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## ***Competencies Identified as Important for 21st Century Plastering Contractors - A Rotational Delphi***

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# Competencies Identified as Important for 21st Century Plastering Contractors - A Rotational Delphi

By Dr. Joseph A. Scarcella & Dr. Rodney L. Custer

## Introduction

Present day plastering contractors are operating plastering contracting businesses without having the type and extent of training (knowledge, skills, and abilities) that contractors in the industry have had in the past. Specifically, for the last 20 years, delivering training has been a problem for the plastering industry due to the downsizing of union members in the early 1980s (Maher, 1982 & Northrup 1992). In the past, unions served as feeder programs for training future contractors by providing accredited training programs through formal apprenticeship programs (Maher, 1982; Northrup, 1993; & The Business Round Table, March, 1982). With the reduction of these programs, today's contractors are less fortunate when it comes to meeting their training needs. These changes have had a tremendous effect on today's plastering industry. One important effect, in addition to the reduction in the amount of formal training, has been a reduction in scope. Specifically, rather than a comprehensive knowledge of all aspects of the plastering industry (i.e., plaster, lath, drywall, exterior insulation finish system (EIFS), metal-stud-stud framing, fire-proofing, insulation, decorative, and ornamental and specialty) (The Business Roundtable Report, 1983), today's contractors tend to have a less comprehensive base of knowledge.

This training gap is further exacerbated by a lack of standards for training at the contractor level. This lack of National Training Standards for the plastering industry creates additional problems in the trade because there is a lack of specific standards that can be

used as a basis for competency certification at the contractor level (Engineering News, 1989; National Standards of Apprenticeship for the Plastering Industry, 1946, 1956 & 1982; & The Business Roundtable, September, 1982). Thus, the combination of reduced formal training mechanisms and lack of identified standards have converged to create a serious training problem across the plastering industry. The problems parallel those that are occurring across manufacturing and construction industries. As unions have struggled over the past two decades, capability for delivering training has declined. At the same time, technological changes have increased dramatically which has spanned a need for additional training. The ability of American industry to remain viable in the world market will depend on our ability to establish and maintain clear goals and current, well-defined competencies as well as the training capacity to address changing technologies. To some degree, the challenges facing the plastering industry are similar to those confronting a wide range of industries.

## Purpose of the Study

Competencies should be developed and taught in order to prepare contractors for leadership in the plastering industry (Engineering News, 1989). Significant changes that are occurring in the plastering industry have necessitated the need for upgrading national plastering contractor certification requirements along with contractor, journeyman, and apprenticeship training standard profiles. These changes include addressing politics in the industry, the development of new and emerging technologies,

labor law issues, increased competition, federal legislation, and the decline of unions.

A continued degradation in contractor quality has occurred because currently 60% of the plastering contractors are nonunion (Frein, 1980 & The Business Roundtable, September, 1982). This deterioration of contractor training, in terms of both amount and quality, has created serious problems. Across the nation, contractors have been recalled to jobsites to rectify faulty workmanship. These mistakes cost companies' time and money and the resulting poor quality is eroding the reputation of the industry (Clough & Sears, 1991 & Egan, 1993).

With these problems in mind, plastering contractor competencies must be developed and validated as a basis for curriculum development in the plastering industry. The purpose of this study was to identify and validate the competencies considered important for plastering contractors in the 21st century. The following research questions guided the study.

1. What are the current and emerging competencies considered important for contractors in the plastering industry to have achieved to enable them to be competent and responsible business professionals?
2. What degree of importance should be attributed to each of the tasks?

