive personnel in an ever-increasing competitive market.

Training and education of construction personnel began in the late 1800's with the development of organized labor. The union system of training encompassed masters, journeymen, and apprentices that worked in specialized divisions of work responsibilities. The rules were unwritten, but the tradition was that masters looked out for the long-term welfare of journeymen and the training of apprentices. The masters and journeyman trained the apprentices and passed on the "art" and "mystery" of the craft to the next generation. The difference between the classifications was age, years of experience, and skill level. At the time, employer contractors were willing to pay the added costs of using union workers if the union was willing to accept the responsibility of training and supplying labor (UBCJA, 2005). Today however, the construction

industry in the United States is no longer dominated by a union workforce. "Right-to-Work" states with "open-shops" that do not restrict its employees to union members (*The Columbia encyclopedia, 6th ed* 2004) have significantly reduced the size of construction trade unions, and thus the education and training that they provided (UBCJA, 2005). The recognition of the lack of skilled personnel has forced the construction industry to develop education and training programs for both field and management construction personnel. Led by several construction trade organizations such as the Association of General Contractors (AGC) and the Associated Builders and Contractors (ABC), new education and training programs have been developed and implemented to meet modern industry's needs (George, 1998). Contractors determined that training was needed to combat:

- Labor shortages

- Higher demands for quality, productivity, and timely completion

- Complex technology being used on construction projects

- High employee turnover

The recognition of a need for education and training and the need for the development of education and training programs has not immediately translated into action. One reason for a lack of action is that in the construction industry, like in many other industries, there is a notion that there is not enough time to train. A recent survey by Hedley (2005) found that of 2000 companies surveyed, 98 percent stated their employees would do a better job if they were provided more training. The following statistics were found as they relate to education and training of employees in the construction industry:

Field Employees

51%   0 – 8 Hours training per year

20%   9 – 16 Hours training per year

19%   17 – 40 Hours training per year

10%   Over 40 Hours training per year

<u>Management Employees</u>

35%   0 – 8 Hours training per year

25%   9 – 16 Hours training per year

20%   17 – 40 Hours training per year

20%   Over 40 Hours training per year

Adapted from: No Train No Gain

Hedely found that less than 8 hours of training per year is offered to management personnel by

35 percent of the companies surveyed, and only 20 percent offer 40 hours or more of training to

management personnel.

In addition to a perceived lack of time for training, contractors believe that the cost of

training employees is too great, and that the return on investment makes training a non-option

(George, 1998). Assessing the value of an education and training program to a company and its

employees is difficult. Companies must analyze such hard-to-define items as rework, employee

turnover, and poorly performed work. In assessing the value of education and training,

Kirkpatrick (1983) classified training outcomes into four categories. The classifications are:

- Reaction – The value of the training program itself.

- Learning – The effect of the training upon the participants.

- Behavior and/or Performance – The transfer of the learning to the job or organization.

- Outcomes and/or Results – The impact of the training on the productivity and
  profitability of the organization.

Kirkpatrick further states that a focus should be placed upon the last two assessment outcomes because the transfer of learning directly affects the company's bottom line. In spite of the cost, it is known that employee training pays off in increased quality, productivity, employee retention, improved employee morale, as well as with recruiting new employees (George, 1998). The bottom line is that it may be more expensive not to train employees than it is to train them well.

The education and training of construction personnel is not different than the training and educating of other personnel, in that there are challenges, risks, and rewards in the change process. Kirkpatrick (1983) contends that to ensure that training is delivered effectively and efficiently, a process of instructional systems design (ISD) should be used for the assessment, design, development, implementation and evaluation of training. This process begins with a defining of the needs of the organization, analyzing the causes of performance problems and opportunities, determining possible solutions, and then determining a cost-effective training solution. Similar to the instructional system design offered by Kirkpatrick is the process of performing a "Needs Assessment" to determine if there is an actual need for the education and training process. A needs assessment, according to Rouda and Kusy (1996), is performed to determine the way things are and the way they should be relative to organizational and/or individual performance. Prior to performing any intervention questions should be asked to determine:

- What learning will be accomplished?
- What changes in behavior and performance are expected?
- Will we get the changes in behavior and performance we expect?
- What are the expected economic costs and benefits of any projected solutions?

Rouda and Kusy have also developed a four step process to conducting a needs assessment:

1. Gap Analysis - Check actual performance of the organizations and personnel against existing or new standards.

    - *Current situation*

    - *Desired or necessary situation*

    The difference "gap" between the current and the necessary will identify the needs, purposes, and objectives of the training and education.

2. Identify Priorities and Importance.

    - *Cost-effectiveness*

    - *Legal mandates*

    - *Executive pressure*

    - *Population*

    - *Customers*

3. Identify Causes of Performance Problems and/or Opportunities.

    - Are personnel doing their jobs effectively?

    - Do personnel know how to do their jobs?

4. Identify Possible Solutions and Growth Opportunities.

Education vs. Learning

It is important when defining education not to confuse it with learning (Merriam & Brockett, 1997). Education emphasizes the educator while the learning emphasizes in whom a change occurs. These two definitions appear separate and distinct, but developing a working definition has proved difficult (M. Knowles, Holton III, Holton, Holton, & Swanson, 2005).

Education is an action or process of educating and/or the knowledge and development resulting from an educational process, and mainly deals with methods of teaching and learning in schools (Merriam-Webster, 2000). It is an activity undertaken to effect change in knowledge, skill, and attitudes in individuals and/or groups (Malcolm Knowles, 1980). Education is the result of a relationship between an educator and a learner where the educator selects, arranges, and directs a task that provides experiences that lead to learning (Verner, 1964). It is concerned with specific learning outcomes and with the process of teaching students the information needed to achieve those outcomes (Thomas, 1991).

Learning is a process of gaining knowledge, skills, or attitudes through formal or informal means (Rouda & Kusy, 1996). It is the result of the exchange of information from educator to learner, or it can be in the form of incidental or unplanned learning, the result in daily life (Thomas, 1991). Kimble (1961) contends that learning is a relatively permanent change in observable behavior that occurs as a result of reinforced practice. After learning, individuals involved in the learning process are capable of performing in a way that they could not do before being involved in the learning experience. Though it is possible that the change in behavior may or may not occur immediately following the learning experience, the learning process facilitates the change in behavior that results from reinforced experience or practice. According to Kimble, there are three specific learning processes:

1. The acquisition of new information that is often a replacement of what the learner has previously known.

2. The transformation and manipulating of the newly gained knowledge in performing new tasks.

3. The evaluation of the learning to determine if the new information has been

    manipulated correctly for the need.

It is the formal process that separates education from learning. Thus, education cannot exist

without learning; learning, however, not only can exist outside the context of education but most

likely is found there (Thomas, 1991).

The Adult

To understand adult education one must first determine who or what is an adult. Defining the

term "adult" is not easy and no single definition is commonly agreed upon. Many different

definitions of "adult" have been proposed. The Merriam-Webster (2000) dictionary defines adult

as "a human being after an age (as 21) specified by law, being fully developed, mature and/or

grown-up. One that relates to, intends for, or befits adults." An adult can be thought of in terms

of age, psychological development, maturity, and/or puberty. In North America, the age of the

adult ranges from 16, when a child can drive and choose to drop out of school, 18 when an

individual can vote and be drafted into the armed services, to 21 when an individual can legally

purchase and consume alcohol. However, there are exceptions to all of these ages, including the

court's determination that a child can be tried as an adult at the age of 14 and younger (Merriam

& Brockett, 1997).

Some definitions of an adult use psychological maturity and/or social roles as the

determining factor. Knowles (1984) stated that the psychological definition of an adult is, "one

who has arrived at a self-concept of being responsible for one's own life, of being self-directing"

(p. 9). Knowles (1980) stated that when defining adulthood using social roles as the determining

factor, "a person is an adult to the extent that the individual is performing social roles typically

assigned by our culture to those it considers adults" (p. 24). These definitions fail to account for

adults that are living in some type of assistance or institutional facility. Further, they fail to account for youth that have been forced to assume adult type roles due to situational factors beyond their own control.

Determining an exact point that a person passes from an adolescent to an adult is difficult because the norms of that passing have changed extensively. Sheehy (1995) states that as early as the eighteenth century the transition from adulthood, the pulling-up roots or passage into adulthood coincided with marker events of life that have shifted and are no longer normative. The transition from puberty, a deciding factor of adulthood in many societies, is now less valid because of the declining age at which children are reaching puberty. The social and psychological factors associated with adulthood have been fundamentally altered because people today are leaving childhood sooner, but are growing up later.

Defining adulthood is further complicated by not only the elusive passing or transitioning process from adolescence to adult, but from the transitioning from multiple phases or stages in the life of an adult. Adults tend to evolve through a sequence of constant and transitional periods that correlate with aging (Levinson & Levinson, 1996), and/or to life events that give shape and direction to various aspects of a person's life (Merriam & Caffarella, 1999). Therefore, a wholly agreed upon definition of adulthood may not be possible because the definition is greatly influenced by psychological, social, economic, political, and cultural factors. Thus, the definitive definition of an adult most likely will be left to the scrutiny and decision of the individual or group making the determination.

Adult Education

Adult education has been defined in many ways but there is constant debate as to which is the definitive definition. A problem in determining a singular definition of adult education is that

the term is associated with at least three different meanings. In a broad sense, adult education means the process of adults learning. In a more technical sense, adult education means the organized activities carried on by different institutions to accomplish specific educational objectives. Lastly, adult education can mean an all-encompassing process that is undertaken to accomplish social change (Malcolm Knowles, 1980). Many definitions of adult education are considered too general or too specific to satisfy all forms of adult education. The broadest and most frequently cited definition of an adult education was developed by the United Nations Educational, Social, Cultural Organization (UNESCO) (1980) and stated:

> The entire body of organized educational processes, whatever the content, level
>
> and method, whether formal or otherwise, whether they prolong or replace initial
>
> education in schools, colleges and universities as well as in apprenticeship,
>
> whereby persons regarded as adult by the society to which they belong develop
>
> their abilities, enrich their knowledge, improve their technical or professional
>
> qualifications or turn them in a new direction and bring about changes in their
>
> attitudes or behavior in the twofold perspective of full personal development and
>
> participation in balanced and independent social, economic and cultural
>
> development (p. 3).

In 1936 Bryson (1936) contended that adult education consisted of all educational activities that are carried on by people engaged in ordinary life. Verner (1964) further defined adult education as a process where an educator selects, arranges, and directs progressive tasks that provide a systematic experience for the learner in an effort to teach ideas that are subsidiary and supplemental to the learner's role in society. It is an organized process carried on by a wide variety of institutions for the accomplishment of specific educational objectives (Malcolm

Knowles, 1980). Adult education can cause the learner to not only gain knowledge and skills, but to change attitudes, values, and/or skills (Darkenwald & Merriam, 1982), this happening through a systematic and purposeful effort by adults to become educated (Long, 1987).

The reoccurring theme in all of these definitions is that adult education is a planned process that is in some way instigated by the learner. It is the acceptance and the desire of the learner, as well as the intentional purpose of bringing about learning, that separates adult education from different forms of education (Usher & Bryant, 1989).

The Goals of Adult Education

Many educators believe that the goal of adult education is to bring about social change. Others in the field believe that education in itself is the goal of adult education and that social change is brought about through the education of the adult. Others believe that the goal of adult education is to fulfill the learner's desire to obtain knowledge, information, or skill through a process that includes some form of instruction (Merriam & Caffarella, 1999). To define the goal of Adult Education, experts in the field have compiled typologies that describe the stated goals. Compilations of these typologies reveal a common thread of goals that can be summarized into five categories. They include:

- Liberal – The studies of the humanities and of social and natural science.

- Knowledge – Knowledge valued for its own sake; the goal is to be an educated person.

- Work Related - Occupational or vocational career development.

