TECHNICAL PUBLICATION NO. 58

RECRUITMENT TRAINING AND EMPLOYMENT OF CONSTRUCTION CRAFTSMEN IN FLORIDA: IMPEDIMENTS AND RECOMMENDATIONS

SPONSORED BY A GRANT FROM THE BUILDING

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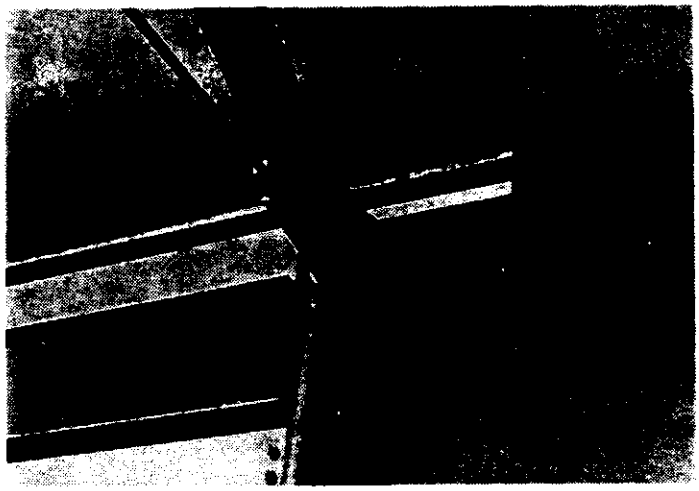

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EXECUTIVE SUMMARY:

RECRUITMENT, TRAINING, AND EMPLOYMENT OF CONSTRUCTION CRAFTSMEN IN FLORIDA: IMPEDIMENTS AND RECOMMENDATIONS

By

Brisbane H. Brown, Jr., and Ali M. Markus

The School of Building Construction at the University of Florida, in conjunction with the Building Construction Industry Advisory Committee, has undertaken a study of the manpower shortage in the State of Florida's construction industry. Graduate students, under the close supervision of faculty, developed a number of surveys and conducted numerous interviews for the purpose of isolating the causes and effect of a shortage of skilled carpenters and identifying steps that could be taken to prevent, or at least minimize, such a shortage.

Because of the broad scope of this topic, seven separate studies were conducted of the different segments of the construction industry and its training programs. Each study assembled detailed data and examined the unique aspects of one segment of the industry. All seven studies were coordinated and the results combined into this report, as follows:

1) Technical Publication 47: Carpentry Apprenticeship Program
2) Technical Publication 48: Florida Homebuilders Association;
3) Technical Publication 50: Associated General Contractors of Florida
4) Technical Publication 51: Union Brotherhood of Carpenters
5) Technical Publication 52: Associated Builders and Contractors
6) Technical Publication 54: Community College and Vocational Training

7) Report on the Penal System

The data demonstrated that construction contractors and carpentry educators believe that a definite shortage of skilled carpenters exists in Florida. Despite this situation, training programs are inefficiently utilized. This investigation has revealed that several factors contribute to the discrepancy between the low utilization of carpentry training programs and the high industry demand for skilled carpenters. The most significant factors include the following:

- Lack of articulation between curriculum content and the requirements of an increasingly specialized industry
- Lack of on-the job training as part of the curriculum of community colleges and voc-tech programs
- Low level of communication between personnel from training programs and construction contractors
- A tendency of graduates to choose an alternative to carpentry upon graduation, resulting in a low employment rate due mainly to low wages paid to carpenters in Florida.

Copies of this overview of the carpenter shortage in Florida and recommendations to alleviate the problem may be obtained by contacting:

Executive Secretary
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RECRUITMENT, TRAINING, AND EMPLOYMENT OF CONSTRUCTION CRAFTSMEN IN FLORIDA: IMPEDIMENTS AND RECOMMENDATIONS

Sponsored by a Grant From
The Building Construction Industry Advisory Committee

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CHAPTER I: INTRODUCTION

The United States Department of Labor has forecast that 2.4 million new construction tradesmen will be needed by the end of the decade: 900,000 to fill new jobs and 15 million to replace retirees and those who shift into other lines of work (Annual Construction Industry Report: 1980). In October 1985, after examining the supply of skilled tradesmen nationally, the Construction Labor Research Council (CLRC, 1985) declared:

> It is estimated that replacement needs will result in annual requirements for at least 180,000 new workers entering the construction industry over the next 5 to 10 years. This is about six percent of all construction workers. Of these, about 114,000 are skilled craftsmen. The aging of the construction work force over this period is likely to mean that these estimates will be too low by the mid-1990's. (P. 8)

Construction is one of the nation's largest industries; its sheer size means that a continuing supply of new workers is required. Even under the pessimistic, and probably unrealistic, assumption of no growth, more workers will be needed by the construction industry. Computer hardware- and software-related industries are projected to grow about 50 percent more rapidly than the construction industry, but construction will generate three times as many jobs as the computer field (CLRC, 1985). National construction training programs are turning out an average of only 50,000 tradesmen annually (Business Round Table, 1983).

At this rate, there could be a shortage of 1.9 million construction tradesmen by the year 1990. The March 1988 issue of the Associated Builders and Contractors journal declared that "The construction industry is facing the most serious skilled labor shortage in the nation's history" (Dunbar, p. 28). According to projections by the Bureau of Labor Statistics (1986), the annual need for new construction workers from 1990 to 1995 will be 263,000 workers. Another study published by Business Round Table (1983) on the cost-effectiveness of the construction industry recommended that efforts be made to create a formal group in each state to improve communication between construction leaders and vocational education officials to combat this shortage.