## Methodology

The Plastering Contractors Competency Rating Scale (PCCRS) was developed for the study based on an extensive review of the literature and interaction with national leaders and practicing contractors in the plastering industry. Forty-eight managerial competencies were identified and categorized into 19 cognitive items, 23 psychomotor items, and 6 affective items. The technical skill section contained 27, items that were categorized into 4 cognitive, 19 psychomotor and 3 affective items. Each item contained an importance rating scale, ranging from 1-6, Important to Unimportant. Prior to use in this study, the

instrument was validated and pilot-tested by selected contractors and national leaders. Twenty-one contractors (primarily plastering contractor panelists employing in excess of 50 employees) and 21 policy makers (individuals working in leadership positions of trades associations, bureaus, or organizations) were selected randomly from a list of panelists, nationally nominated by key representatives of the plastering industry on a national basis. Specifically, panelists were nominated by executive directors of the Joint Apprenticeship Committee, the Association of the Walls and Ceiling Industries-International, the US Department of Labor Bureau of Apprenticeship and Training, the Operative Plasterers and Cement Masons International, and the International Institute for Lath and Plaster.

A three round modified Rotational Delphi technique was used to conduct the study. The rotational technique consisted of "rotating" subsets of the total instrument through panel subgroups. This provided a mechanism for obtaining ratings on an extensive competency set while reducing the workload on any single panelist. Following each round, the responses were analyzed and compiled to build the next round's instrument and to obtain the final results. The analysis process was designed to achieve two goals for each item; (a) degree of consensus across the panel, and (b) perceived importance of the item. To accomplish these goals, interquartile ranges were calculated as measures of dispersion and median scores were calculated as measures of central tendency for each item. Consensus was judged to have been achieved for each competency item when an interquartile deviation score of less than 1.2 were obtained. The degree of importance was established by clustering the median scores into three categories (high rating, median rating, or low rating). Competencies with a median score between 1-2.5 were assigned high ratings, 2.6 - 4.5 were assigned median ratings, and 4.6 - 6 scores were assigned low ratings.

## Findings

By the conclusion of round three it was found that plastering contractors are

most frequently involved in working with lath, plaster, exterior insulation finish systems (EIFS), fire-proofing, and drywall rather than with insulation, decorative and ornamental, and specialty contracting. The majority of plastering contractors operating in the plastering industry are involved in residential construction. To a lesser extent, some contractors are operating under both commercial and residential construction. Moreover, contractors and policy makers ratings were over 95% for managerial skills and over 40% of technical skill competencies; and these competencies had reached consensus (criterion score of 1.2) across the sample of panelists that participated (21 contractors and 21 policy makers combined. A complete listing of managerial skills that were rated as high-consensus/high-rating combinations is presented in Table 1. Each item is ranked from the lowest to the highest median and interquartile range scores.

The list of managerial competency items were examined in an attempt to identify thematic threads and patterns of emphasis. This analysis procedure showed that items rated as high-consensus managerial skills were concentrated into six distinct areas. These are (a) content related to business practices (i.e., finance, marketing, accounting, estimating, etc.), (b) management and employee relations (i.e., planning, directing, and scheduling production tasks, conducting employee evaluation and discharge procedures, maintaining employee records, etc.), (c) construction law (i.e., knowledge of the mechanics lean laws, insurance and bonding practices, federal and state labor laws and regulations, etc.), safety (i.e., safety regulations, insuring safety of job-site equipment, safe procedures, etc.), and basic academic skills (i.e., performing basic mathematical calculations, reading blueprints, writing correspondence.).

As was done with managerial skills, a list of high consensus technical skills was compiled. These are presented in Table 2.