- Relational - Programs in which personal growth is a priority. The aim is to develop effective relationships, provide leadership training, improve self esteem, and/or foster self actualization efforts and offer learning related to home, family, and leisure.

- Compensatory - Literacy and adult basic education.

- Political – Adult education activities related to citizenship responsibilities in a democracy. Teach civil and social responsibility, and support and maintain good social order.

The ultimate goal of adult education, however, may be a combination of all of these typologies in an effort to bring about human fulfillment by helping individuals to achieve their goals, all the while satisfying the needs of institutions and society (Malcolm Knowles, 1980).

Adult Education Philosophies

According to Galbraith (2004), it is important to understand that there is a direct correlation between an individual's beliefs, values, and/or attitudes and that individual's basis for selecting instructional content, instructional material, interaction with learners, and evaluating the outcomes of education. Galbraith quotes Rokeach (1968) on the subject of personal philosophies, stating, "once a value is internalized, it becomes a consciously or unconsciously standard or criterion for guiding action" (p.16). Thus it is important that we understand the basis of our personal philosophies towards education and know of the theories that are associated with those philosophies.

Though there are an infinite number of answers to these questions, all contribute to determining our personal philosophies towards education. Brockett (1988) and Merriam and Brockett (1997) developed what they believe to be the dominant philosophies in adult education. They include:

1. Idealism – A philosophy based upon a belief that education can help in changing people's lives for the better.

2. Realism – A philosophy based upon a belief that reality exists external to the knower and can be known through the senses with overt, observable behavior of humans and animals.

3. Progressivism – A philosophy based upon the belief that the learner knows best what and how to teach. The individual is the key to the progressive philosophy, and it is the goal of the educators to meet the needs of that individual.

4. Liberalism - A philosophy that adheres to a goal of producing an intelligent, informed, cultured, and moral citizenry.

5. Behaviorism – A philosophy based upon the belief that humans are a product of the environment and conditioning to which they have been prior exposed.

6. Humanism - A philosophy based upon the notion that human nature is intrinsically good. It emphasizes independence, individualism, and self-fulfillment, as well as adheres to the belief that individuals can grow and develop through self-actualization.

7. Radicalism – A philosophy based upon a belief that change can best occur when the existing systems are abandoned and replaced with a perspective commitment to social change.

Most educators use a combination of philosophies to be successful in providing effective learning.

The Adult Learner

The adult learner is an autonomous individual that identifies, plans, carries out, and assesses their own learning needs (Mezirow, 1991). The learning needs of the adult learner are life-centered in their orientation, experience base, and are usually undertaken to satisfy needs derived from experiences or interests (Lindeman, 1989), or to achieve some level of self-actualization

(Malcolm Knowles, 1988). Assumptions about adults learners made by Knowles (1988) are: (1) Adults tend to be more self-directed; (2) Adults possess personal histories that serve as a resource of experiential learning upon which new learning can be applied; (3) Motivation in adults is directed to more socially relevant learning; and (4) Adult learners have interest in immediate application for problem-solving.

According to Houle, three different types of adult learners include: (1) goal-oriented learners, (2) activity-oriented learners, and (3) learning-oriented learners. The goal-oriented learner is the adult learner who participates to meet specific goals. This goal can be the attainment of a grade, certificate, degree, or the simple completion of the course to better themselves in their work or personal life. The activity-oriented learner is the adult learner who attends a program because they enjoy the social aspect of the learning experience. These people often are not attending class based on the purposes or content of the activity. They prefer to make friends and engage socially with the thought of learning as a secondary consideration. The learning-oriented learner is the adult learner who participates in "learning for learning's sake." This individual has the desire to learn and may frequently attend classes, visit the library and seek out other types of independent learning such as correspondence study or reading on their own (Houle, 1961).

Teaching Perspectives

There are many different views as to what constitutes good methods of teaching or what sometimes are referred to as teaching perspectives. Pratt (1998) defined five teaching perspectives that he believes are the essence of good teaching. The development of the five perspectives is the result of what he describes as "a carefully written, well-researched analysis of the five major philosophical and practical orientations to teaching that influence how we live our lives as teachers" (p. ix). Pratt presents a constructed model of teaching that contains five

elements, including the teacher, learners, content, context, and ideals. Interviewing teachers using these elements as a framework, Pratt found that education practitioners suggested that a need for a commitment to teaching is more important than teaching techniques. The findings of his research coalesced into what he describes as five teaching perspectives. The five perspectives in teaching in adult and higher education are transmission, apprenticeship, developmental, nurturing, and social reform. In addition to the defining of the five techniques, Pratt presented four propositions that also emerged from his research:

> Proposition 1: There is no universal best perspective.

> Proposition 2: Teaching is guided by one's perspective on teaching, which is defined by
> > actions, intentions, and beliefs.

> Proposition 3: Some of the beliefs are more central to one's being than others, and are
> > therefore open to change.

> Proposition 4: Improvements in instruction can focus actions, intentions, or beliefs.

Social reform, according to Pratt, is when effective teaching seeks to change society in a positive way, allowing students to embrace the values and ideologies that are part of their work. Students are challenged to take stands on viewpoints and take social action to improve their society. This social reform perspective, though valuable, is not largely used in the teaching of construction personnel.

The nurturing perspective, according to Pratt, is based upon a belief that long-term, hard, persistent effort to achieve comes from the heart as much as it does from the head. The nurturing perspective operates under the assumption that people will be more successful in their learning if they are supported academically and emotionally. Teaching from the nurturing perspective, learners are challenged to achieve goals while their individual growth is encouraged. The

nurturing perspective can include mentoring and should be used in the teaching of construction management personnel.

Though used in some situations, the transmission perspective of teaching is not the dominant teaching perspective used in teaching construction personnel. Pratt describes the transmission perspective as requiring the teacher to be a subject matter expert relative to the content being taught. The "stand and deliver" approach requires the teacher to accurately put forth to the student the content to be delivered. The content is systematically covered with the delivery being varied to meet the needs of the learner. The transmission perspective works well in a lecture and/or classroom type setting, but rarely do construction companies take time for this formal type of training.

The apprenticeship perspective is an effective method of teaching that is used consistently in the construction industry. Pratt contends that the apprenticeship process socializes the learner to norms and ways of working. The teacher is the master or the journeyman that serves as a mentor to the student or apprentice. The apprenticeship perspective is successful in the construction industry because it allows the teacher to reveal the skills needed to perform a task. For the apprenticeship to be successful, the teacher must not only demonstrate the skill needed, but allow the student to actually work on the task. The apprenticeship perspective works well in the construction industry, especially in hands on trade positions; however it does not translate as well in the teaching of management disciplines.

The developmental perspective is effective in the teaching of construction personnel, and it is particularly effective in teaching management disciplines. Pratt stated that for the developmental perspective to be successful, the teaching must be planned and conducted from the learner's point of view. The needs and learning styles of the learner are considered to ensure that the content is

delivered in a manner that facilitates the needs of the learner. Pratt contends that the primary goal of the developmental perspective is to help learners develop increasingly complex cognitive structures related to the content, and then changing those cognitive structures. Changing the cognitive structures requires the learners to be engaged by the teacher to move from simple to complex forms of thinking. To change the cognitive structures the teacher must also bracket the knowledge, allowing the learner to construct their own understanding of the content. The developmental perspective works well in the construction industry and in particular in the management-type disciplines because individuals that are charged with the task of training the learner observe the learning styles of the learner and tailor the learning method to that individual.

Again it is important to note that Pratt contends that the perspectives are not mutually exclusive views of teaching, and that the majority of teachers hold one perspective as a dominant view of teaching, but hold other perspectives that allowed them to be flexible in their approach to different learners. Pratt also contends that individuals cannot hold all of the perspectives equal because the perspectives sometimes have contrasting and competing views.

Summary

The construction industry plays a significant role in the U.S. economy; therefore the success of the companies in the industry is vital. The ability for construction project managers to lead personnel is critical to effective project management, yet little information about how construction project managers are educated and trained in leadership theories exists. Literature concerning the adult, adult education, the adult learner and adult leaning theory must be understood and addressed when educating and training construction personnel to ensure successful projects. Chapter III, Methodology, will present the research design to effectively

research the leadership qualities possessed by construction project managers, and to obtain data

concerning the need for training and education of personnel.

CHAPTER III

Methodology

Introduction

The purpose of this mixed method study was first to identify the most significant key competencies needed to be an effective project manager (PM) in the United States (U.S.) commercial construction industry and then to identify the teaching perspective most often used when teaching the identified key competencies to adults in higher education. A Likert scale research instrument was sent to current commercial construction project managers to determine if a definitive set of key competencies were needed. Once the findings of the quantitative portion of the study were examined, questions were developed and used to query construction educators to find if a most effective way of teaching the identified competencies to adults in higher education construction programs could be determined. In an effort to eliminate confusion, Chapter III has been written in the same format as the study with the quantitative portion of the study first and the qualitative portion second.

Mixed Methodology Research Design

The three systems or paradigms that guide researchers in educational research are quantitative (also known as positivism), qualitative (also known as interpretive / constructivism), and mixed methodology or pragmatism. All three of these paradigmatic viewpoints are legitimate in that they can all produce quality research findings; however, there is little agreement as to when one paradigm might be more appropriate to use than another. There are no mechanical rules for making the decision to use quantitative methods to the exclusion of qualitative methods or vice versa (Howe & Strauss, 1993). This may be because there is some

question as to whether the paradigms are more similar than different, and that the exclusionary use of the one paradigm over another may be the result of an unrelenting attitude of the quantitative researcher to cling to classical, linear, straight-forward rational; and the attempt of the qualitative researcher to reinterpret and reshape the research process (Keeves & Lakomski, 1999). "Instead of searching for one method that works for all research, researchers should consider the correct method to be 'what works' (Tashakkori & Teddlie, 1998, p. 12), because as stated by House (1993), there "is no guaranteed methodological path to the promised land" (p. 20).

The combining of the quantitative and qualitative paradigms is the result of a need for a more informed and sophisticated approach to research that combines the positive attributes of each approach into a mixed methodology, allowing the researcher to use the methodology most appropriate for the study, instead of relying on only one exclusive method (Tashakkori & Teddlie, 1998). The use of both paradigmatic approaches simultaneously, either by different researchers or by a single researcher, enhances the ability of the researcher to understand "what is going on" (Hathaway, 1995, p. 555), and despite the segregated beliefs of many, there are no good reasons for avoiding combinations of both the quantitative and qualitative methods (Paul & Marfo, 2002).

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

Rationale for Quantitative Design

Quantitative methods, also known as empirical-analytical inquiry, assume that research is not influenced by the researcher. Hathaway (1995) stated that, "empirical-analytical inquiry is characterized by the researcher's detachment from the organizational setting under study," and that "the detachment derives, in part, from the assumption that the object under study is separate

from, unrelated to, independent of, and unaffected by the researcher" (p. 544). Mertens (1998) described the foundation of the quantitative paradigm as a view that the social world can be studied in the same way as the natural world, and that it is possible to perform an un-biased, value-free study of the social world . However, Hathaway (1995) warned that "empirical-analytical research can systematically overlook critical features that can affect the results of quantitative research" (p. 554).

The limitations of quantitative inquiry noted, the first portion of this study was undertaken using quantitative research methods with a positivist/post positivist paradigmatic approach. In following the positivism/post positivism paradigm, objectivity was the standard to which to strive in the research, and the researcher attempted to remain neutral to prevent biases and values from influencing the work that followed proscribed procedures (Mertens, 1998, p. 10). The rational for conducting the quantitative study lies in the need to obtain current data concerning the most significant key competencies needed to be an effective project manager in the commercial construction industry so that questions could be developed to use in the qualitative portion of the study.

Quantitative Research Design

The design of the quantitative portion of the study was a survey developed to gather demographic data of the participants and to gather data to identify the most significant key competencies needed to be an effective project manager in the U.S. commercial construction industry. Descriptive statistical analysis and cross-tab analysis were conducted on the resulting demographic data. The calculations performed on the survey data consisted of determining the competencies deemed most important to the study participants by summing the responses from

the Likert scale survey instrument to determine which of the competencies had the highest mean response.