The consensus of current labor market research and of general contractors throughout the nation is that the construction industry is experiencing a serious labor shortage in several crafts. This skilled manpower shortage is acute in Florida, where construction activity is fueled by the state's high economic and population growth. According to forecasts of the U.S. Census Bureau, the population of Florida will increase from its 1986 level of 11,650,000 to 14,765,821 by the year 2000 (Florida Statistical Abstract, 1986, p. 21). These figures indicate that Florida will grow four times faster than the nation as a whole and become the third most populous state in the nation (after California and Texas). To accommodate this growth, construction activity will increase significantly, leading to the creation of many new jobs.

In its September 1986 issue, Engineering News Record (ENR) reported that contractors in large areas of the Southeast are searching for skilled workers, but no relief is in sight. Robert F. Kidder, President

of the Associated Builders and Contractors of Florida, Inc., stated that labor shortages have created "tremendous scheduling problems--nothing is getting done on time" (Setzer, p. 11). Many contractors are having to pay workers "extensive overtime" to make up for the shortage of skilled workers. This shortage will become even more severe with construction of the $1.2 billion Trident Submarine Base in Southern Georgia, which will require the labor of thousands of skilled construction tradesmen for the next nine years (to 1997). Furthermore, the expansion at Walt Disney World is expected to aggravate the shortage in Central Florida, where Disney officials plan $500 million in large new projects (Isaac, 1986).

The major objectives of vocational education have been to provide graduates with marketable skills and to place them in jobs for which they have been trained. However, a dichotomy exists between the demand for construction craftsmen and the placement rate of graduates of building trades programs in Florida's community colleges and voc-tech centers. The most recent data on placement and follow-up obtained from Florida's Department of Education in Tallahassee indicated that students of building trades programs who graduated in 1985 and 1986 are now experiencing low employment rates. Several programs either closed down completely or operated well below their capacity (Florida Department of Education Follow-up Survey, 1986; Final Report, Spring 1987).

Apprenticeship training programs have experienced similar problems. Data obtained from the Florida Bureau of Apprenticeship indicated that enrollment in these programs has decreased and apprentices must wait several weeks before reassignment from one job to another during the

course of training.

In times of general labor surplus, as in a recession, most building trades programs are expected to have low student enrollment and low placement rates for graduates. However, in times of high economic activity, as was the case in 1987 in Florida, labor shortages are common, particularly of skilled craftsmen. In such a situation, training programs for construction craftsmen are expected to have high enrollments and high employment rates. In Florida, however, students are not enrolling in programs and graduates have not been getting placed in jobs related to their training, despite the increasing demand for construction craftsmen. More construction craftsmen need to be trained to meet the needs of the construction industry and avert a skilled manpower shortage.

In the present study, a craft was chosen for investigation to serve as a basis for developing a research methodology that would apply to other construction crafts. The carpentry trade, representing the largest group of skilled craftsmen in Florida, was selected as the study vehicle for this research. Nationally, almost 40 percent of the need for skilled tradesmen is expected to occur in carpentry (CLRC, 1985). In Occupational Outlook (1986), the Department of Labor forecast that the employment of carpenters would increase as fast as the average of all occupations through the mid-1990's; this translates to an 11 percent increase in employment, or an additional 101,000 carpenters by 1995.

Purposes of the Study

The purposes of this study were as follows:

1) To examine current postsecondary training programs in Florida that train skilled carpenters and to identify the impediments to an adequate supply of skilled carpenters in the State of Florida

2) To examine the recruitment procedures used by these training programs

3) To examine the employment rate of graduates of these programs

4) To determine the construction industry's needs and demands

5) To determine why these in-flow programs are failing to meet the industry's need for skilled carpenters

6) To develop recommendations to fulfill industry demands

The study was divided into the segments shown in Figure 1-1. The research covered training programs offered by Florida's Department of Education and industry-supported apprenticeship training programs that supply skilled carpenters to Florida's construction industry. The four major construction associations were: Associated Builders and Contractors (ABC), Associated General Contractors (AGC), Florida Home Builders Association (FHBA), and the United Brotherhood of Carpenters and Joiners of America (union programs). Also included were a number of individual and group nonunion apprenticeship programs.

Separate studies were conducted of seven segments of the construction industry. In each study, detailed data were assembled, and the unique features of that segment of the industry were characterized. All studies were coordinated to ensure integration of the results in this summary report, providing an overview of the carpenter shortage and recommendations to alleviate the problem.