Table 1  
Managerial Skill Consensus Items

Managerial Item Numbers	Median	Interquartile Range
20. Estimate the number and type of workers needed for specified jobs.	1.000	.0000
22. Estimate job costs and profit margins.	1.000	.0000
32. Successfully respond to customer complaints.	1.000	.0000
40. Read and interpret blueprints and job specifications.	1.000	.0000
44. Safety regulations specified by the Occupational Safety Health Administration (OSHA).	1.000	.0000
4. Federal and state labor laws and contracts.	1.000	1.000
5. The contracting laws and regulations pertaining to government and private sector contracting (i.e., commercial, residential).	1.000	1.000
11. The workman's compensation laws.	1.000	1.000
12. The mechanics' lien laws.	1.000	1.000
13. Insurance and bonding practices.	1.000	1.000
15. Accepted employee evaluation and discharge procedures.	1.000	1.000
17. Basic employee supervision record-keeping procedures (i.e., employee attendance, work records, training records, etc.).	1.000	1.000
18. The risks of sole proprietorship (i.e., running and operating a business, capital investment, etc.).	1.000	1.000
21. Determine production capabilities of each employee.	1.000	1.000
23. Perform basic mathematical calculations (i.e., addition, subtraction, multiplication, division, etc.).	1.000	1.000
34. Explain and discuss job production problems and concerns with management and staff.	1.000	1.000
39. Read and interpret technical reports and instructions related to job contract activities and procedures (i.e., product application specifications, safety standards, etc.).	1.000	1.000
41. Interpret monthly profit and loss statements.	1.000	1.000
43. General contracting practices and procedures (i.e., lifting, equipment guarding, eye protection, etc.).	1.000	1.000
45. Establishing positive working relationships with management and employees.	1.000	1.000
48. Following through on job-site construction and contracting responsibilities.	1.000	1.000
9. Labor movement, collective bargaining and government regulations.	1.500	1.000
25. Maintain business financial and employee records.	1.500	1.000
47. Working and cooperating with other job-site contractors.	1.500	1.000
27. Write general correspondence and proposals related to job contract activities.	2.000	.0000
2. The theories, policies and practices governing employer and employee relations.	2.000	.5000
14. Legal issues related to product quality and contractor performance.	2.000	.5000
16. Accounting practices (i.e., preparing customer billing statements, sales records, etc.).	2.000	.5000
6. How to work with material suppliers, vendors, equipment suppliers, customers, etc.	2.000	1.000
7. The national, regional and local building codes.	2.000	1.000
8. Business operating practices, policies and procedures for union and non-union contracting.	2.000	1.000
19. Basic marketing and sales strategies (i.e., forecasting market needs).	2.000	1.000
26. Use calculators, computers and other office equipment.	2.000	1.000
28. Reference industry handbooks, catalogs, guidebooks and other commercial information concerning effective contracting practices and operations.	2.000	1.000
29. Understand and maintain appropriate payroll procedures.	2.000	1.000
30. Conduct on-the-job training.	2.000	1.000
31. Market their services and generate new business.	2.000	1.000
33. Plan, direct, control and schedule production tasks.	2.000	1.000
35. Motivate employees and increase their productivity.	2.000	1.000
38. Determine what tools, materials and equipment are appropriate for a given job procedures.	2.000	1.000
46. Assisting individuals in developing their potential through training and instruction.	2.000	1.000

Those technical skill competency items identified as high-consensus (i.e., diagnosing job-site problems and failures, quality workmanship), generally had to do with maintaining quality, and learning new products and systems (i.e., training and upgrading skills). It should be noted that the more specific technical skills on the instrument did not achieve consensus.

Additional data analysis indicated that the largest number of high-consensus, high rating items were in the managerial skill category for both contractors and policy makers.

There was also relatively close agreement between contractors and policy makers for both managerial skills and technical skills. Both groups rated managerial skills as most important, while technical skills were determined to be less important.

### Conclusions

Based on the findings and within the limitations established for this study, the following conclusions were drawn.

1. Contractors and policy makers are in broad agreement regarding the competencies necessary for contractors to have in order to function successfully in the plastering industry.
2. The competencies identified as high-consensus, high-rating present an appropriate and valid foundation on which to develop curriculum and

- training systems for the plastering industry.
3. Plastering contractors are most frequently involved in working with lath, plaster, exterior insulation finish systems (EIFS), fire-proofing, and drywall rather than with insulation, decorative and ornamental, and specialty contracting.
4. The majority of plastering contractors operating in the plastering industry are involved in residential construction. To a lesser extent, some contractors are operating under both commercial and residential construction.
5. Competency items related to managerial skills are more important for contractors to have than are specific technical skills. Contractors do not need to have high levels of technical proficiency to be able to function as plastering contractors, particularly in larger companies.
6. The major emphases in the managerial skill area are on topics such as business practices, knowledge of legal issues affecting contractors, concern for and knowledge about safety, employee/ employer relations skills and practices, and knowledge of

- building code regulations.
7. In the technical skill area, “bigger picture” issues (such as insuring quality and ensuring job-site safety) are more important for contractors to have than are specific technical skills.