Quantitative Research Participants

The study participants in the quantitative portion of the study were a representative convenience sample of commercial construction Project Managers employed by commercial construction entities located within the West Coast and Pacific Northwest regions of the United States. The construction entities were in the top 400 U.S. construction entities ranked by construction revenue in 2006 (Engineering News Record, 2005). All of the companies participating in the survey agreed to assist in the survey process by ensuring that construction project managers at their companies completed and returned the survey in a timely manner.

Quantitative Research Methods of Data Collection

In accordance with the quantitative paradigmatic approach, a Likert scale survey instrument was developed to obtain statistically significant data. The statistical data was used to give the study rhetorical power by employing rule-governed and naturalized means of producing what is perceived to be the most conclusive knowledge about the target question (Sandelowski, 2003 as cited in Tashakkori & Teddlie, 1998). The defined response survey instrument used to determine the dependent variable was developed using a similar survey instrument used by Souder and Gier (2006) to determine what is expected of CM graduates. Similar in focus, the proposed study was not an exact replication of the Souder and Gear study because the previous research focused exclusively on entities in the state of California, and did not exclusively focus on commercial construction entities that met set revenue parameters.

To pre-validate the Likert scale survey instrument a pilot study was conducted. Senior management personnel of pre-selected construction companies were contacted via

telecommunication and e-mail to solicit their participation in the pilot study. Project managers that agreed to participate were sent via e-mail a copy of the instructions for participating in the pilot study, and an electronic copy of the Likert scale survey instrument. The senior management personnel were asked to evaluate the key competencies included in the survey instrument, identifying those that may be considered insignificant, and to list additional key competencies that may be considered significant. The pilot study responses were evaluated and, accordingly, changes were made to the existing survey instrument.

The Human Subjects Consent to Participate Form and the survey instrument were uploaded onto a web-based survey site and were made available on-line via a web-link. An e-mail containing the web-link was sent to corporate management at commercial construction companies that met the parameters of the study. The individual corporate management personnel that had been contacted and had agreed to assist in the collection of data for the study then forwarded the web-link to project managers at their companies. The rationale behind the use of an electronic survey instrument was to allow the data to be imported directly into statistical analysis software, eliminating potential data input errors.

Quantitative Research Sampling

The study participants in the quantitative portion of the study were a representative convenience sample of commercial construction Project Managers employed by commercial construction entities located within the West Coast and Pacific Northwest regions of the United States. The construction entities were in the top 400 U.S. construction entities ranked by construction revenue in 2006 (Engineering News Record, 2005). No minimum sample size was required since non-parametric analysis methods were to be performed. However, to increase the validity of the findings the researcher made an attempt to obtain as large a number of responses

as possible; thus the survey was distributed to approximately 224 participants. Participation in the study was voluntary, and this may be considered to have an effect on the outcome of the findings. According to Rosenthal and Rosnow (1975), volunteers tend to be better educated, of higher social class, more intelligent, less authoritarian, and less conforming than non-volunteers (Gall, Borg, & Gall, 1996). In the study, however, the education level, social class, and intelligence of the group from which the volunteers are drawn is fairly homogeneous; thus the effect of these traits due to voluntary participation should be minimal.

Quantitative Research Method of Data Analysis

The surveys were tabulated and the data was analyzed to determine what the participants perceived to be the most significant key competencies a project manager must posses to be effective in the U.S. commercial construction industry. The researcher followed an analytical procedure to ensure that the quantitative analysis, data organization, interpretation of the findings, and report writing were accurate and valid. The analytical procedures included organizing the completed survey instrument data into a usable format, importing the data into statistical analysis software for data analysis, interpreting the findings, and writing the report. Once imported into the statistical analysis software, the resulting data from the survey was analyzed to identify the key competencies found most significant, and to determine trends and correlation from the demographic data. Because the data was collected from a Likert-Scale research instrument, nonparametric statistics were used for the analysis; specifically, a Mann-Whitney U-Test.

There exists a great debate about the relationship between appropriate statistics and scales of measure. The debate centers around the relationship between ordinal and interval scales, and parametric and non-parametric statistics (Gardner, 1975). The determination of the type of scale

is not always clear. Knapp (1990) stated that for a scale to be ordinal, it must be comprised of categories that are mutually exclusive and ordered. However, the ordinal scale can be somewhat arbitrary, allowing for individual interpretation of the scaled response. Parameters for interval scale, according to Knapp (1990) require the existence of an arbitrary zero point, and that throughout the scale the unit of measure must be constant. Ordinal scale is one which numbers are empirically ordered, and the ranking, similar to numbers assigned to objects, can have no meaning attached to the size of the interval between the measurements. Interval measurement possesses equality between the units and the size of the interval between the objects can have meaningful interpretation (Stevens, 1968). Therefore, the measurement, number of categories that comprise the scale, and the concept of meaningfulness all are important when deciding between the use of ordinal and interval scale (Knapp, 1990).

Parametric statistics are based on certain assumptions about shape and/or variance parameters of a population. These assumptions include the normal distribution of the population about the mean and the population variances of the comparison groups are about equal. When the research data deviates from these assumptions, non-parametric statistics should be used in lieu of parametric statistics (Gall, Borg, & Gall, 1996). Non-parametric equivalents of parametric tests are often used by researchers when data sets are skewed and/or have non-equivalent variances (Huck, 2000).

Thus, because an ordinal-level Likert-scale instrument was used to gather data for the study, the collected data was unlikely to be normally distributed, and a convenience, rather than a random sample was used, a Mann-Whitney U-test (the nonparametric equivalent of a t-test) was selected for data analysis.

Quantitative Research Ethical Issues

To meet university requirements, the researcher submitted the research plan and the survey instrument to the University of Idaho Human Assurances Committee for approval. The study was approved as following ethical requirements set forth by that committee.

Quantitative Research Timeline

Completed surveys were accepted for a 45 day period, with no unanticipated problems. The survey was to be considered complete at the end of the 45 day duration though less than 100% of the completed surveys were received.

Qualitative Research

Rationale for Qualitative Design

Qualitative research is a term used to identify several forms of inquiry that help researches gain greater understanding and explain the meaning of social phenomenon (Merriam, 1998). It is composed of natural and interpretive genres that employ many methods of inquiry (Marshall & Rossman, 1999). Known as interpretive inquiry, qualitative research is based upon the assumption that the research and its results are greatly influenced by the researcher. Hathaway (1995) stated that, "the researcher can come to know the reality of a situation by being there: by becoming part of the phenomenon of study, and by documenting the understanding of the situation by those engaged in it" (p. 544). Mertens (1998), the author of several books on research methodologies, further stated that, "the qualitative paradigm emphasizes a view that the values of researchers directly affect research and that research cannot be independent of them" (p. 11). However, again according to Hathaway (1995), "the limitation of qualitative research is

that it may appear replete with subjectivism and be viewed as having questionable precision, rigor, or credibility" (p. 554).

Qualitative Research Design

The qualitative portion of the study, like many qualitative studies in education was not built upon a solid grounded theory nor bounded system. Rather it was conducted simply to discover and understand a phenomenon, a process, and the perspective of the people involved. It was based upon concepts, models, and theories in educational psychology (Merriam, 1998). To collect data, an interpretive/constructivist approach was taken that employed the use of semi-structured, conversational, interactive, one-on-one interviews with the study participants. According to Bogdan and Biklen (2003), the interpretive/constructivist research approach is based upon the theory that objects, people, situations, and events do not posses their own meaning, rather meaning is given as part of an essential interpretation process that is neither accidental nor secondary to what they experience. The semi-structured interview involved asking structured questions, and then inquiring more deeply using open-ended questions to obtain additional information (Merriam, 1998). This allowed the researcher and the study participants to be tied in an interactive process, both influencing the other (Mertens, 1998). The structured questions were developed using the key competencies found to be most significant in the quantitative research portion of the study, and were focused to work within the conceptual framework of teaching adults in higher education developed by Pratt (1998).

Qualitative Research Participants

Study participants were a representative convenience sample of current faculty members of geographically diverse CM colleges accredited by the ACCE.

Qualitative Research Methods of Data Collection

Consent forms were given to each of the 10 potential interviewees and were collected prior to

the beginning of the interview process. In order to facilitate the interview process, faculty

members that agreed to participate in the study were sent via electronic mail a general overview

of the five perspectives on teaching adults in higher education developed by Pratt. The

interviews were conducted at a private, neutral location over a three day period, and all

conversations were digitally recorded to ensure accuracy of the data transcription. It was the

belief of the researcher that conducting the interviews at a neutral site and ensuring the

anonymity of the participants would enhance the outcomes of the study. Follow-up interviewing

of individuals through the use of telecommunications or electronic mail was required.

Qualitative Research Method of Data Analysis

The digitally recorded responses to the questions in the interviews were transcribed,

reviewed and analyzed to identify the perceptions about the most effective way to teach key

competencies to adults in higher education construction programs within the parameters of the

conceptual framework. The researcher followed an analytical procedure to demonstrate the

researcher is sufficiently knowledgeable about the qualitative analysis, data organization, theme

development, interpretation, and report writing. The analytical procedure included organizing the

data, generating categories, themes and patterns, testing emergent understandings, searching for

alternative explanations, and writing the report.

1. *Organizing the Data.* The researcher transcribed verbatim all interviews of the

   participants. Included in the transcriptions were notations of voice inflections, and

   notable pauses. In addition, the transcriptions also contain noted verbal and nonverbal

   observations made by the researcher.

2. *Generating Categories, Themes and Patterns.* The researcher categorized the transcribed data into evident patterns, ideas, and themes. The patterns, ideas, and themes were identified upon a thorough review of the transcribed interviews.

3. *Testing Emergent Understandings.* During the data coding and analysis process the researcher reanalyzed the coding construct to determine if new coding or an alteration to the coding were needed.

4. *Searching for Alternative Explanations.* During the data coding and analysis process, the researcher looked for exceptions to the data to determine if the data coding was adequate.

Qualitative Research Ethical Issues

In an effort to anticipate ethical concerns, the overall strategy and intent of the interview process was revealed to the participants to ensure that the interviews were carried out without harming the individuals (Marshall & Rossman, 1999).

Qualitative Research Validity Issue

The rigor with which the study was conducted, the study's design, the care taken to conduct measurements, and decisions concerning what was and was not measured were determined prior to the interview process. Documentation of the time, date, location, and interviewee were logged and are available along with the transcribed data for review by authorized individuals.

Qualitative Research Limitations

The success of the interview process was dependent upon the interviewing skills of the researcher, yet the opportunity for the researcher to gain further knowledge by probing topics made this method a distinct advantage over quantitative survey methods (IDRC, 2007). The study's findings may be questioned because the product of the interviews could have been

influenced by the beliefs of the researcher and therefore may not be considered research independent of the values of researcher (Mertens, 1998, p. 11). However, it is the belief of this researcher that this interpretation is an integral part of the findings because the mind is active in the construction of knowledge, and human beings do not find or discover knowledge so much as to construct or make it there (Mertens, 1998, p. 11).

Qualitative Research Timeline

The qualitative portion of the study began upon the development of the research questions and upon the receipt of consent forms from the prospective participants. Interviews were conducted over a three day duration. The results of the study, significant findings, and recommendations for use and further study were then developed.

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

The quantitative portion of the study was undertaken to identify the most significant key competencies needed to be an effective project manager in the U.S. commercial construction industry. A Likert scale survey instrument was used to survey project managers employed by commercial construction entities located within the West Coast and Pacific Northwest regions of the U.S., and that were in the top 400 U.S. construction entities ranked by construction revenue in 2005. Once the key competencies were identified, questions were developed to use in the qualitative portion of this study. A representative convenience sample of current faculty members of CM colleges were interviewed to gather information as to the teaching perspective most often used when teaching the identified key competencies found in the quantitative portion of the study.