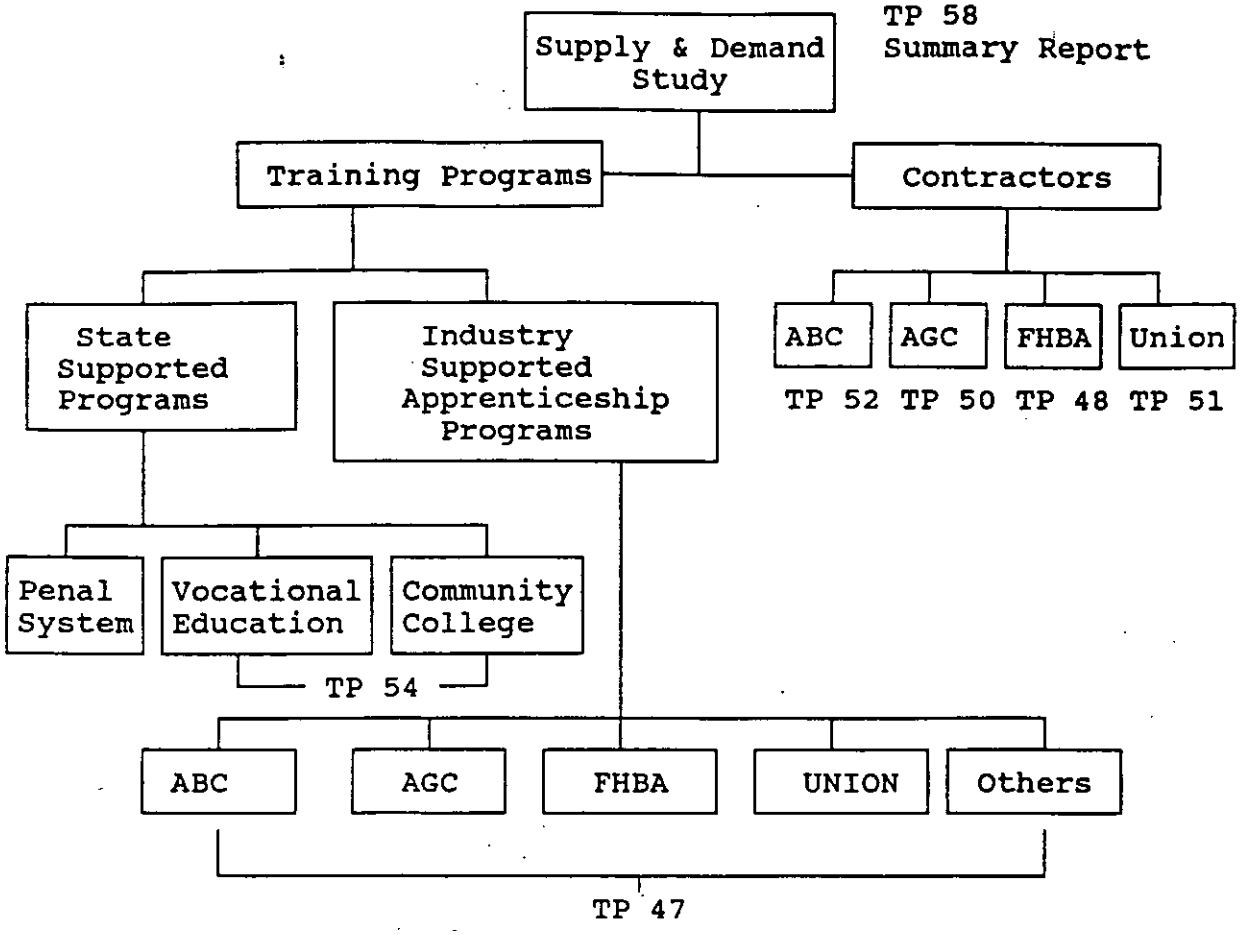

FIGURE 1-1. Scope of study. Abbreviations: ABC = Associated Builders and Contractors; AGC = Associated General Contractors; FHBA = Florida Home Builders Association; Other = Any nonunion individual or group program not belonging to a particular building organization.

Following are the reports representing the seven segments of this research study:

- Technical Publication 47: An Analysis of Carpentry Apprenticeship Programs in Florida, 106 pages and appendices. Brown, B. (P.I.), et al.
- Technical Publication 48: Effects of the Shortage of Skilled Carpenters in the Homebuilding Industry in Florida: Impediments and Recommendations, 130 pages and appendices. Brown, B. (P.I.), et al.
- Technical Publication 50: Effects of the Shortage of Skilled Carpenters on the Associated General Contractors of Florida, 103 pages and appendices. Brown, B. (P.I.), et al.
- Technical Publication 51: An Analysis of the Shortage of Skilled Carpenters in Florida as Reported by Union Contractors: Impediments and Recommendations, 119 pages and appendices. Brown, B. (P.I), et al.
- Technical Publication 52: Effects of the Shortage of Skilled Carpenters on the Associated Builders and Contractors of Florida: Impediments and Recommendations, 115 pages and appendices. Brown, B. (P.I.), et al.
- Technical Publication 54: Recruitment, Training and Placement of Residential and Commercial Carpentry Programs Offered Through State-Supported Vocational Training Centers and Community Colleges, 80 pages and appendices. Brown, B. (P.I.), et al.
- Penal System Report: Analysis of the Florida State Penal System Carpentry Training Programs, 19 pages and appendices. Brown,

B. (P.I.), and Markus, A.

- Technical Publication 57: Summary Report: Recruitment Training and Employment of Construction Craftsmen in Florida: Impediments and Recommendations, 40 pages. Brown, B. (P.I.), and Markus, A.

Organization

The study was conducted in four phases, as described below:

Phase I: Personal contact was established with representatives of Florida's Department of Education, the Florida Bureau of Apprenticeship, and major construction trade associations; this was accomplished by a series of meetings and personal interviews. A detailed explanation of the study and its benefits was presented. The interviews provided a focus for the problem and a thorough understanding of the key individuals and organizations in the study.

Phase II: A research methodology was developed to investigate building trades training programs in one construction craft. Based on the craft of carpentry, four questionnaires were developed that combined input from the interviews conducted in Phase I.

Phase III: Data obtained from the four survey questionnaires developed in Phase II were analyzed to answer the six research questions outlined in the purpose of the study.

