Ranking Construction Superintendent Competencies and Attributes Required for Success

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This is the second in a series of articles reviewing the results of an ongoing mixed methods research project designed to document construction superintendent competencies and attributes, and develop postsecondary curricula to support superintendent education and training. Varying views of the role of the superintendent are presented in a review of literature. The research methodology for this second phase is presented. Qualitative and quantitative data collected in Phase II from the interviews with 14 superintendents have been analyzed and the results of these analyses are provided. Coupled with the Phase I research, interviews with seven superintendents, the results indicate the top five ranked competencies or attributes that facilitate success for a construction superintendent are: Oral Communication; Leadership; Scheduling; Strong Values and Ethics; and Ability to Plan Ahead. Insights into how the role of the superintendent has changed and the preparation needed for future superintendents are provided from these interviews. These results indicate superintendents are responsible for more of the project documentation, and there is a role for colleges and universities in developing these required competencies. Superintendents are also more involved with the use of computers to facilitate the accomplishment of their responsibilities.

Key Words: construction superintendent, construction supervision, project superintendent, construction skills, mixed methods research

Introduction

"The [construction] job superintendent is like the conductor of a symphony orchestra. He must see that all elements are fitted together at the right time and sequence" (Diamant & Debo, 1988, p. 8). This construction conductor is responsible for the on-time and within budget completion of construction projects. The superintendent plays a key role in the completion of the built environment. The phrase "built environment" refers to "the collection of buildings, facilities, transportation systems, and other structures and spaces created for the purpose of providing convenient places for work, play, living, and human related activities" (Simmons, 2007). There are common threads that weave through different authors' perceptions of the role that the project superintendent plays in the construction process. Conversely, there are also some subtle differences. The common threads focus on the supervisory role of the construction superintendent, and the main difference seems to be related to the recent changes in the background of these professionals. Schaufelberger and Holm (2002) state, "The ***superintendent*** is responsible for the direct daily supervision of construction activities on the project, whether the work is performed by the contractor's workers or those employed by subcontractors" (p. 9). Mincks and Johnston (2004) focus on the superintendent's field knowledge stating that regardless of the project delivery method chosen, "the superintendent is responsible for the correct, timely, and profitable construction of the project. It is the superintendent's responsibility to coordinate labor, material, equipment and subcontractors" during construction. The functional

role has "the necessary skills and understanding of common construction methods and practices" (p. 24). Schexnayder and Mayo (2004) focus more on the superintendents' field experience when they state, "Superintendents often come up through the trades, and have many years of experience. Their primary function is to coordinate the field work and supervise the trade foremen" (p. 73). Gould and Joyce (2002) identify the changing source of superintendents stating that traditionally superintendents "were people from the trades themselves, working their way up to a management position. Recently, however, more superintendents have been hired out of college engineering or construction management programs" (p. 50). This research focuses on the competencies (also referred to as skill sets) and attributes needed by today's construction superintendent to be successful.

The first article in this series (Gunderson, Barlow & Hauck, 2007) provided a history of the project superintendent's role in the construction process. This article shifts focus to defining project success. This shift may help clarify the setting in which the required superintendent competencies and attributes are grounded.

Webster's Third New International Dictionary (1993) defines success as "the degree or measure of attaining a desired end" (p. 2,282). Sanvido, Grobbler, Parfitt, Guvenis, and Coyle (1992) determined the contractor's criteria for project success to include: "meet the schedule; project profit; under budget including savings for the owner or the contractor; quality met or exceeded; no claims and/or litigation; safety; client satisfaction; good subcontractor buy out; good direct communication; and minimal or no surprises during the project" (p. 96). The success of a project is the responsibility of the construction team leaders, the project manager and the superintendent. Clough, Sears and Sears (2005) state, "In practice, construction project authority is wielded much as a partnership effort, with the project manager and the project superintendent functioning as allied equals" (p. 285). The list of success factors generated by Sanvido et. al. (1992) is presented in Table 1. Different construction companies delegate responsibility and authority in different ways. Table 1 is the authors' attempt at summarizing how the responsibility for project success is often delegated.