Chapter IV

FINDINGS

Introduction

Chapter Four presents the results of the statistical analysis performed on the data collected in the survey undertaken in the quantitative portion of the study, and the analysis of the transcribed interviews undertaken in the qualitative portion of the study. The data groups for both portions of the study are described and the results are presented in response to each respective research question.

Quantitative Demographic Data

The quantitative portion of this study investigated the key competencies of effective construction project managers in the U.S. construction industry. Fifteen individuals employed at construction entities that met the parameters of the study were contacted prior to the start of the study and they agreed to participate in the distribution of the survey instrument. An e-mail that contained an electronic link to a website containing a Quantitative Study Consent Form (Appendix A) and a Survey Instrument (Appendix C) were sent via e-mail to 15 individuals and the electronic link was then forwarded to 224 project managers in total. The survey instrument was completed and returned by 132 individuals, approximately 59% of the total sample population. Cohort effects are not likely to have affected the study because the survey was completed by individuals employed at multiple entities located in geographically diverse locations.

The majority of the 132 construction project managers that participated in the study fell between the ages of 36 to 40 (a total of 34, or 25.8% of the participants), with a range of ages between 20-25 and 56-60. The resulting data is displayed in Figure 1.
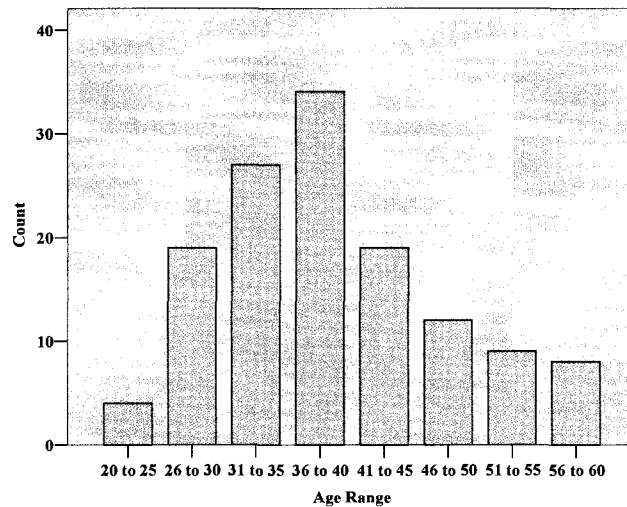
Figure 1. Age Range of Project Managers

The study included 116 (approximately 88%) males and 16 (approximately 12%) females. The resulting data is displayed in Figure 2.
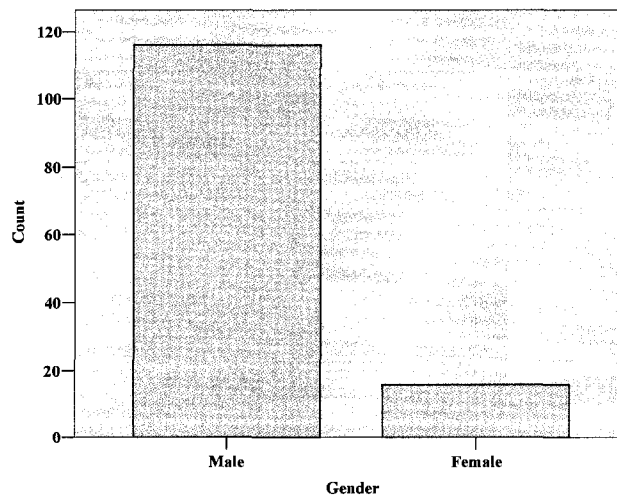
Figure 2. Gender of Project Managers

Using cross-tabulation analysis of the data it was found that 25% of all of the male survey

participants and approximately 31% of the females fall within the age range 36 to 40. The

resulting data is displayed in Table 1.

Age Range * Gender Crosstabulation

			Gender		Total
			Male	Female	
AgeRange	20 to 25	Count	3	1	4
		% within Gender	2.6%	6.3%	3.0%
		% of Total	2.3%	.8%	3.0%
	26 to 30	Count	17	2	19
		% within Gender	14.7%	12.5%	14.4%
		% of Total	12.9%	1.5%	14.4%
	31 to 35	Count	24	3	27
		% within Gender	20.7%	18.8%	20.5%
		% of Total	18.2%	2.3%	20.5%
	36 to 40	Count	29	5	34
		% within Gender	25.0%	31.3%	25.8%
		% of Total	22.0%	3.8%	25.8%
	41 to 45	Count	16	3	19
		% within Gender	13.8%	18.8%	14.4%
		% of Total	12.1%	2.3%	14.4%
	46 to 50	Count	11	1	12
		% within Gender	9.5%	6.3%	9.1%
		% of Total	8.3%	.8%	9.1%
	51 to 55	Count	9	0	9
		% within Gender	7.8%	.0%	6.8%
		% of Total	6.8%	.0%	6.8%
	56 to 60	Count	7	1	8
		% within Gender	6.0%	6.3%	6.1%
		% of Total	5.3%	.8%	6.1%
Total		Count	116	16	132
		% within Gender	100.0%	100.0%	100.0%
		% of Total	87.9%	12.1%	100.0%

Table 1. Age / Gender Cross Tabulation

With regard to educational level or highest degree attained, 10 (7.6%) of the study's

participants had a high school education, 6 (4.5%) had an associates degree, 110 (83.3%) had an

undergraduate degree, and 6 (4.5%) had a graduate degree. The resulting data is displayed in

Figure 3.
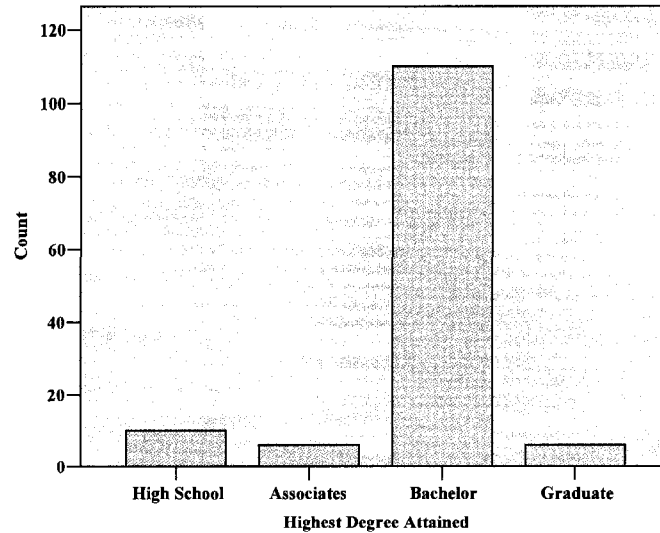
Figure 3. Highest Degree Attained

Of the 110 survey participants that had attained a bachelors degree, 96, (72.7%) were male

(approximately 83% of the total male population), and 14 (10.6%) were female (approximately

88% of the total female population). The resulting data is displayed in Table 2.

Gender * Highest Degree Attained Crosstabulation

			HighestDegreeAttained				
			High School	Associates	Bachelor	Graduate	Total
Gender	Male	Count	10	4	96	6	116
		% within Gender	8.6%	3.4%	82.8%	5.2%	100.0%
		% of Total	7.6%	3.0%	72.7%	4.5%	87.9%
	Female	Count	0	2	14	0	16
		% within Gender	.0%	12.5%	87.5%	.0%	100.0%
		% of Total	.0%	1.5%	10.6%	.0%	12.1%
Total		Count	10	6	110	6	132
		% within Gender	7.6%	4.5%	83.3%	4.5%	100.0%
		% of Total	7.6%	4.5%	83.3%	4.5%	100.0%

Table 2. Gender / Highest Degree Attained Cross Tabulation

The highest educational degree reported by construction project managers that participated in

the study included 69 (52.3%) with a BS and/or MS in construction management (CM), 20

(15.2%) with a BS and/or MS in civil engineering (CE), 6 (4.5%) with a BS and/or MS in

business administration, 22 (16.7%) with a BS and/or a MS in other areas, including other

engineering disciplines and architecture, and 15 (approximately 11.4%) with an associates

degree or high school diploma. The resulting data is displayed in Figure 4.
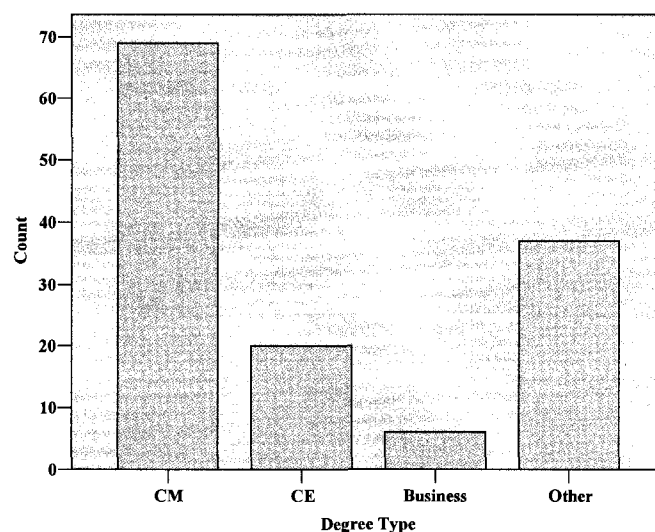
Figure 4. Degree Type

Cross-tabulation analysis of the data shows that of the 69 survey participants that had

attained a CM degree, 20 (approximately 29%) were within the age range of 36 to 40, and of the

20 survey participants that had attained a CE degree 6 (approximately 30%) were within the age

range of 36 to 40. The resulting data is displayed in Table 3.

Degree Type * Age Range Crosstabulation

			Age Range								Total
			20 to 25	26 to 30	31 to 35	36 to 40	41 to 45	46 to 50	51 to 55	56 to 60	
Degree Type	CM	Count	3	12	16	20	8	4	5	1	69
		% within DegreeType	4.3%	17.4%	23.2%	29.0%	11.6%	5.8%	7.2%	1.4%	100.0%
		% of Total	2.3%	9.1%	12.1%	15.2%	6.1%	3.0%	3.8%	.8%	52.3%
	CE	Count	0	3	5	6	3	2	0	1	20
		% within DegreeType	.0%	15.0%	25.0%	30.0%	15.0%	10.0%	.0%	5.0%	100.0%
		% of Total	.0%	2.3%	3.8%	4.5%	2.3%	1.5%	.0%	.8%	15.2%
	Business	Count	0	1	1	0	0	2	1	1	6
		% within DegreeType	.0%	16.7%	16.7%	.0%	.0%	33.3%	16.7%	16.7%	100.0%
		% of Total	.0%	.8%	.8%	.0%	.0%	1.5%	.8%	.8%	4.5%
	Other	Count	1	3	5	8	8	4	3	5	37
		% within DegreeType	2.7%	8.1%	13.5%	21.6%	21.6%	10.8%	8.1%	13.5%	100.0%
		% of Total	.8%	2.3%	3.8%	6.1%	6.1%	3.0%	2.3%	3.8%	28.0%
Total		Count	4	19	27	34	19	12	9	8	132
		% within DegreeType	3.0%	14.4%	20.5%	25.8%	14.4%	9.1%	6.8%	6.1%	100.0%
		% of Total	3.0%	14.4%	20.5%	25.8%	14.4%	9.1%	6.8%	6.1%	100.0%

Table 3. Degree Type / Age Range Cross Tabulation

Cross-tabulation analysis also revealed that of the 69 survey participants that had attained a

CM degree, 62 (nearly 90%) were male, about 53% of the total male population, and 7

(approximately 10%) were female, about 44% of the total female population. It was found that of

the 20 survey participants that had attained a CE degree, 17 (85%) were male, almost 15% of the

total male population, and 3 (15%) were female nearly 19% of the total female population. The

resulting data is displayed in Table 4.