Phase IV: Based on analysis of the data, impediments were identified and recommendations developed for meeting the craftsman shortage; a research methodology was designed to study other construction crafts.

CHAPTER II: SUMMARY OF RESULTS

A total of 1,138 questionnaires were sent. Of the 59 questionnaires submitted to course instructors of carpentry programs, all were returned; of the 1079 submitted to construction contractors, 281 (26 percent) were returned. This provided a comprehensive and significant data base to answer the six research objectives.

Tables 2-1, 2-2, and 2-3 indicate the number of questionnaires submitted to groups of educators and contractors and the number returned by each. Tables 2-4 through 2-9 present a summary of responses to the survey questionnaire submitted to construction contractors by region and a statewide average. Tables 2-10 through 2-16 show contractors' responses by association and a statewide average. Tables 2-17 through 2-20 summarize responses from coordinators of carpentry programs.

TABLE 2-1. Educators' Responses to Instruments

Educators	No. Sent	No. Responded	%
Apprenticeship programs	25	25	100
Voc-tech centers	28	28	100
Community colleges	3	3	100
Penal system	3	3	100
Totals	59	59	100

TABLE 2-2. Contractors' Responses by Association

Contractors	No. Sent	No. Responded	%
ABC	280	64	23
AGC	267	70	26
FHBA	363	95	26
Union	169	52	31
Totals	1079	281	26

TABLE 2-3. Contractors' Responses by Region

Region	No. Sent	No. Responded	%
Central	170	55	32
Northeast	165	42	25
Northwest	85	24	28
Southeast	360	90	25
Southwest	298	70	23
Totals	1079	281	26

TABLE 2-4. Responses of Construction Contractors (by Region) to Survey Instrument

Issue	State-wide	Region of State				
		NW	NE	Central	SW	SE
Residential construction undertaken (ave. %)	29.8%	3.9%	38.2%	30.1%	31.8%	24.0%
Commercial construction undertaken (ave. %)	58.4%	54.1%	46.1%	58.3%	55.5%	67.2%
Other construction undertaken (ave. %)	11.8%	15.0%	15.6%	11.2%	28.0%	8.8%
Annual volume of business ($ million)	$18.4	$8.4	$29.7	$36.3	$13.2	$8.9
Projects carried per year (ave. no.)	40.1	21.3	40.5	68.5	26.7	38.8
Journeyman carpenters employed (ave. no.)	14.0	12.8	10.7	14.5	16.5	13.6
Journeyman carpenters considered skilled (ave. no.)	9.0	6.5	7.0	10.6	12.9	6.7
Apprentice carpenters employed (ave. no.)	4.0	2.7	5.2	2.9	4.3	3.1
Hourly wage for journeyman carpenter (ave.)	$10.97	$8.88	$10.65	$10.70	$9.92	$12.58

TABLE 2-4 (continued)

Issue	State-wide	Region of State				
		NW	NE	Central	SW	SE
Hourly wage for apprentice carpenter (ave.)	$8.01	$6.20	$6.90	$7.41	$6.97	$8.80
Employment length for journeyman (ave. mo.)	27.0	24.5	29.8	23.7	22.5	32.7
Employment length for apprentice (ave. mo.)	16.0	17.7	19.4	17.8	12.4	17.2
Contractors without enough skilled carpenters to hire	67.4%	40.9%	68.3%	60.0%	69.0%	72.2%
Contractors with a need for more skilled carpenters (ave. %)	88.4%	90.9%	87.5%	85.2%	88.6%	90.0%
Contractors who may increase work volume if enough skilled carpenters (ave. %)	36.1%	31.8%	34.1%	20.8%	38.9%	45.3%
Contractors with scheduling problems caused by carpenter shortage	64.7%	42.9%	--	60.0%	80.5%	75.4%

TABLE 2-4 (continued)

Issue	State-wide	Region of State				
		NW	NE	Central	SW	SE
Contractors who have paid overtime due to shortage of skilled carpenters	51.5%	45.5%	65.0%	41.2%	49.3%	54.7%
Contractors who would hire more skilled carpenters to avoid paying overtime	59.2%	50.0%	59.0%	55.1%	49.3%	72.1%
Overtime hours worked by carpenters (ave. %)	10.0%	7.6%	8.0%	6.8%	7.0%	6.4%
Carpentry work subcontracted (ave. %)	54.7%	52.2%	54.2%	59.3%	57.8%	48.8%
Contractors without enough subcontract carpentry firms to hire	43.2%	25.0%	52.6%	51.5%	35.6%	48.8%
Contractors dissatisfied with quality of carpentry subcontractors	51.0%	44.4%	38.1%	61.1%	59.1%	41.9%

TABLE 2-4 (continued)

Issue	State-wide	Region of State				
		NW	NE	Central	SW	SE
Contractors who think skill of carpentry subcontractors is inadequate	60.6%	44.4%	52.4%	71.4%	61.4%	56.1%
Skilled carpentry subcontractors (ave. %)	33.8%	47.9%	54.2%	26.3%	36.2%	32.6%
Contractors who think carpenters should have some classroom training	82.5%	77.3%	85.0%	81.1%	58.7%	81.1%
Contractors who think carpenters should not be required to be licensed	58.6%	68.2%	53.7%	65.4%	59.7%	53.5%
Contractors who think illegal aliens are hired by other construction firms	38.9%	13.6%	41.5%	28.8%	36.6%	52.4%
Carpenters believed to be illegal aliens (ave. %)	10.3%	15.0%	10.0%	8.2%	10.3%	10.9%