Table 1
Criteria Leading to Project Success

Contractor's Criteria for Project Success	***Responsible Person***
Meet the Schedule	Superintendent
Project Profit	Project Manager and Superintendent
Under Budget (including savings for the owner or contractor)	Project Manager and Superintendent
Quality Met or Exceeded	Superintendent
No Claims and/or Litigation	Project Manager and Superintendent
Safety	Superintendent
Client Satisfaction	Project Manager and Superintendent
Good Subcontractor Buy Out	Project Manager
Good Direct Communication	Project Manager and Superintendent
Minimal or No Surprises during the Project	Project Manager and Superintendent

This delegation of responsibility varies from company to company and from project to project. Although arguable, the project superintendent is responsible or shares responsibility with the project manager for nine of the 10 criteria leading to project success. Since the superintendent has a key role in the success of a construction project, the competencies and attributes that make that individual successful are very important.

Research Methodology

This paper documents Phase II of research focused on the project superintendent competencies and attributes required to be successful in the construction industry. The phases, which were revised after Phase I, currently include:

- Phase I – Interviews with Construction Superintendents (n = 7)
- Phase II – Interviews with Construction Superintendents with a Quantitative Ranking Instrument (n = 14)
- Phase III – Survey sent to a Larger Sample Population of Construction Superintendents
- Phase IV – Survey sent to Project Managers
- Phase V – Interviews with Operations Managers, VP's, and Presidents

Phase I, interviews with seven project superintendents, was primarily qualitative research. Open ended questions allowed themes surrounding superintendent competencies and attributes to emerge. These themes, coupled with selected American Council of Construction Education (ACCE) curricula content requirements, were used to develop the quantitative ranking instrument. The revised research protocol, adding the quantitative ranking instrument to the Phase II interviews, was approved by the Institutional Review Board on June 21, 2007.

Population Sampling

The theoretical population for Phases I and II of the research is all project superintendents working on commercial construction projects in the United States. No limits on the size of construction projects or annual volume of the construction company have been established. There is not a minimum number of years of experience an individual has as a superintendent to qualify to be a participant.

The superintendents who consented to the interview were selected by a combination of methods. The researchers first used purposive sampling. In purposive sampling "the participants are hand picked from the accessible population" (Gliner & Morgan, 2000, p.154). The participants were selected because of their experience as project superintendents for commercial construction projects. Phase II included superintendents working in five states in the United States.

Convenience sampling also was used to solicit participants for Phase II of the research. In convenience sampling, "the participants are selected on the basis of convenience rather than chosen in a serious attempt to select participants who are representative of the theoretical population" (Gliner & Morgan, 2000, p.155). Superintendents working for companies in states to which the researcher travelled were given the opportunity to volunteer for participation. In some cases the companies were known to the researcher and in other cases the companies were

randomly selected from the phone book. In some cases snowball sampling was used. "Snowball sampling is a modification of convenience or accidental sampling …. People are asked for additional references" (Gliner & Morgan, 2000, p.155).

Delimitations

In Phase II of the research, the focus continues to be delimited to superintendents with the majority of their experience in commercial construction. In future phases, research on superintendent skill sets will be expanded to other types of construction such as residential, heavy-civil, or industrial, and to specialty construction superintendents such as mechanical and electrical. Although not by design, delimitations at this point of the research also have included area of the country. Interviews have been limited to superintendents working in Alaska, Northern and Southern California, Colorado, Montana, Oregon, and Washington. It is anticipated that superintendents working in all parts of the country will be surveyed in Phase III to check for consistency in the data.