Gender * Degree Type Crosstabulation

			DegreeType				
			CM	CE	Busines s	Other	Total
Gender	Male	Count	62	17	4	33	116
		% within Gender	53.4%	14.7%	3.4%	28.4%	100.0%
		% of Total	47.0%	12.9%	3.0%	25.0%	87.9%
	Female	Count	7	3	2	4	16
		% within Gender	43.8%	18.8%	12.5%	25.0%	100.0%
		% of Total	5.3%	2.3%	1.5%	3.0%	12.1%
Total		Count	69	20	6	37	132
		% within Gender	52.3%	15.2%	4.5%	28.0%	100.0%
		% of Total	52.3%	15.2%	4.5%	28.0%	100.0%

Table 4. Gender / Degree Type Cross Tabulation

Quantitative Research

Research Question 1

The first research question posed was: *What key competencies are needed to be an effective*

project manager in the U.S construction industry?

Quantitative Research Findings

Data concerning the 44 key competencies needed for a construction project manager to be

effective in the U.S. construction industry that were included in the survey were analyzed using

descriptive methodologies. Thirty-two of the competencies in the study were listed as "Hard

Skill Competencies" and twelve were listed as "Soft Skill Competencies." The breakdown of the

"Hard Skill" and "Soft Skill" competencies were as follow:

Hard skill competencies:

1. Building Codes
2. Building Systems
3. Business Skills
4. Business Writing
5. Computer Skills
6. Construction Materials
7. Construction Management (Management of the Construction Process)
8. Construction Methods
9. Construction Safety
10. Construction Surveying
11. Contract Administration
12. Contract Documents
13. Contract Law
14. Cost Accounting
15. Equipment Utilization
16. Estimating
17. Graphics
18. Human Resources
19. Job Site Layout
20. Labor Relations
21. Managerial Accounting
22. Marketing
23. Negotiation
24. Organizational Management (Management of the Organization)
25. Plan Reading
26. Procurement
27. Productivity Analysis
28. Public Speaking
29. Quality Control
30. Scheduling
31. Structural Analysis
32. Temporary Structures

Soft skill competencies:

1. Analytic Thinking
2. Buy-In and Advocacy
3. Coaching
4. Coping
5. Delegation
6. Facilitation
7. Leadership
8. Professional and Ethical Judgment
9. Social Awareness

10. Systematic Problem-Solving
11. Vision and Goal-Setting
12. Working in Partnership Clients

The ten competencies with the highest mean results ranked from highest to lowest are

displayed in Table 5.

Ten Competencies w/ Highest Mean

1	Leadership	1.4167
2	Construction Management (Management of the Construction Process)	1.4545
3	Professional and Ethical Judgment	1.5000
4	Contract Documents	1.5682
5	Plan Reading	1.5682
6	Negotiations	1.5758
7	Systematic Problem Solving	1.6364
8	Working in Partnership with Clients	1.7121
9	Analytical Thinking	1.7273
10	Scheduling	1.7348

Table 5. Ten Competencies with the Highest Mean

The five competencies with the lowest mean results were ranked from highest to lowest are
displayed in Table 6.

Five Competencies w/ Lowest Mean

1	Human Resources	3.0530
2	Temporary Structures	3.0909
3	Structural Analysis	3.2197
4	Construction Surveying	3.2424
5	Graphics	3.5530

Table 6. Five Competencies with the Lowest Mean

The mean score of each of competency type is presented in Table 7.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Leadership	132	1.00	5.00	1.4167	.94942
ConstructionManagement	132	1.00	5.00	1.4545	.89412
ProfessionalEthicalJudgment	132	1.00	5.00	1.5000	.98461
ContractDocuments	132	1.00	5.00	1.5682	.92623
PlanReading	132	1.00	5.00	1.5682	.87539
Negotiation	132	1.00	5.00	1.5758	.90056
SystematicProblemSolving	132	1.00	5.00	1.6364	.90184
WorkingInPartnershipWithClients	132	1.00	5.00	1.7121	.91243
AnalyticThinking	132	1.00	5.00	1.7273	.91711
Scheduling	132	1.00	5.00	1.7348	.89834
ContractAdministration	132	1.00	5.00	1.7348	.89834
BusinessWriting	132	1.00	5.00	1.7727	.93768
BusinessSkills	132	1.00	5.00	1.7803	.92723
CostAccounting	132	1.00	5.00	1.8106	.98951
Procurement	132	1.00	5.00	1.9167	.94135
ConstructionSafety	132	1.00	5.00	1.9242	1.00852
BuildingSystems	132	1.00	5.00	1.9318	.94257
VisionGoalSetting	132	1.00	5.00	1.9394	.88893
ConstructionMethods	132	1.00	5.00	1.9621	.85073
Delegation	132	1.00	5.00	1.9697	.87317
OrganizationalManagement	132	1.00	5.00	2.0076	1.00758
Coaching	132	1.00	5.00	2.0227	.81462
Facilitation	132	1.00	5.00	2.0606	.88893
ComputerSkills	132	1.00	5.00	2.0909	.81451
ProductivityAnalysis	132	1.00	5.00	2.1288	.89447
Estimating	132	1.00	5.00	2.1364	.91445
BuyInAdvocacy	132	1.00	5.00	2.1515	.82411
QualityControl	132	1.00	5.00	2.1591	.93146
ConstructionMaterials	132	1.00	5.00	2.2500	.86823
PublicSpeaking	132	1.00	4.00	2.2576	.80666
ManagerialAccounting	132	1.00	5.00	2.2803	.95161
SocialAwareness	132	1.00	5.00	2.2803	.91062
Coping	132	1.00	5.00	2.3182	.95963
ContractLaw	132	1.00	5.00	2.4167	.88276
LaborRelations	132	1.00	5.00	2.7045	.83564
Marketing	132	1.00	5.00	2.7576	1.00473
JobSiteLayout	132	1.00	5.00	2.8333	.94236
EquipmentUtilization	132	1.00	5.00	2.9924	.83343
BuildingCodes	132	1.00	5.00	3.0000	.89101
HumanResources	132	1.00	5.00	3.0530	1.02126
TemporaryStructures	132	1.00	5.00	3.0909	.92013
StructuralAnalysis	132	1.00	5.00	3.2197	.94356
ConstructionSurveying	132	1.00	5.00	3.2424	.94199
Graphics	132	1.00	5.00	3.5530	1.02126

Table 7. Key Competencies Mean Response Results

Analysis of the data revealed that four of the top ten competencies with the highest mean

result were soft skill competencies: professional and ethical judgment, systematic problem

solving, working in partnership with clients, and analytical thinking.

A Mann-Whitney non-parametric U test was performed on the competency data to assess

whether the competencies identified by gender resulted in the same distribution. Analysis of the

competency data revealed that the competencies with the mean highest scores were ordered

differently between men and women, and that three of the top ten competencies with the highest

mean result were soft skill competencies: professional and ethical judgment, systematic problem solving, and working in partnership with clients. The soft skill "analytical thinking" ranked eleventh and twelfth by men and women, respectively. Analysis further revealed that that there were statistically significant differences between men and women in two of the ten competencies. "Negotiations" ranked the most important competency for women, but ranked the sixth most important competency for men ($p = .025$). "Building Systems" ranked the fifth most important competency for women, but was ranked the nineteenth most important competency for men ($p = .015$).

Qualitative Demographic Data

The qualitative portion of this study investigated the most effective ways to teach adults in higher education construction programs the key competencies required to be an effective construction project manager in the U.S. construction industry. The study participants interviewed were part of a representative convenience sample of current faculty members of geographically diverse CM colleges accredited by the ACCE. Each of the ten potential interviewees was given a Qualitative Study Consent Form (Appendix B) prior to being asked questions contained in the Qualitative Interview Protocol (Appendix D). The ten study participants had a mean of 19 years in the construction industry, with a maximum of 40 years and a minimum of 13 years. In addition, the study participants had a mean of nine years in construction education, with a maximum of 25 years and a minimum of three years. It must be noted that many of the participants stated that their years in construction education and years in the construction industry were not mutually exclusive, and that they continued to participate in the construction industry while being a construction management educator.

Qualitative Research Findings

The qualitative portion of the study was conducted with questions that were developed using data from the quantitative portion of the study. Specifically, the questions were developed to determine the teaching perspective most often used when teaching the identified key competencies the teaching perspective most often used when teaching the identified key competencies needed to be an effective project manager in the commercial construction industry. The participant interviews were digitally recorded and transcribed, and the participant response to each question was given a numerical value that corresponded to each of Pratt's five perspectives. It should be noted that some participants gave more than one response to each question and thus a multiplying factor was given to each response to ensure that the dominate response carried greater weight than a secondary response. Once a total value for each question was determined, a numerical value evaluation could be made to determine the teaching perspectives used most by the study participants.

The value of each response was entered into the Qualitative Study Results Matrix presented in Table 8.

Interviewee	Teaching Perspective	Leadership	Management of Construction Process	Professional and Ethical Judgment	Contract Documents	Plan Reading	Negotiation	Problem Solving	Working in Partnership with Clients	Analytical Thinking	Scheduling	Total
John	3	3	3	5	1	2	1	3	1	3	1	
						4	4				3	
						***					***	
Bart	1	3	3	???	???	1	???	???	???	???	3	
		***	***			2					***	
						***						
Dirk	2	5	1	4	1	1	1	1	1	1	1	
	3	4	3	3	4	3	3	3	3	3	3	
	***	2	4		***	***	***	***	***	***	***	
		*** ** ***										
Sonny	1	2	1	2	3	2	3	2	3	2	1	
	2	4	2	3		***					2	
	***			***								
Hahn	1	2	1	1	3	1	1	1	3	2	1	
	2	4	3	3	4	3	***	3	2	3	3	
	4	*** ***				***		2			***	
Steve	1	2	1			1					???	
	3	3	3			3						
						***						
Monty	1	4	1	5	1	2	3	3	1	3	???	
	3	***	2	2		1	***	1	3	***		
			3	3				***	***			
			***	***								
Rob	1	4	???	1	1	1	2	1	1	3	???	
	2	2		5	2	2	3	2	2	***		
	4					***						
Sky	3	4	2	3	1	1	3	3	2	3	1	
	5	3		***							3	
											***	
Dana	1	1	2	5	1	1	5	2	2	1	1	
	2	2		2	2	2	2	4	1	2	3	
	4				3	3			4			
												Total
Developmental	7	1	5	2	6	8	3	4	5	2	6	42
Transmission	5	6	4	3	2	6	2	4	4	3	1	35
Apprenticeship	5	4	6	5	3	4	5	5	4	6	6	48
Nurturing	3	6	1	1	2	1	1	1	1	0	0	14
Social Reform	1	1	0	4	0	0	1	0	0	0	0	6
Developmental	350	50	250	100	300	390	150	190	240	100	300	2070
Transmission	210	260	180	130	80	290	90	180	180	140	40	1570
Apprenticeship	220	180	250	200	130	150	230	230	180	280	250	2080
Nuturing	90	270	0	50	80	40	40	40	30	0	0	550
Social Reform	40	50	0	200	0	0	50	0	0	0	0	300

Table 8. Qualitative Study Results Matrix

To begin the study each participant was asked, "Of the five perspectives detailed by Pratt, which perspective or combination of perspectives do you consider the most similar to your own teaching style?" All of the study participants stated they believe that the *transmission* perspective is used and is necessary much of the time to convey information that is needed to allow students to have a base knowledge of a subject. However, many of the participants stated that the transmission style was not their desired teaching style. Sonny, a participant with 30 years of construction experience and six years of construction education experience stated that, "there are certainly times when I don't get ahead of the game enough and fall back to transmission, but I always am disappointed in myself if that's where I end up." Several participants stated that

because they were fairly new to construction education, they relied on the transmission

perspective too often. Sonny continued that,

> I consider myself an expert in construction. I have spent 30 years in the industry
>
> and so therefore I'm very comfortable with the content. However, as someone
>
> that's relatively new to academia I think it's easy for me to fall into a transmission
>
> style.