### Discussion and Implications

Among the important questions raised in this study. One question raised was “why was the degree of consensus on managerial skills higher than with technical skills?” One answer could have to do with the types of backgrounds that many plastering contractors have at this point in history. Specifically, many individuals who have entered contracting in recent years have begun as managers rather than by “coming up through the ranks” as technicians or apprentices. This presents a change from the past culture of the plastering industry, which has tended to be family-oriented, where young men have worked for family-owned and operated businesses for a number of years until the company was eventually “handed off” at the retirement of a company patriarch. In recent years, as company sizes have grown, the industry has experienced numerous changes. The family-owned business culture has shifted in favor of contractors with more managerial expertise and higher level of education rather than family ties and technical experience.

Table 2  
Technical Skill Consensus Items

Technical Item Numbers	Median	Interquartile Range
1. Diagnose job-site problems and failure.	1.000	1.000
2. Evaluate the quality of work being done by employees.	1.000	1.000
4. Set-up job-sites with the tools, materials and equipment required for maximum productivity.	1.000	1.000
24. Applying the proper materials and mixtures for interior and exterior substrates.	1.000	1.000
25. Using the proper techniques, materials and equipment.	1.000	1.000
26. Learning new products, applications and procedures that they may be unfamiliar with.	1.000	1.000
27. Install a quality control/assurance program to monitor employee/job-site performance.	1.000	1.000
3. Identify new products and evaluate their benefit and performance.	2.000	.0000
5. Erect scaffold using proper techniques for insuring safety.	2.000	1.000



A second reason for the emphasis on managerial over technical skills could be due to the companies represented in this study's sample. The majority of plastering contractor panelists employed in excess of 50 employees. In larger companies, contractors must be able to manage multiple job-sites and must have the expertise with personnel, financial, legal, and business matters. While some knowledge of the technical aspects of the trade is important for these individuals, it is more critical that they be able to manage and direct others who have specialized technical skills (i.e., foremen, apprentices, and technicians). While some plastering contractors continue to move up from technician level jobs, the industry is increasingly selecting individuals with more education, business training, and experience (particularly in medium to large sized companies). Had this study been conducted with a sample of contractors from small companies (less than 25 employees), it is quite likely that the competencies in the technical skill category would have been rated more highly.

A third reason for the emphasis on managerial skills could be that this study's results accurately represent the needs and realities of the modern plastering industry. Specifically, the panel of experts in this study, with a rather unified voice, indicated that this set of managerial competencies are in fact, highly important if 21st century contractors are to be competent and successful in the industry. It is also important to note that this list tends to represent the views of those more oriented to, and familiar with, residential rather than commercial construction. A slightly different set of outcomes might have evolved if a group of commercial contractors had been represented.

Another important issue raised by this study has to do with mechanisms used to train contractors. Historically, most contractors achieved their positions because of technical ability. Much of this ability was developed through formal union-delivered apprenticeship programs. In recent years, many are joining the contracting ranks of the

plastering industry through other mechanisms (i.e., on-the-job training, two or four year industrial technology programs, or formal management education, etc.), without obtaining the technical skills via an apprenticeship program. Whereas union-trained apprentices knew the technical aspects of the trade, many today are assuming contractor responsibilities without being technically proficient; thus the emphasis has shifted from technical expertise to management concerns (i.e., profit margins, and financial matters, business law practices, safety, and building code and regulations).

The general lack of formal technical training and certification of plastering contractors has also shifted the type of work (plastering applications) that many are performing. Specifically, most are involved in working with lath, plaster, exterior insulation finish systems (EIFS), fire-proofing, and drywall rather than with insulation, decorative and ornamental applications, and specialty contracting. There are some important reasons for this: (a) There are greater profit margins in production operations than in the specialty areas, (b) few qualified applicators are trained and available to perform decorative, ornamental, and specialty work, and (c) insulation is not accepted as part of the plastering trade.