Interviews with Project Superintendents

Fourteen interviews, 13 in person and one by telephone, were conducted as part of Phase II data collection. In both types of interviews, the questions and answers were tape recorded and transcribed in preparation for data analysis. The interview included demographic questions such as how long the participants have worked in construction, how long they have worked as a superintendent, the types of projects on which they have worked, and the type of project delivery method employed on those projects. The participants were asked to identify the skill sets required by project superintendents, and how those required skill sets have changed over the past 10 years. They also were asked how they think those required skill sets will change in the future. (See Interview Questions listed in Appendix A.) At the end of the interview the superintendents were asked to rank the skills sets and attributes. (See the Ranking Instrument in Appendix B.)

Data Analysis

The tape recorded interviews were transcribed. Names of construction companies and individuals were deleted to maintain confidentiality. A constant comparative approach (Bogdan & Biklen, 2003) was used after each interview was coded to "look for key issues, recurrent events, or activities in the data that become categories of focus" (p. 67). The data from the open ended interviews were coded with open, axial, and selective codes using a combined deductive and inductive approach. Patton (2002) states, "Discovery and verification mean moving back and forth between induction and deduction, between experience and reflection on experience, and between greater and lesser degrees of naturalistic inquiry" (p. 67). Although the questions asked during the interview (refer to Appendix A) were intended to gather specific information about the skills needed by superintendents to direct work on the job site, the questions were also open ended enough to allow participants to explore aspects of the superintendents' role not preconceived by the researchers.

At the end of the interview participants were given a ranking instrument and asked to select the top 10 skill sets or attributes (refer to Appendix B) required for superintendent success. Then they were asked to rank those top 10 skill sets or attributes with one being the most important.

Research Results

Combining the data collected in both Phase I and Phase II, twenty-one (21) project superintendents have been interviewed to date. The data collected in the interviews, and the ranking instrument used in Phase II, provide the following results.

Demographic Information

The superintendents interviewed in Phases I and II of this research project were working in Alaska, Northern and Southern California, Colorado, Montana, Oregon, or Washington. Demographic information for the 21 superintendents interviewed is presented in Table 2.

Table 2
Participants' Construction Experience

	Total Years	***Average Years***	***Most Experience***	***Least Experience***
Years in Construction	598	28.48	47	11
Years as a Superintendent	391	18.62	35	1

The average construction experience that these 21 participants had before moving into the superintendent role was approximately 10 years. Table 3 presents the education these 21 participants had prior to committing to a career in the construction industry. One very successful superintendent stated, "The last education I had was in 10th grade." This wide range of formal education among the participants did not produce a wide range of differences in the data. The majority of the participants came "up through the ranks" starting as a carpenter.

Table 3
Participants' Education

Number of Participants	***Master's degree***	***Bachelor's degree***	***Associate's degree***	***Some College (no degree)***	***High School degree***	***Some H.S. (no degree)***
21	2	8	1	4	7	1

The participants have diverse academic backgrounds. Table 4 presents the major concentrations for the postsecondary degrees held by the eight (38.1%) participants who have a 4-year degree. Also included in Table 4 are the major concentrations for the two (9.5%) participants who have Master's degrees. Of the 38.1% of the participants who hold a Bachelor's degree, 50% of those degrees are in Construction Management. Including Civil Engineering, 62.5% of the participants with a Bachelor's degree have that degree in a construction related concentration. The researchers acknowledge that it could be argued that English, Psychology, and/or Education are construction related concentrations. Neither of the Master's degrees held by the two participants

have a construction related concentration such as Engineering, Architecture, Interior Design, or Construction Management, for example.

Table 4
Participant Postsecondary Education

Participants with College Degree (4 yr)	***Master's degree***		***Bachelor of Science degree***		***Bachelor of Arts degree***		
8	1	1	4	1	1	1	1
Academic Major	Forestry	Creative Writing	Construction Management	Civil Engineering	English	Psychology	Education

Superintendent Competencies and Attributes

In Phase II of the data collection the participants were asked to select 10 skill sets or attributes most important to the success of a construction superintendent. Then they were asked to rank those 10 selected skill sets or attributes from 1 to 10 with 1 being the most important. The list was generated from interviews with superintendents in Phase I of the research. Table 5 provides the results for the ranked superintendent skills sets and attributes.