Bart, a participant with 19 year of construction experience but only three years of construction

education experience stated that,

> Initially I was very transmission, but as I move along and develop in my career
>
> I'm finding that the developmental and apprenticeship styles are becoming more
>
> important. I think that's a natural transition as we become more comfortable in
>
> what we do.

Sky, a female participant with 20 years of construction experience and six years of

construction education experience stated that the developmental perspective was her preferred

style because it allowed her to "help focus the learning to the individual learner. Helping the

student understand the basic concepts and then allowing them to continue moving towards

understanding of more difficult concepts." Study participants that had spent time in the

construction field as a union tradesman, including Sonny and Dirk, a participant that has 40 years

of construction experience and 25 years of construction education experience, made similar

statements about the apprenticeship style that fosters a student's ability to move from basic

understand to more difficult concepts. The nurturing and social reform perspectives were not

identified as a teaching style as often as the other three perspectives. However Sky and Rob, a

participant with 14 years of construction experience and 14 years of construction education

experience, both stated they believed that nurturing and social reform perspectives were a focus when counseling and advising students in life and career choices.

Survey Question 2

The second research question posed was: *If a defined set of key competencies are needed to be an effective project manager in the U.S. commercial construction industry, what is the most effective means to teach those competencies to adults in higher education?*

The following are the ten competencies most identified in the quantitative portion of the study combined with the responses of the qualitative participants as they pertain to the teaching perspective most often used to teach the identified competencies:

Leadership

The nurturing and apprenticeship perspectives were identified almost equally as the perspectives most often used by the study participants when teaching leadership. Statements included those made by Monty, a participant with 20 years of construction experience and four years of construction education experience who stated, "To teach leadership you sort of have to nurture them along and figure out how to tap into their natural abilities and then teach skills that they might need to develop their leadership skills." Hahn who had 13 years construction experience and 12 years construction education experience believed that the nurturing and apprenticeship perspectives allow the faculty member to be a role model for students at all levels. Nurturing them and demonstrating in an effort to facilitate the learning.

A side note to the study question was made by Sonny, who stated,

I think that's interesting that leadership should come up first in the list of competencies because in my own research I have found leadership to be lacking in a lot of our curriculum. I believe that leadership is more of a soft skill or people skills. I would like

to think that soft skills like "leadership" are important things for our students to have when they get out in the real world, but perhaps our students aren't ready to learn those types of things.

Construction Management (Management of the Construction Process)

The transmission and developmental styles were identified equally by the study participants as the perspectives most often used teaching construction management or the management of the construction process. The participants stated that the transmission style is needed to give learners a foundation for learning, but it is the developmental style that allows learners to continue in the learning process. Monty reinforced this thought when he stated,

> I mean you have to have a certain amount of transmission; you have to teach them the basics, the terminology, and the rules of the road. But I also think there's a lot of developmental teaching that has to go along with that because when you are teaching construction management you're kind of walking them (the students) through the process and they're developing their skills. It's not something you can just tell them, it's something you're leading them through, guiding them through the process to understand it.

Monty then stated that he believed the developmental style worked when teaching construction management because,

> Managing the construction process is not just understanding RFI's (Request for Information) and submittals, it's developing relationships with people, negotiating skills, figuring out how to get from point A to point B when you have different things to deal with and different personality types to deal with, like architects and engineers.

Professional and Ethical Judgment

Though the developmental and social reform perspectives were identified equally as the

perspective most often used when teaching professional and ethical judgment, all of the

perspectives were found to be used. Dana, a female participant with 20 year construction

experience and four years of construction education experience stated that, "Professional and

ethical judgment goes along with students being able to develop critical thinking skills. I think

using the developmental style works because it takes students time to learn and acquire those

skills." Monty stated that social reform style is needed because, "Teaching professional and

ethical judgment requires the student to go through a process of talking about the norms of

society, because everybody has a different definition of ethics."

Contract Documents

The transmission perspective was identified as the common perspective used when teaching

students about contract documents. Sky and John, a study participant with 17 years of

construction experience and 19 years of construction education experience summarized the

statements of all of the participants when they stated that when teaching contract documents:

"We have to build a base of knowledge for them to be able to make judgments. It's a brief

systematic approach where we stand and deliver the different attributes of the contracts."

Plan Reading

The transmission perspective was identified as the most commonly used perspective when

teaching plan reading. However, all of the study participants stated that transmission is not

sufficient in itself to ensure that learners understand how to read plans. Dana stated that,

> There is a level of transmission that has to happen, especially vocabulary so that
>
> the student can understand what words are out there and how they are used in the

sense of the drawings and specifications. However it is practice that is needed.

Thus we have the apprenticeship style to guide them the best we can. It's a

practice thing. You have to get used to how plans are organized and where to find

things. You can talk to a student until you are blue in the face but until they

practice things they don't get it as well.

It was also stated by Bart that,

It can't be done using a PowerPoint presentation, in plan reading you have got to

do it. You have to give the students a set of plans and have them physically touch

it, feel it, smell it and taste it to get them to learn it correctly.

Negotiation

The developmental perspective was identified to be the most commonly used teaching style

when teaching negotiations, and was followed by the transmission perspective. Monty stated that

that the developmental style works when teaching negotiations because,

The way that a person negotiates has a lot to do with the way that they think about

things, the way that they see things and their point of view on things. It is also

about understanding other people's point of views and how they relate to your

point of view.

Sky gave an example of how they use the developmental teaching style when teaching

negotiations. "Students pair up and they are given a scenario to study. They then negotiate

different points included in the scenario. They learn from the first negotiating experience and

then apply that learned experience to another more complex problem." However, Hahn stated

that, "negotiations are all about transmission, what each side represents and how they posture

themselves. It is reading between the lines, understanding issues where there's a comfort factor, where there's vulnerabilities, where there's liabilities."

Problem Solving

Transmission and apprenticeship followed close behind the developmental perspective when the study participants identified the teaching perspective most often used to teach problem solving. Dirk stated that, "Transmission is needed at the beginning to convey basic methods of problem solving, and then a developmental approach is needed to increase the students' ability to apply the simple method to more complex problems." Monty mirrored the comment stating that,

> A portion of problem solving can be taught through the stand and deliver
>
> approach by giving them steps that you can go through to accomplish problem
>
> solving. There's a specific way to solve problems that people follow, step by step
>
> directions on how to approach a problem. That said, there's also a portion that
>
> would have to be developmental. What's really important is to make students
>
> understand that in order to solve a problem you have to be able to understand your
>
> own thoughts and opinions about things. You must be able to often decouple
>
> yourself from the problem in order to think logically about something that might
>
> be emotional.

Working In Partnership With Clients

The transmission perspective was the teaching perspective most identified by study participants when teaching working in partnership with clients, but the developmental and apprenticeship perspectives were also identified. Monty stated that "Working in partnership with clients first requires you to stand and deliver, tell them different approaches, give some suggestions. You say, here are some ways that you can deal positively with people and clients,

giving them the developmental part of it so that they understand the complex cognitive structures that are related to that type of discussion." "This is needed because dealing with clients is something that you generally learn at a more advanced level in your learning. It requires the student to understand the nuances of customer relations and dealing with clients."

Analytical Thinking

The developmental perspective was most identified by the study participants when teaching analytical thinking. When describing why he used the developmental perspective, Dirk stated,

Analytical thinking is best taught using the developmental perspective because it's putting things in order, its developing processes and procedures creating a system so that we can get a predictable outcome. The teacher should be able to take on the learner's perspective and try to help them grow from a very simple cause and effect kind of process to a more complex understanding. Its goal should be to help learners develop and process cognitive structures."

Scheduling

Transmission and developmental were equally identified as the perspectives most used by the study participants when asked about teaching scheduling. Dana stated that, "Transmission is needed first in scheduling because you need to give them the basics first." Bart however stated that he used the developmental perspective when teaching scheduling because,

You need to know how to do construction process, you need to know how things come together, you know how to build a building, you need to know/understand timelines, you need to understand how long activities take, understand productivity, you need to understand all kinds of things to make a schedule, a really good schedule work."

This statement was reinforced with Dana's comment that "To be able to interpret what they are looking at they must go through a learning process of getting information that is not immediately obvious."

Summary

A quantitative on-line survey was undertaken to gather demographic data and to identify the most significant key competencies of effective project managers in the U.S. commercial construction industry. Demographic data gathered included age, gender, education level, and degree type. Analysis of the data using cross-tab analysis allowed for a detailed description of the study participants. Forty-four competencies were used in the Likert Scale survey instrument and the ten competencies with the highest mean response were determined. A qualitative study was undertaken using questions derived from the results of the quantitative study. Participants in a convenience sample were interviewed and the resulting information was analyzed. Teaching perspectives most often used to teach the key competencies identified in the quantitative study were determined. Chapter V will discuss the interpretation and implication of the data, and will present recommendations for future research.

Chapter V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter provides a summary of the study, conclusions of the study based upon the findings, limitations, and recommendations for further research.

Summary

A sizable body of research exists that has attempted to determine if there are specific key competencies that are needed to be an effective project manager in the U.S. construction industry. Further, a great deal of research has been conducted to attempt to determine the most effective ways to teach adults in higher education. The intent of this study was to combine the two pursuits and identify the most effective way to teach adults in higher education construction programs the most significant key competencies needed to be an effective project manager in the U.S. commercial construction industry.

Quantitative Study Findings

The quantitative portion of the study surveyed project managers employed at construction companies that met the parameters of the study. Using an on-line survey instrument (Appendix C) demographic data were gathered to gain insight as to the study participants. The Likert-scale on-line survey was completed by 132 of the 224 project managers to which a web link to the instrument was distributed. Statistical analysis of the data revealed the demographic makeup of the participants and a rating of the key competencies needed to be an effective project manager in the U.S. construction industry. It was found that the typical effective project manager was a male with a bachelor degree in construction management and was between the ages of 36 to 40.

However, cross- tabulation of the data also revealed that gender, educational level, degree type, and age of effective project managers vary considerably.

Several other important results were found during the analysis of the demographic data. First, it was found that the majority of the project managers in the study had attained a bachelor degree in construction management, approximately 52% of the total population, rather than in civil engineering, approximately 20% of the total population. This is important because many companies and government entities in the U.S. require a project manager to have a civil engineering degree and do not recognize a CM degree as a valid degree for employment as a project manager. However, the results of the study indicate that a vast majority of effective project managers have degrees in construction management.

Another important result of the analysis of the demographic data revealed that only six or 4.5 percent of the survey population had attained a graduate degree. Four of those with a graduate degree had attained a graduate degree in construction management. This gives some indication that attaining a graduate degree is not required to be an effective project manager.

It was also found that of the total population surveyed, 16 or approximately 12 percent had attained a high school degree or an associate degree. Seventy five percent of those with a high school degree or associates degree were in age ranges above the mean for the total population, giving some indication that a bachelor degree may have become a recent minimum requirement for employment as a project manager.

Another important result of the analysis of the demographic data revealed that the total population of females in the study was small, approximately 12 percent. It is not known if the population size of women that participated in the study is indicative of the commercial construction industry in its entirety, or is indicative of the population surveyed. Gender specific

analysis further revealed the age range (36 to 40), highest degree attained (bachelor), and degree

type (CM), were consistent between females and their male counterparts. This is important

because it gives an indication that hiring requirements for males and females are not dissimilar.

Further research is needed to gain greater insight into the opportunities for females in the

commercial construction industry.