TABLE 2-5. Opinion of Construction Contractors (by Region)

Regarding Future Task Variety of Carpenters

Issue: Future Task Variety on a Scale of 1 (narrower) to 4 (much broader)	State-wide	Region of State				
		NW	NE	Central	SW	SE
Form carpenters	2.65	2.93	2.75	2.60	2.44	2.73
Finish carpenters	2.60	2.88	2.33	2.51	2.51	2.70
Framing carpenters	2.58	2.60	2.40	2.43	2.45	2.78

TABLE 2-6. Ranking by Contractors of Training Programs That Contribute to Supply of Skilled Carpenters (by Region)

Issue: How Training Programs Contribute to Supply of Skilled Carpenters (1-4 Scale)*	State-wide	Region of State				
		NW	NE	Central	SW	SE
On-the-job training	3.25	3.50	3.45	3.20	3.32	3.05
Open-shop apprenticeship programs	2.48	2.33	2.51	2.73	2.41	2.44
Vocational training centers	2.29	2.75	2.07	2.50	2.44	2.14
Community college training	2.24	1.50	2.19	2.09	1.96	2.73
Union apprenticeship programs**	1.96	1.75	1.99	1.97	2.06	1.95

* 1 = negligible, 2 = to a small extent, 3 = to some extent, 4 = to a large extent.

**Due to the small number of union contractors surveyed (52 out of 281), union apprenticeship programs were not surprisingly rated as the least effective in producing skilled carpenters for Florida's construction industry, scoring 1.96 on a 4.0 scale.

TABLE 2-7. Reasons Cited by Construction Contractors (by Region) for Shortage of Skilled Carpenters

Issue: Reasons for Shortage of Skilled Carpenters (on a 1 to 4 Scale of Importance)*	State-wide	Region of State				
		NW	NE	Central	SW	SE
General decline in craftsmanship	3.11	3.33	3.05	2.96	3.06	3.20
Construction boom	2.74	2.57	2.74	2.91	2.84	2.63
Lack of training programs	2.75	3.00	2.72	2.91	2.68	2.83
Emphasis on cutting cost, not on quality	2.54	2.19	2.86	2.56	2.65	2.37
Emphasis on factory-built components, not on-site skill of carpenters	2.27	2.38	2.39	2.18	2.35	2.16
Low wage rates	2.13	2.14	2.47	2.11	2.20	1.97
Part-time carpenters	1.77	1.91	1.64	1.79	1.84	1.74
Low profile of labor union	1.72	1.33	1.55	1.71	1.61	2.00

* 1 = Not a reason at all, 2 = could be a reason, 3 = important reason, 4 = very important reason.

TABLE 2-8. Communication Level of Construction Contractors (by Region) With Various Training Programs

Issue: Communication Level on a Scale of 1 (Very Remote) to 4 (Very Close)	State-wide	Region of State				
		NW	NE	Central	SW	SE
On-the-job training	2.98	3.52	3.03	2.81	3.12	2.81
Open-shop apprenticeship programs	1.93	2.29	2.18	1.80	1.90	1.81
Vocational training centers	1.55	1.95	1.65	1.39	1.67	1.42
Community college training	1.52	1.65	1.61	1.47	1.56	1.46
Union apprenticeship program**	1.46	1.24	1.41	1.24	1.33	1.77

TABLE 2-9. Ranking by Construction Contractors of Best Methods To Establish Linkages Between Contractors and Training Programs

Issue: Methods to Establish Industry/Training Program Linkages (Scale of 1 to 4)*	State-wide	Region of State				
		NW	NE	Central	SW	SE
Formal meeting of the two groups	3.15	3.00	3.20	3.40	2.86	3.28
Sitting on an advisory committee	2.51	2.14	2.67	2.44	2.38	2.62
Attending educational functions	2.55	1.95	2.44	2.62	2.46	2.78
Written contact	2.37	2.19	2.15	2.22	2.49	2.48

* 1 = least important, 4 = most important.

TABLE 2-10. Responses of Contractors (by Trade Association) to Survey Instrument

Issue	State-wide	Contractors			
		ABC	AGC	FHB	Union
Residential construction undertaken (ave. %)	29.8%	8.2%	13.0%	71.0%	8.6%
Commercial construction undertaken (ave. %)	58.4%	73.8%	77.2%	27.9%	71.3%
Other construction undertaken (ave. %)	11.8%	18.0%	9.6%	5.3%	20.1%
Annual volume of business ($ million)	$18.4	$17.1	$29.6	$5.3	$24.1
Projects carried per year (ave. no.)	40.1	22.9	27.0	--	65.0
Journeyman carpenters employed (ave. no.)	14	16	21	4	21
Journeyman carpenters considered skilled (ave. no.)	9	11	12	2	12
Apprentice carpenters employed (ave. no.)	4	3	6	2	3
Hourly wage for journeyman carpenter (ave.)	$10.97	$10.29	$10.87	$9.97	$13.15

TABLE 2-10 (continued)