Table 5
Superintendent Competencies or Attributes Ranking

Rank	***Competency or Attribute Description***	***Rank***	***Competency or Attribute Description***
1	Oral Communication	16	Trust Building
2	Leadership	17	Time Management
3	Scheduling	17	Written Communication
4	Strong Values and Ethics	19	Ability to "Keep your Cool"
5	Ability to Plan Ahead	20	Reinforcing Behaviors
6	Detailed Knowledge of Construction	21	Strong Work Ethic
7	Team Building	22	Collaboration
8	Broad Knowledge of Construction	23	Understand Materials
9	Computer Skills	23	Good with Numbers
10	Listening Skills	25	Conceptualization
10	Cost Control	26	Get Along with People
12	Ability to Work with Different Kinds of People	27	Estimating
13	Understand Subcontractors' Work	27	Typing Skills
14	Ability to Teach	27	Ability to Sketch
15	Ability to Learn from Others		

People Skills

Each of the seven participants interviewed in Phase I of the research stated that people skills were very important to the success of a construction superintendent, and several participants believed that it is the most important skill set. When asked what the most important skill set was, one participant responded, "People skills because if you don't have it you won't have a successful project." Later in the interview this same superintendent stated, "You can have the education and the knowledge, but without people skills, you can't really apply it." The participants identified people skills as being multi-faceted. They require building trust, being a good teacher, and being a good communicator. A superintendent must be able to work with a diverse group of individuals. One participant stated that different people like to be managed in different ways when he stated, "Some guys want you to scream at them and some want to hear that they're doing a great job." Another participant referred to the diverse people that a superintendent has to manage stating, "You're dealing with multiple-personalities." Several participants stated that superintendents need to be able to get along with people including subcontractors, architects, and owners.

In Phase II, the researchers wanted to get a clearer understanding of the specific aspects of "people skills" that are required for superintendent success. "People skills" was not included in the ranking instrument, but was replaced with the competencies and attributes the participants identified as contributing to, or defining, people skills.

Understanding the Work and Sequencing

One theme that emerged from the Phase I interviews was "Understanding the Work and Sequencing". This theme was broken down in the ranking instrument into its components which were identified by the participants. Almost all of the participants believed that understanding the work and the sequencing of different work is critical to being a successful superintendent. One participant stated, "You [the superintendent] need to know each facet of work." Another participant stated that the superintendent must have "knowledge of the industry and knowing the different methods." This opinion was echoed by a participant who felt that the superintendent does not need to know "how long every footing is, or where every bolt is, or how long every beam is, but you have to know how and when those pieces have to be in place." Several participants believed that this knowledge of construction includes understanding the basic practices of different subcontractors' work. Having knowledge of subcontractors' work facilitates the sequencing of work on the project – proper planning of activities performed in a "timely sequence so the subcontractors can make money" stated one participant. Another participant emphasized the importance of a superintendent understanding the work done by the mechanical and electrical subcontractors.

The components included in the ranking instrument were: Scheduling; Detailed Knowledge of Construction; Broad Knowledge of Construction; Understand Subcontractors' Work; and Understand Materials.

Scheduling, Estimating, and Cost Control

The ability to schedule the work, estimate the cost of the work, and control those costs throughout the project are skills several of the participants identified as important for a superintendent to be successful. One superintendent stated, "Elements that are really critical [are] estimating and scheduling, because if you don't know how to schedule, you won't be able to put a building together, so scheduling, communication, leadership and estimating [are] probably the four elements I think that are very important." When asked what the most important skill set was, another participant responded, "I think the most important would be able to schedule jobs."

How the Superintendent Position has Changed

The results of the first phase of the research on how the superintendent position has changed (Gunderson et al., 2007) were unchanged by the results of the data analysis associated with Phase II of the research.