The analysis of the competency data revealed that the ten competencies with the highest

mean results were:

1. Leadership – 1.4167
2. Construction Management (Management of the Construction Process) – 1.4545
3. Professional and Ethical Judgment – 1.5000
4. Contract Documents – 1.5682
5. Plan Reading – 1.5682
6. Negotiations – 1.5758
7. Systematic Problem Solving – 1.6364
8. Working in Partnership with Clients – 1.7121
9. Analytical Thinking – 1.7273
10. Scheduling – 1.7348

The competencies with the lowest mean results were:

1. Human Resources – 3.0530
2. Temporary Structures – 3.0909
3. Structural Analysis – 3.2197
4. Construction Surveying – 3.2424
5. Graphics – 3.5530

Quantitative analysis revealed a mean difference between leadership, the most identified

competency, and scheduling, the tenth highest identified competency, was .3181. The mean

difference between leadership (1.4167), the most identified competency and Graphics (3.5530),

the lowest identified competency, was 2.13.

One significant finding is that four of the ten competencies with the highest mean;

"professional and ethical judgment", "systematic problem solving", "analytical thinking", and

"working in partnership with clients" were soft skills. This result is significant because

construction management education tends to focus on hard skills rather than soft skills. Additional research needs to be conducted into this area to determine if soft skills need to become a greater focus in construction education.

Another significant result of the analysis of the competency data is that the three competencies with the lowest mean result are required to be part of the curricula for construction management schools accredited by the ACCE. A reassessment of the curricula requirements for accredited construction management schools may be needed to ensure that the curricula and the needs of industry are congruent.

Significant findings with respect to gender was that the ten competencies with the highest mean results for men were not congruent with those identified by women, that several of the competencies that were identified by both gender were not ranked in the same order, and that the mean result of two of the competencies, "negotiations" and "building systems" were found to be statistically significantly different between men and women. Further research is needed to highlight the opportunities for females in the commercial construction industry and to determine the need for gender specific construction education.

Qualitative Study Findings

The qualitative portion of the study surveyed ten current faculty members of U.S. construction management colleges. A qualitative interview protocol (Appendix D) was developed that defined five teaching perspectives used when teaching adults in higher education, gathered demographic data of the study participants, inquired as to the perspective that most closely fit the teaching perspective of the qualitative study participant, and the teaching perspective most commonly used when teaching each of the ten competencies identified in the quantitative portion of the study. Analysis of the qualitative demographic data revealed that the

participants had a wide range of experience in construction education, but all had significant amount of actual industry experience, a factor that could have a significant affect on the interview responses.

No individual perspective was found to be universally used in teaching to adults in higher education construction programs the identified key competencies; a combination of perspectives was used in most cases. This finding is consistent with Pratt's (1998) proposition that there is no universal best perspective in teaching. It was found that the developmental and transmission perspectives were the most commonly used perspectives, followed by the apprentice, nurturing, and social reform perspectives. The nurturing perspective was found to be used most commonly on soft skill competencies, and used a great deal when teaching leadership, the competency with the highest mean result. The social reform perspective was found to be used frequently when teaching professional and ethical judgment, but was only identified once when teaching the other key competencies.

The transmission perspective was found to be the perspective most commonly used by the study participants, though all believed the transmission style to be the least effective overtime. Students early in construction education need to have an understanding of basic concepts that can be delivered in a transmission format. Similar to the construction process, the building of a strong foundation for learning must be developed, allowing for the construction of further knowledge and understanding as students progress in their education. Dirk aptly stated that,

"It's like in elementary school where you started with the ABCs, then learned short words, and then learned that those words could be assembled into meaningful sentences. Eventually students are able to see the big picture." However, one problem with focusing on the use of the transmission perspective when teaching younger students is that younger students

sometimes need more nurturing than older students. This nurturing may be needed in the form of educator, mentor, and/or career counselor.

Another theme was revealed concerning the use of the transmission perspective. It was found that instructors with the least amount of construction education used the transmission style most often. This may be because all of the qualitative study participants had begun their careers in construction and then migrated to construction education. Therefore, they may have knowledge of the skills needed by students, but lack the ability to teach what they know. This finding is significant because there is a great debate as to which is more important for an instructor of construction management education, industry experience or pedagogical proficiency. Is it conceivable to teach a subject like construction management without "hands-on" experience? Is being a subject matter expert advantageous if the teacher cannot effectively put forth the knowledge to the student? The answer may be that both experience and teaching proficiency are equally important. Like the student, the educator must have a foundation of knowledge upon which to build. The construction educator must be able to evolve and grow their teaching style, reacting to the needs of their students, moving to styles of teaching that will be the most effective for the subject and students being taught.

The study revealed that instructors that had participated in an apprenticeship program while working in the construction industry were most likely to identify and use the apprenticeship perspective. This finding is consistent with Pratt's (1998) proposition that teaching is guided by one's perspective on teaching, and that the actions, intentions, and beliefs of a teacher greatly affects how classes are taught. These individuals believe that there is no substitution for experience, and that it is real life experience that fosters the acquisition and retention of new knowledge. As teachers, the more we can put students in situations to get real life experiences,

the more we can build deeper learning experiences. However, the challenge is finding an effective way to use the apprenticeship teaching style in construction management higher education curricula. Though the apprenticeship style has elements of all of the perspectives (transmission, development, nurturing, and social reform), true apprenticeship learning comes from the worksite and not from an academic setting.

Another common theme that became evident during the study was that teaching perspectives varied greatly depending upon whether the students being taught are undergraduate or graduate students. Sonny, stated that,

> Undergrads seem to be more box checkers, they finish this class, they move on, they finish the next one; their ultimate goal is to get the piece of paper. Graduate students respond more favorably to the nurturing perspective because they have the maturity to be challenged. It may also be because graduate students are more passionate about their individual learning, understanding that the ultimate goal is learning.

An echoed theme concerning the perspectives proposed by Pratt is that the perspectives are too similar and lacking of detail. Participants found it difficult to place their teaching style within the confines of Pratt's. Dana went as far as to state that,

> You can't put teaching perspectives into neat little boxes. Students learn differently, and because you have a multitude of students, and thus a multitude of learning types in a classroom, your teaching perspective is and needs to be all over the board." Students learn audibly, some students learn better reading a book, some students learn better writing papers, other students learn better by working in groups, some students learn better by physically touching and handling things.

It is most important as teachers that we try to use all of these tools to our best advantage. Some lend themselves better to different ways of teaching, but we must approach them from many different sides.

Conclusions

The findings of the quantitative study suggest that the majority of the project managers that responded to the study were male, within the age range of 36 to 40, and had an undergraduate degree in CM. However, it was found that gender, age, educational level, and degree type were not barriers to entry or success in the field of project management in the commercial construction industry. It was also found that there are specific key competencies that are needed to be an effective project manager in the U.S. commercial construction industry. The findings of the qualitative study suggest that no one specific teaching perspective is universally used to teach the key competencies identified in the quantitative portion of the study, and that the teaching perspective used was greatly dependent upon the teaching experience of the educator, the background of the educator, the competency being taught, and the age of the student.

Limitations and Recommendations

The interpretations of the results of this study are not without limitations. First, the results indicated that there were specific key competencies that are needed to be an effective construction project manager in the U.S. construction industry, but those key competencies were chosen from a list that was developed by the researcher after a thorough review of previous studies of key competencies. The range of key competencies limited the selection and thus may have skewed the results of the study.

Participants in the quantitative portion of the study are all construction project managers employed by commercial construction entities that are statistically in the top 400 grossing U.S.

construction entities; thus the findings may not be indicative of the key competencies needed by smaller commercial construction entities. It is recommended that further research be undertaken to determine if similar key competencies are in other U.S. geographic areas. It is also recommended that industrial, utility, highway, and residential construction industries are studied to determine if the most significant key competencies identified in the commercial construction industry are needed to be effective in all construction disciplines.

A common theme of the participants in the qualitative portion of the study is that they all had significant industry experience. This fact may have a significant influence on their teaching perspective. Further investigation is needed to validate the findings of this study to determine the most effective way to teach the key competencies of construction project managers in the U.S. commercial construction industry.

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APPENDICES

Appendix A

Quantitative Study Consent Form

You have been asked to participate in a study to investigate the key competencies needed to be an effective project manager in the United States (U.S.) commercial construction industry. The intent of the study is to develop education and training methods and procedures to facilitate the instruction of key construction competencies, and improve the effectiveness of future PMs in the commercial construction industry. Approved by the University of Idaho Human Assurances Committee, this research is being conducted as the final requirement in a Ph.D. program coordinated through the University of Idaho.

Data for the study, gathered through the use of this survey instrument will be analyzed to determine if there is a defined set of key competencies needed to be an effective construction project manager in the U.S. commercial construction industry. Further, demographic data will be gathered to analyze the age, gender, formal education obtained, and if applicable the type of degree earned of the study participants. You will not be required to reveal your identity, and the name of the company for which you are employed will remain confidential. The survey will take approximately 20 minutes to complete.

The participation in the study is completely voluntary, and you may decline to participate at anytime. Once the data has been analyzed, the completed survey instrument will be destroyed. Any published writing stemming from this study will ensure participant confidentiality by neither identifying the participant name, nor location of employment. No specific information from the study will be revealed to your employer.

If there are further questions after reading this quantitative study consent form or any questions concerning this study, please direct them to:

R. Casey Cline
111 Broadway Suite #133
Boise, Idaho 83702
(208) 841-3343
rccline@cableone.net

1) I have reviewed this consent form and understand and agree to its contents.

   □ Yes - I consent to participate in the study
   □ No - I decline to participate in the study

Appendix B

Qualitative Study Consent Form

Date:

You have been asked to participate in a study to investigate the teaching perspective most often used when teaching the identified key competencies to adult learners in higher education. The intent of the study is to develop education and training methods and procedures to facilitate the instruction of key construction competencies, and improve the effectiveness of future PMs in the commercial construction industry. Approved by the University of Idaho Human Assurances Committee, this research is being conducted as the final requirement in a Ph.D. program coordinated through the University of Idaho. The university requires that you give your signed consent to participate in the research.

The information will be gathered through one-on-one, semi formal interviews. The interviews will range from thirty to forty minutes and will be digitally recorded and transcribed with your consent, and you are free to turn the digital recorder off at any time. The recording will be held with the strictest of confidence and once analyzed the recordings will be erased.

The participation in the study is completely voluntary, and you may decline to participate at anytime. Any published writing stemming from this study will ensure participant confidentiality by neither identifying the participant name, nor location of employment. No specific information from the study will be revealed to your employer.

If there are further questions after reading this qualitative study consent form or any questions concerning this study, please direct them to:

R. Casey Cline		Martha Yopp, Ph.D.
608 Warm Springs		University of Idaho - Boise
Boise, Idaho 83712	or	322 E. Front Street
(208) 841-3343		Boise, Idaho 83702
rccline@cableone.net		(208) 364-9918
		myopp@uidaho.edu

I am grateful for your participation in the study.

I have reviewed this consent form and understand and agree to its contents.

Participant Name: _____   Date: _____

Researcher Name: _____   Date: _____

Thank you once again

R. Casey Cline

Appendix C

Quantitative Survey Form

A STUDY TO DETERMINE THE KEY COMPETENCIES OF EFFECTIVE PROJECT MANAGERS IN THE U.S. COMMERCIAL CONSTRUCTION INDUSTRY

1) I have reviewed this consent form and understand and agree to its contents.
    ☐ Yes - I consent to participate in the study
    ☐ No - I decline to participate in the study

2) 1. Employer:

_____

3) 2. Job Title:
    ☐ Project Manager
    ☐ Assistant Project Manager
    ☐ Senior Project Manager
    ☐ Construction Manager
    ☐ Project Engineer
    ☐ Other (please specify)

    If you selected other please specify:

_____

4) 3. Age Range:
    ☐ Under 20
    ☐ 20 to 25
    ☐ 26 to 30
    ☐ 31 to 35
    ☐ 36 to 40
    ☐ 41 to 45
    ☐ 46 to 50
    ☐ 51 to 55
    ☐ 56 to 60
    ☐ 61 to 65
    ☐ Over 65

5) 4. Gender:
    ☐ Male
    ☐ Female

6) 5. Highest Degree Attained:
    ☐ None
    ☐ High School
    ☐ Associate
    ☐ Bachelor
    ☐ Graduate
    ☐ Other

7) **6. Degree Type:**

    ☐ Construction Management
    ☐ Civil Engineering
    ☐ Business Administration
    ☐ Other (please specify)

    If you selected other please specify:

_____

Please rate the importance of each individual competency on a scale of 1 to 5.