Issue	State-wide	Contractors			
		ABC	AGC	FHB	Union
Hourly wage for apprentice carpenter (ave.)	$8.01	$7.33	$7.89	$6.51	$9.30
Employment length for journeyman (ave. mo.)	27.0	27.6	24.0	26.0	32.0
Employment length for apprentice (ave. mo.)	16.0	21.8	14.0	15.0	16.0
Contractors without enough skilled carpenters to hire	67.4%	81.2%	71.8%	56.0%	57.7%
Contractors with a need for more skilled carpenters (ave. %)	88.4%	94.0%	94.4%	78.0%	80.0%
Contractors who may increase work volume if enough skilled carpenters (ave. %)	36.1%	37.5%	36.6%	36.0%	32.7%
Contractors with scheduling problems caused by carpenter shortage	67.8%	70.3%	80.0%	--	53.2%

TABLE 2-10 (continued)

Issue	State-wide	Contractors			
		ABC	AGC	FHB	Union
Contractors who have paid overtime due to shortage of skilled carpenters	51.5%	59.3%	67.1%	40.2%	36.5%
Contractors who would hire more skilled carpenters to avoid paying overtime	59.2%	54.6%	80.9%	39.0%	58.0%
Overtime hours worked by carpenters (ave. %)	10.0%	6.7%	8.1%	6.7%	6.0%
Carpentry work subcontracted (ave. %)	54.7%	54.1%	38.7%	68.0%	23.9%
Contractors without enough subcontract carpentry firms to hire	43.2%	70.1%	43.8%	34.7%	30.8%
Contractors dissatisfied with quality of carpentry subcontractors	51.0%	56.3%	51.4%	52.1%	33.3%

TABLE 2-10 (continued)

Issue	State-wide	Contractors			
		ABC	AGC	FHB	Union
Contractors who think skill of carpentry subcontractors is inadequate	60.0%	62.5%	62.9%	59.4%	42.9%
Skilled carpentry subcontractors (ave. %)	33.8%	29.2%	32.6%	36.0%	33.7%
Contractors who think carpenters should have some classroom training	82.5%	84.3%	83.1%	80.4%	80.0%
Contractors who think carpenters should not be required to be licensed	58.6%	70.3%	58.8%	49.5%	57.7%
Contractors who think illegal aliens are hired by other construction firms	38.9%	20.3%	39.7	43.3%	50.5%
Carpenters believed to be illegal aliens (ave. %)	10.3%	9.2%	9.8%	10.9%	11.0%

TABLE 2-11. Opinion of Contractors

Regarding Future Task Variety of Carpenters

Issue: Future Task Variety on a Scale of 1 (Narrower) to 4 (Much Broader)	State-wide	Contractors			
		ABC	AGC	FHB	Union
Form carpenters	2.65	2.55	2.8	--	2.57
Finish carpenters	2.62	2.55	2.7	--	2.53
Framing carpenters	2.58	2.47	2.6	--	2.61

TABLE 2-12. Reasons Cited by Contractors for Shortage of Skilled Carpenters

Issue: Reasons for Shortage of Skilled Carpenters (on a 1 to 4 Scale of Importance)*	State-wide	Contractors			
		ABC	AGC	FHB	Union
General decline in craftsmanship	3.11	3.03	3.30	3.02	3.05
Construction boom	2.74	2.86	2.60	2.82	2.68
Lack of training programs	2.75	2.73	2.90	2.67	2.55
Emphasis on cutting cost, not on quality	2.54	2.42	2.40	2.63	2.79
Emphasis on factory-built components, not on-site skill of carpenters	2.27	2.21	2.40	2.28	2.30
Low wage rates	2.13	1.82	2.10	2.37	2.17
Part-time carpenters	1.77	1.68	1.90	1.73	1.80
Low profile of labor union	1.72	1.45	1.40	1.61	2.74

* 1 = Not a reason at all, 2 = could be a reason, 3 = important reason, 4 = very important reason.

TABLE 2-13. Communication Level of Contractors With Various Training Programs

Issue: Communication Level on a Scale of 1 (Very Remote) to 4 (Very Close)	State-wide	Contractors			
		ABC	AGC	FHB	Union
On-the-job training	2.98	3.36	3.20	2.80	2.46
Open-shop apprenticeship programs	1.93	2.57	2.30	1.59	1.20
Vocational training centers	1.55	1.57	1.70	1.54	1.30
Community college training	1.52	1.62	1.70	1.54	1.13
Union apprenticeship programs	1.46	1.56	1.10	1.15	2.78

TABLE 2-14. Ranking of Best Methods to Establish Linkages Between Contractors and Training Programs by Contractors

Issue: Methods to Establish Industry/Training Program Linkages (Scale of 1 to 4)*	State-wide	Contractors			
		ABC	AGC	FHB	Union
Formal meeting of the two groups	3.15	3.09	3.20	3.15	3.14
Sitting on an advisory committee	2.51	2.44	2.60	2.36	2.62
Attending educational functions	2.55	2.33	2.50	2.52	2.84
Written contact	2.37	2.33	2.20	2.35	2.74

* 1 = least important, 4 = most important.

TABLE 2-15. Ranking of Training Programs Contributing to Supply of Skilled Carpenters by Contractors

Issue: Contribution of Training Programs to Supply of Skilled Carpenters on Scale of 1 to 4*	Statewide	Contractors			
		ABC	AGC	FHB	Union
On-the-job training	3.30	3.23	3.15	3.51	2.93
Open-shop apprenticeship programs	2.13	2.57	2.32	1.85	1.69
Vocational training centers	2.13	2.02	2.38	2.04	2.03
Union apprenticeship programs	2.02	1.77	1.89	1.58	3.29
Community college training	1.78	1.88	1.84	1.81	1.37

* 1 = negligible, 4 = a large extent.