More Paperwork

Participants said the tasks and duties that keep a superintendent busy throughout the day have changed over the last 10 to 20 years. Several participants indicated that there is much more paperwork for which the project superintendent is responsible. One participant emphasized this increase when he stated, "The paper work has just, oh, I'll bet it's 10 times more [than] it was 10 years ago."

More Managerial Responsibilities

One participant stated, "As a superintendent, we're far more involved in the management, in the dealing with owners, than we used to be." Another superintendent compared the time in the field to the time in the job site office when he stated that he used to spend 6 hours in the field and now he spends 1 hour. This change is because there are more managerial responsibilities for the superintendent.

Must be Computer Literate

Almost all participants indicated that a superintendent must now be computer literate, which is a big change from 10 years ago. One participant stated that now the construction industry "is fluent in the computer age." Another participant detailed this change when he stated that now a superintendent will send an e-mail rather than make a phone call. This change in communication methodology has facilitated the speed with which we communicate. One superintendent stated that we are sending information faster.

Increased Emphasis on Safety

The majority of the participants stated that there is an increased emphasis on safety over the past 10 years. This was emphasized by one superintendent when he stated, "There is a dramatic drop in injuries today than in the past." This was confirmed by another superintendent when he stated, "Back then, 10 years ago, people were getting killed all the time and then the insurance rates started going up and then it became unacceptable for general contractors to get anybody hurt."

Increased Reliance on Foremen

Several participants believed that, since today's superintendents are more involved in project management activities, more reliance on foremen and the need to trust the foremen are required. This reliance was emphasized when one participant stated, "I'm just lucky. The past 10 or 15 years I always had a good foreman."

Source of Construction Personnel

One superintendent stated that one of the ways in which the superintendents' position has changed is that "we're getting them from colleges." This superintendent believed that this change has been facilitated by educational opportunities. He stated, "In the past there were very few schools that had construction management programs." This opinion was confirmed by another participant when he stated, "In the future a superintendent can be coming out of college rather than out of a trade." This look to the future leads to a discussion about participants' recommendations for preparing young people for the superintendent's position.

Preparation for Becoming a Superintendent

There are two major themes that emerged from the data analysis that describes the preparation required for young people to become a superintendent in the future. The first theme focused on education and the second theme focused on construction experience.

Education

All of the participants felt there is a place in the college or university for providing education to future superintendents. The topics these participants felt are good to be learned in school are scheduling, estimating, communication, writing and English, people skills, and sustainable construction materials and methods including LEED (Leadership in Energy and Environmental Design) certification. One participant stated that a construction management college education is just as helpful as learning a trade. Another superintendent believed that preparation for becoming a superintendent includes a construction management or a civil engineering degree. Participants also believed there is another type of education that can only be gained over time as an individual works on construction projects.

Construction Experience

The participants felt internships, also referred to at some universities as co-ops, are one aspect of the college experience that provides a positive preparation to be a superintendent. Every participant expressed the same opinion in different words: there is no substitute for construction experience as a person prepares to be a superintendent. One superintendent emphasized the importance of learning from each other when he stated, "College superintendents give a lot of computer skills to the craft superintendent, and that one helps him learn how to build the actual job." This superintendent felt we will still have superintendents coming up through the trades in the future. The importance of learning a trade was emphasized by another participant who stated, "I think a little more education wouldn't be bad, I mean like your construction management program. Maybe I'm old school, but I think a guy ought to be of a trade to be a superintendent." A shifting trend in where superintendents will come from was identified by the participant who stated, "There will still be [superintendents] coming from the fields and the trades, but I think we will see a lot more coming from college."

Conclusions, Discussion, and Future Research

The research into superintendent competencies and attributes and the development of postsecondary curricula to support construction superintendent education is ready to be taken to a larger population. Phases I and II of the research indicated there is a place in colleges and universities to educate young people about the competencies and attributes required to become a successful superintendent. In an effort to provide results which may be generalized to a larger population, Phase III of the research will be a survey sent to superintendents across the United States. The surveys will be sent to superintendents working for commercial, residential, heavy-civil, industrial, mechanical, and electrical construction companies.