HARD SKILL COMPETENCIES
8) **1. Building Codes:**
    1 = Most Important   5 = Least Important
        ☐ 1
        ☐ 2
        ☐ 3
        ☐ 4
        ☐ 5

9) **2. Building Systems:**
    1 = Most Important   5 = Least Important
        ☐ 1
        ☐ 2
        ☐ 3
        ☐ 4
        ☐ 5

10) **3. Business Skills:**
    1 = Most Important   5 = Least Important
        ☐ 1
        ☐ 2
        ☐ 3
        ☐ 4
        ☐ 5

11) **4. Business Writing:**
    1 = Most Important   5 = Least Important
        ☐ 1
        ☐ 2
        ☐ 3
        ☐ 4
        ☐ 5

12) **5. Computer Skills:**
    1 = Most Important   5 = Least Important
        ☐ 1
        ☐ 2

☐ 3
☐ 4
☐ 5

13) 6. Construction Materials:
1 = Most Important   5 = Least Important
    ☐ 1
    ☐ 2
    ☐ 3
    ☐ 4
    ☐ 5

14) 7. Construction Management (Management of the Construction Process):
1 = Most Important   5 = Least Important
    ☐ 1
    ☐ 2
    ☐ 3
    ☐ 4
    ☐ 5

15) 8. Construction Methods:
1 = Most Important   5 = Least Important
    ☐ 1
    ☐ 2
    ☐ 3
    ☐ 4
    ☐ 5

16) 9. Construction Safety:
1 = Most Important   5 = Least Important
    ☐ 1
    ☐ 2
    ☐ 3
    ☐ 4
    ☐ 5

17) 10. Construction Surveying:
1 = Most Important   5 = Least Important
    ☐ 1
    ☐ 2
    ☐ 3
    ☐ 4
    ☐ 5

18) 11. Contract Administration:
1 = Most Important   5 = Least Important
    ☐ 1
    ☐ 2
    ☐ 3

☐ 4
☐ 5

19) 12. Contract Documents:
1 = Most Important   5 = Least Important
    ☐ 1
    ☐ 2
    ☐ 3
    ☐ 4
    ☐ 5

20) 13. Contract Law:
1 = Most Important   5 = Least Important
    ☐ 1
    ☐ 2
    ☐ 3
    ☐ 4
    ☐ 5

21) 14. Cost Accounting:
1 = Most Important   5 = Least Important
    ☐ 1
    ☐ 2
    ☐ 3
    ☐ 4
    ☐ 5

22) 15. Equipment Utilization:
1 = Most Important   5 = Least Important
    ☐ 1
    ☐ 2
    ☐ 3
    ☐ 4
    ☐ 5

23) 16. Estimating:
1 = Most Important   5 = Least Important
    ☐ 1
    ☐ 2
    ☐ 3
    ☐ 4
    ☐ 5

24) 17. Graphics:
1 = Most Important   5 = Least Important
    ☐ 1
    ☐ 2
    ☐ 3
    ☐ 4

□ 5

25) 18. Human Resources:
   1 = Most Important   5 = Least Important
   - □ 1
   - □ 2
   - □ 3
   - □ 4
   - □ 5

26) 19. Job Site Layout:
   1 = Most Important   5 = Least Important
   - □ 1
   - □ 2
   - □ 3
   - □ 4
   - □ 5

27) 20. Labor Relations:
   1 = Most Important   5 = Least Important
   - □ 1
   - □ 2
   - □ 3
   - □ 4
   - □ 5

28) 21. Managerial Accounting:
   1 = Most Important   5 = Least Important
   - □ 1
   - □ 2
   - □ 3
   - □ 4
   - □ 5

29) 22. Marketing:
   1 = Most Important   5 = Least Important
   - □ 1
   - □ 2
   - □ 3
   - □ 4
   - □ 5

30) 23. Negotiation:
   1 = Most Important   5 = Least Important
   - □ 1
   - □ 2
   - □ 3
   - □ 4
   - □ 5

31) 24. Organizational Management (Management of the Organization):
1 = Most Important   5 = Least Important
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5

32) 25. Plan Reading:
1 = Most Important   5 = Least Important
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5

33) 26. Procurement:
1 = Most Important   5 = Least Important
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5

34) 27. Productivity Analysis:
1 = Most Important   5 = Least Important
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5

35) 28. Public Speaking:
1 = Most Important   5 = Least Important
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5

36) 29. Quality Control:
1 = Most Important   5 = Least Important
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5

37) 30. Scheduling:
1 = Most Important   5 = Least Important

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5

38) 31. Structural Analysis:
1 = Most Important   5 = Least Important

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5

39) 32. Temporary Structures:
1 = Most Important   5 = Least Important

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5

SOFT SKILL COMPETENCIES
40) 1. Analytic Thinking:
1 = Most Important   5 = Least Important

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5

41) 2. Buy-In and Advocacy:
1 = Most Important   5 = Least Important

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5

42) 3. Coaching:
1 = Most Important   5 = Least Important

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5

43) 4. Coping:
1 = Most Important   5 = Least Important

□ 1

□ 2

□ 3

□ 4

□ 5

44) 5. Delegation:
  1 = Most Important   5 = Least Important

□ 1

□ 2

□ 3

□ 4

□ 5

45) 6. Facilitation:
  1 = Most Important   5 = Least Important

□ 1

□ 2

□ 3

□ 4

□ 5

46) 7. Leadership:
  1 = Most Important   5 = Least Important

□ 1

□ 2

□ 3

□ 4

□ 5

47) 8. Professional and Ethical Judgment:
  1 = Most Important   5 = Least Important

□ 1

□ 2

□ 3

□ 4

□ 5

48) 9. Social Awareness:
  1 = Most Important   5 = Least Important

□ 1

□ 2

□ 3

□ 4

□ 5

49) 10. Systematic Problem-Solving:
  1 = Most Important   5 = Least Important

□ 1

□ 2
□ 3
□ 4
□ 5

50) 11. Vision and Goal-Setting:
   1 = Most Important   5 = Least Important
          □ 1
          □ 2
          □ 3
          □ 4
          □ 5

51) 12. Working in Partnership Clients:
   1 = Most Important   5 = Least Important
          □ 1
          □ 2
          □ 3
          □ 4
          □ 5

52) If you would like to be entered into the drawing for an IPod Shuffle please enter your e-mail address in the space provided and select "next page". Your e-mail address will in no way be tied to your survey responses.
If you choose not to enter:
Please move to the "Next Page" to submit the survey.

Thank you for participating in this study.

R. Casey Cline

Appendix D

Qualitative Interview Protocol

Teaching Perspectives Background

There are many different views as to what constitutes good methods of teaching or what sometimes are referred to as teaching perspectives.
Pratt presents four propositions on teaching perspectives:

Proposition 1: There is no universal best perspective.
Proposition 2: One's actions, intentions, and beliefs guide and define the teaching perspective.
Proposition 3: Some beliefs are more central to one's being than others, and are therefore open to change.
Proposition 4: Improvements in instruction can focus actions, intentions, or beliefs.

Pratt defined the five perspectives in teaching in adult and higher education as:
1. Transmission:
   - Where the teacher is a subject matter expert relative to the content being taught.
   - The "stand and deliver" approach requires the teacher to accurately put forth to the student the content to be delivered.
   - The content is systematically covered with the delivery being varied to meet the needs of the learner.
2. Apprenticeship:
   - The process socializes the learner to norms and ways of working.
   - The teacher is the master or the journeyman that serves as a mentor to the student or apprentice.
   - It allows the teacher to reveal the skills needed to perform a task.
   - To be successful the teacher must not only demonstrate the skill needed, but allow the student to actually work on the task.
3. Developmental:
   - The teaching must be planned and conducted from the learner's point of view.
   - The needs and learning styles of the learner must be considered to ensure that the content is delivered in a manner that facilitates the needs of the learner.
   - The primary goal is to help learners develop increasingly complex cognitive structures related to the content, and then changing those cognitive structures.
   - Changing the cognitive structures requires the learners to be engaged by the teacher to move from simple to complex forms of thinking.
   - Changing the cognitive structures requires the teacher to bracket the knowledge, allowing the learner to construct their own understanding of the content.
4. Nurturing:
   - Is based upon a belief that long-term, hard, persistent effort to achieve comes from the heart as much as it does from the head.
   - Operates under the assumption that people will be more successful in their learning if they are supported academically and emotionally.
   - Learners are challenged to achieve goals while their individual growth is encouraged.
5. Social Reform:
   - Teaching to change society in a positive way, allowing students to embrace the values and ideologies that are part of their work.
   - Students are challenged to take stands on viewpoints and take social action to improve their society.

Interview Protocol

Interview Questions:

1.   Name?

2.   Position?

3.   Educational Institution?

4.   Years in Construction Education?

5.   Years in Construction?

6.   Of the five perspectives detailed by Pratt, which perspective or combination of perspectives do you consider most similar to your teaching perspective?

- Transmission:
- Apprenticeship:
- Developmental:
- Nurturing:
- Social Reform:

7.   Of the five perspectives detailed by Pratt which perspective or combination of perspectives do you use most often when teaching each of the ten identified key competencies?

- Leadership:
- Construction Management (Management of the Construction Process):
- Professional and Ethical Judgment:
- Contract Documents:
- Plan Reading:
- Negotiations:
- Problem Solving:
- Working in Partnership with Clients:
- Analytical Thinking:
- Scheduling:

8.   Do you have any final thoughts about teaching perspectives or key competencies needed to be an effective project manager in the U.S. commercial construction industry?

Appendix E

Human Assurances Committee Letter of Approval

University of Idaho
University Research Office
Institutional Review Board
P.O. Box 443043
Moscow, Idaho 83844-3043

Phone: 208-310-9877
Fax: 208-885-7710

Federalwide Assurance: FWA00005639
Federal Assigned IRB #: 00000843
UI Assigned Number: 07-048

M E M O R A N D U M

TO: Richard Casey Cline
        608 Warm Springs
        Boise, ID 83712

FROM: Eric Jensen, Chair
        Human Assurances Committee

DATE: July 25, 2007

SUBJECT: Approval of "Key Competencies of Effective Construction Project
Managers in the U.S. Construction Industry"

- -

On behalf of the Human Assurances Committee at the University of
Idaho, I am pleased to inform you that the above-named proposal is
approved as offering no significant risk to human subjects. This
approval is valid for **one year** from the date of this memo. Should
there be a significant change in your proposal, it will be necessary
for you to resubmit it for review. Thank you for submitting your
proposal to the Human Assurances Committee.

Eric L. Jensen
ELJ/ed

To enrich education through diversity the University of Idaho is an equal opportunity/affirmative action employer.

Appendix F

Human Assurances Completion Certificate

Human Participant Protections Education for Research Teams

Completion Certificate

This is to certify that

R. Casey Cline

has completed the **Human Participants Protection Education for Research Teams** online course, sponsored by the National Institutes of Health (NIH), on 09/06/2005.

This course included the following:

- key historical events and current issues that impact guidelines and legislation on human participant protection in research.
- ethical principles and guidelines that should assist in resolving the ethical issues inherent in the conduct of research with human participants.
- the use of key ethical principles and federal regulations to protect human participants at various stages in the research process.
- a description of guidelines for the protection of special populations in research.
- a definition of informed consent and components necessary for a valid consent.
- a description of the role of the IRB in the research process.
- the roles, responsibilities, and interactions of federal agencies, institutions, and researchers in conducting research with human participants.

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