TABLE 2-16. Ranking of Training Programs Producing the Best Carpenters for Needs by Contractors

Issue: Rank of Training Programs Producing the Best Carpenters for Needs on Scale of 1 to 4*	State-wide	Contractors			
		ABC	AGC	FHB	Union
On-the-job training	3.25	3.15	3.20	3.54	2.88
Open-shop apprenticeship programs	2.48	2.76	2.50	2.46	2.00
Vocational training centers	2.29	2.17	2.30	2.47	2.13
Union apprenticeship programs	2.24	2.00	2.00	1.85	3.25
Community college training	1.96	1.81	1.90	2.22	1.79

* 1 = the worst, 4 = the best.

TABLE 2-17. Summary of Survey Responses From Educators

Issue	Vocational Centers/ Community Colleges	Apprenticeship Training
Educators who believe a shortage of skilled carpenters exists	90.3%	83.3%
Educators who believe training programs fulfill the demand for carpenters	61.3%	56.0%
Number of programs offering carpentry	31	25
Average number of students enrolled per program	19.2	35.2
Average number of students graduating each year per program	9.0	11.5
Graduates of programs who have full-time carpentry jobs	69.5%	89.4%
Graduates who chose alternate occupation to carpentry	23.0%	--
Average hourly wage upon graduation	$5.56	$10.30
Educators who believe student recruiting is adequate	53.0%	52.0%
Highest-ranking recruitment strategies	1) Tours of programs for prospective students; 2) local radio and TV	1) advisory committee; 2) ads in local newspapers, journals

TABLE 2-18. Opinion of Educators Regarding Future Task Variety of Carpenters

Issue: Future Task Variety on a Scale of 1 (Narrower) to 4 (Much Broader)	Vocational Centers/ Community Colleges	Apprenticeship Training
Form carpenters	2.50	2.62
Finish carpenters	2.90	2.60
Framing carpenters	2.83	2.55

TABLE 2-19. Ranking of Best Methods to Establish Linkages Between Industry and Training Programs by Educators

Issue: Methods to Establish Industry/Training Program Linkages (Scale of 1 to 4)*	Vocational Centers/ Community Colleges	Apprenticeship Training
Formal meeting of the two groups	3.48	3.22
Sitting on an advisory committee	3.52	3.00
Attending educational functions	3.13	2.82
Written contact	2.62	1.82

* 1 = least important, 4 = most important.

TABLE 2-20. Communication Level That Educators Have With Contractors

Issue: Communication Level of Educators and Industry on Scale of 1 (Remote) to 4 (Very Close)	Vocational Centers/ Community Colleges	Apprenticeship Training
Educators' ranking of communication level	3.1	3.1

Summary of Statistical Analysis of Carpenter Skills Combining Contractors' and Educators' Responses

Construction contractors and vocational educators rated 20 tasks necessary for a skilled carpenter on a scale of 1 to 4, 1 being "not necessary" and 4 being "very necessary." Analysis of responses (Table 2-21) indicated that the two groups differed significantly at the 95 percent confidence level in the rating of necessary skills on five items: 1) install insulation and sound control material, 2) frame partitions, 3) frame roofs, 4) conduct site preparation and layout, and 5) install decking and sheathing. Vocational educators rated all five skills higher than did construction contractors. A look at the rest of the skills indicated that vocational educators also rated the remaining 15 skills higher than did construction contractors.

TABLE 2-21. Comparison of Educators' and Contractors' Rankings of Carpentry Skills to Determine Differences at 95 Percent Confidence Level

Skill	Mean		
	Contractors	Educators	P Value
• Install insulation and sound control material	2.34	2.97	0.0011*
• Frame partitions	3.24	3.87	0.0013*
• Frame roofs	3.14	3.70	0.0066*
• Conduct site preparation and layouts	2.61	3.00	0.0274*
• Install decking and sheathing	3.22	3.60	0.0451*
• Install exterior wall covering and trim	3.06	3.43	0.0517
• Read blueprints	3.06	3.43	0.0543
• Frame floor and sills	3.22	3.57	0.0711
• Install paneling, furring, soffit, ceiling	2.97	3.30	0.0908
• Install door, window frame, and units	3.13	3.37	0.2211
• Install drywall material	2.39	2.73	0.2341
• Apply weather stripping and caulking	2.84	3.06	0.2368
• Build trusses	2.43	2.77	0.2539
• Construct forms (piers, columns, beams, slabs, stairs, bridge, deck)	2.93	3.15	0.2646

TABLE 2-21 (continued)

Skill	Group	Mean	P Value
• Install cabinets, fixtures, shelving	2.79	2.97	0.3512
• Install structural timber	2.90	3.03	0.4937
• Construct forms (footing, walls, edge, curb)	3.06	3.19	0.5213
• Pre-plan forthcoming activities	2.58	2.67	0.6299
• Issue instructions to crew members	2.66	2.74	0.6942
• Construct interior stairs	2.93	2.98	0.8106

* A P value of less than 0.05 indicates a significant difference at the 95 percent confidence level.

Summary of Personal Meetings

The consensus of opinion from a series of meetings and interviews was that a shortage of skilled carpenters definitely exists in Florida. A majority of individuals attributed the shortage to the fact that the carpentry trade is becoming increasingly specialized, resulting in a need for additional carpenters in three main categories: frame carpentry, form carpentry, and finish carpentry.