The results of Phase II of the research have raised questions that the researchers hope will be answered in Phase III. In the interviews superintendents indicated estimating was an important competency for a superintendent, but in the ranking instrument not one superintendent ranked "estimating" in the top ten ranked skill sets. In the Survey Instrument being designed for Phase III, estimating will be broken down into components, quantity take-off and cost estimating, to see if the results change. The researchers are also curious about the item ranked ninth by the superintendents, Computer Skills. In the Phase III survey this item will be broken down into: Computer Skills using Word Processing Software; Computer Skills using Planning and Scheduling Software; Computer Skills using Spreadsheet Software (like Excel); Computer Skills using Project Management Software; and Understanding BIM (Building Information Modeling) Software. Identifying which computer skills are required by superintendents will facilitate specific curricula development.

Phase IV of the research will be a survey sent to project managers to determine what competencies and attributes they want to see in the superintendents with whom they are working. It is anticipated that Phase V will be interviews with operations managers, area managers, vice presidents, and presidents of companies to gain their perspectives on superintendent competencies and attributes.

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Appendix A – Interview Questions

How many years have you worked in the construction industry?

How many years have you worked as a project superintendent?

Describe your work experience leading up to your work as a project superintendent.

Describe your education (formal, informal, union training, etc.) leading up to your work as a project superintendent.

Describe the projects on which you have worked as a project superintendent during the past 5 to 10 years. Helpful information would include the type of project (commercial, residential, heavy-civil, industrial) the type of construction contract/delivery method (design-bid-build, design-build, and CM-at-risk), and the geographic location.

Describe the skill sets that you believe are required for an individual to work as a construction superintendent. Be specific about technical and administration skills that you feel may be required.

Based on this list of skill sets, which is the most important, and which are the top three in terms of making an individual a successful superintendent?

Do you have any advice for someone considering working toward being a construction superintendent?

If you had your career to do all over again, is there anything that you would do differently?

Do you have any comments that you would like to add regarding work as a construction superintendent and/or skill sets required by individuals working as a construction project superintendent?

How has the position of project superintendent (and skill sets required for this position) changed over the past 10 years?

How do you think the required skill sets for a construction superintendent will change in the future?

What do you think would be the ideal preparation for the construction superintendent of tomorrow?

Is there a place for university level training and education in the preparation of future superintendents?

Are there any manuals, books, subscriptions, etc. that you use/utilize on a regular basis to enhance your work as a superintendent?

What managerial tools/equipment (copy machine, phone, fax, computer, PDA, tape recorder, cell phone, two-way radios, etc.) do you need to do your job well?

Appendix B

Superintendent Skill Set Ranking Instrument

Based on interviews with Construction Superintendents, the following list of skill sets (that may be required by a successful superintendent) was generated. Please read through the list and check the 10 most important skill sets in the left hand column. Skill sets not included on this list may be added in the open spaces at the bottom.

After checking the 10 most important skill sets, please rank the selected skill sets from 1 to 10, with 1 being the most important and 10 being least important in the right hand column. Do not rank a skill set if you did not check it as one the 10 most important skills sets.

Check	Skill Set	Rank
	Team Building	
	Collaboration	
	Oral Communication	
	Written Communication	
	Ability to Sketch	
	Ability to Teach	
	Trust Building	
	Ability to work with Different kinds of People	
	Ability to “Keep your Cool”	
	Strong Values and Ethics	
	Computer Skills	
	Typing Skills	
	Good with Numbers	
	Estimating	
	Cost Control	
	Scheduling	
	Ability to Plan Ahead	
	Learn from Others	
	Reinforcing Behaviors	
	Get Along with People	
	Listening Skills	
	Understand subs’ work	
	Understand Materials	
	Broad Knowledge of Construction	

	Detailed Knowledge of Construction	
	Conceptualization	
	Leadership	
	Time Management	
	Work Ethic	