With these factors in mind, and given the results of this study, some important implications for practice, particularly related to the development of training programs and licensing requirements for plastering contractors, should be discussed. One recommendation is that specific training should be developed to expand and formulate the development of managerial skills for practicing contractors. The competency list developed in this study could provide a solid base for this type of curriculum and program development. To accomplish this, it is recommended that the relationship among plastering contractors, associations, vocational-technical schools, union-based apprenticeship training programs, the job corps, community college trade training, and other educational delivery systems be strengthened and assessed to assist in the development of curriculum and

training needs. Various combinations of these organizations could collaborate on the development of a strategic plan for the development of the industry (i.e., union associations, bureaus, and state educational agencies) to establish long term coordinated efforts and for broad-based improvement on a national scale. Enhanced communication across these organizations would also serve to reduce the fragmentation within the industry.

A second and related recommendation for practice has to do with the need for formal and structured training mechanisms across the plastering industry. The results of this study indicate that consensus can be (and has been) achieved regarding the skills needed across the industry. What is now needed is to take the next step and build on this foundation. The potential exists for standardizing plastering industry training, improving the image of the profession, and increasing the level of the industry's workmanship.

Preliminary indicators are that leaders in the plastering industry are quite interested in the results of this study. The study provides a sound base of validated skills that, if accessed and used, could provide a much-needed point of departure for addressing many of the industry's problems. As a result, curriculum development, training planning, licensure standards, and certification standards could be addressed and enhanced. To this end, professionals involved in the industry should take an active role in establishing training curricula for plastering contractors.

The issues addressed in this study generalize to the broader construction trades as well as to other areas within industrial technology. Topics such as personnel management, quality control, legal and financial practices, bidding, scheduling, and much more crowd the curriculum as they become increasingly more important in industry. These are vitally important competency areas for middle-level managers. At the same time some minimal level of technical skills are required in order to establish credibility and to manage effectively. One of the serious challenges facing industrial technology programs is one if

striking an appropriate balance between these competency demands.

Nationally, companies of all kinds are recognizing the importance of product quality and employee workmanship. It is critically important that the plastering industry (and industry in general) take the cue from others and consider the implementation of similar, quality and standards-based program alternatives based on the results of this study.

## References

- Clough, R. H., & Sears, G. A. (1991). Construction project management (3rd ed.). New York, NY: A John Wiley Publication.
- Craft Training in Open Shop Construction. (1983). The business roundtable: A report by the industry activities support task force of the business roundtable construction committee. New York, NY: The Business Roundtable.
- Egan, W. F. (1993). The right choice: Choosing retrofit options will enhance EIFS share in growing renovation market. Construction Dimensions, 21(7), 6-14.
- Frein, J. (1980). Handbook of construction management organization (2nd ed.). New York, NY: Van Nostrand Reinhold Company.
- Government Limitations on Training Innovations. (1982, March). The business roundtable: A construction industry cost effectiveness project report (Report D-2). New York, NY: The Business Roundtable.
- Maher, R. P. (1982). Introduction to construction operations. New York, NY: A Wiley-Interscience Publication. .
- Northrup, H. (1992). The helper controversy in the construction industry. Journal of Labor Research, 13(4), 421-435.
- Training Problems in Open Shop Construction. (1982, September). The business roundtable: A construction industry cost effectiveness project report (Report D-4). New York, NY: The Business Roundtable.
- U.S. Department of Labor, and Apprenticeship Training Service (1946). National standards of apprenticeship for the crafts of the plastering industry. Washington, DC: Government Printing Office.
- U.S. Department of Labor, and Bureau of Apprenticeship (1956). National standards of apprenticeship for the crafts of the plastering industry. Washington, DC: Government Printing Office.
- U.S. Department of Labor, Employment and Training Administration (1982). National apprenticeship and training standards for plastering. Washington, DC: Government Printing Office.