Despite the existence of many carpentry training programs, several respondents indicated that no recognized system is available for transferability of training from one training program to another. Suggestions were made regarding competency-based training; many respondents indicated that this approach lends itself well to testing, enhancing transferability of training in the carpentry trade.

Research Methodology

One of the objectives of this investigation was to develop a research methodology leading to a model that could be applied by future researchers to determine the supply/demand ratio between training programs and the construction industry.

The first stage of the model determines the manpower needs for the craft to be investigated. A determination is made of the appropriate professional trade and training organizations; specific apprenticeship programs, vocational centers, and community colleges are identified that having training programs for this craft. Personal interviews are conducted with representatives of the major trade associations and the union pertaining to that craft. Data are obtained regarding the available supply of

craftsmen, how many more craftsmen are needed, and in which regions the need exists.

Personal interviews need to be conducted with the Florida Division of Vocational, Adult, and Community Education and with the Florida Bureau of Apprenticeship to determine the number of training programs available in that craft and the number of students enrolled. This preliminary analysis determines whether a supply/demand discrepancy exists, to what extent, and in what locations.

In the second phase of the research, two survey questionnaires are developed: 1) an instrument that obtains input from construction contractors who hire skilled personnel in the craft to be investigated, and 2) an instrument to obtain input from educators who train students in that craft. The questionnaires need to determine: 1) what skills and training are needed by industry and the current levels of skills and training taught in the training programs, 2) the level of communication between contractors and training programs, with identification of methods to improve communication and facilitate better interactions, and 3) the wages actually paid.

Based on analysis of the data from the survey instruments, conclusions are drawn and recommendations developed to alleviate any shortage in the craft under investigation.

CHAPTER III: CONCLUSIONS, IMPEDIMENTS, AND RECOMMENDATIONS

The study reveals a serious shortage of skilled carpenters in Florida. A substantial majority of contractors (88 percent) and carpentry instructors (87 percent) indicated a need for more skilled carpenters in the Florida construction industry. A majority of contractors (67.4 percent) felt that not enough skilled carpenters were available for them to hire. The shortage has also affected the carpentry subcontractors employed by the contractors surveyed. Over half (51 percent) of the responding contractors were dissatisfied with quality of subcontracted carpentry work. Over 43 percent of the contractors stated that not enough carpentry subcontractors were available to perform their work. The contractors also indicated that the quality of the carpentry subcontractors' work was deficient. A majority of the contractors were dissatisfied with the quality of the carpentry subcontractors, with over 60 percent believing that the skills of these subcontracted carpenters were inadequate. In fact, analysis of the data revealed that only 34 percent of the carpenters performing subcontracted work were considered skilled.

The shortage of skilled carpenters is so severe that almost 70 percent of the contractors surveyed had paid overtime to skilled carpenters. Many contractors (65 percent) reported that the shortage directly caused them scheduling problems; approximately 36 percent said that the inadequate supply of skilled carpenters constrained their volume of business.

The average number of journeyman carpenters employed per firm was 14. However, the number of those considered skilled was only nine (64 per-

cent). An average of four apprentice carpenters were employed by responding firms. The duration of employment of carpenters was relatively short; on the average, journeyman carpenters remained in employment for 27 months, while apprentices remained in employment for only 16 months.

Impediments

- Communications--The level of communication between most of the training programs and the construction industry is very poor, which results in a lack of interaction and inadequate cooperation.
- Specialization--There is a trend toward specialization. Most respondents indicated that carpentry is becoming increasingly specialized into three categories: frame carpentry, form carpentry, and finish carpentry. However, when the educators' and contractors' ratings of the 20 skills necessary for a skilled carpenter were compared statistically, educators rated every skill higher than did construction contractors. This finding indicates that training programs continue to stress competence in a broad area of training, despite the industry's need for specialization.
- Training Programs--The lack of adequate training programs was also perceived as a serious impediment to an adequate supply of skilled carpenters. Responding contractors consistently ranked "on-the-job training" as the most utilized source for the supply of carpenters to the Florida construction industry. Despite this, a clear majority of contractors (82.5 percent) thought that carpenters should undergo some classroom training. This is a strong statement in favor of more formal training in addition to on-the-job training.

- Recruitment--About half the responding instructors reported that student recruitment is inadequate. However, the greatest barrier to recruiting individuals into carpentry programs is the low status associated with the carpentry trade; the status of carpenters is not perceived to be as high as that of people in other building trades (e.g., electricians, plumbers). The data also demonstrate that carpentry apprenticeship training programs have a capacity that is only half-utilized. Therefore, a pressing need exists to improve recruitment of individuals into the carpentry trade. The data indicate that training programs are only half-filled because of low wage rates, low annual employment rates, and no official recognition of the skilled carpenter in the form of licensure or certification. However, the majority of respondents in this study (59 percent) opposed licensure as a way to ensure better skills and standards in carpentry.
- Declining Enrollment--Only 56 carpentry training programs are available in Florida, with an average of 27 students currently enrolled per program. An average of only 10 carpenters are graduated annually per program. The study showed that statewide enrollment in community colleges and voc-tech centers declined from 1086 in 1986 to 594 in 1988. There is also a slight decline in enrollment in apprenticeship programs.
- Craftsmanship--In the opinion of contractors, a general decline in craftsmanship was the critical reason for the shortage.
- Wages--Carpentry instructors judged the low wages paid to carpenters to be another impediment. On the average, journeyman carpenters were

paid $10.97 per hour; apprentices were paid $8.00 per hour. However, carpentry instructors indicated that graduates of community colleges and voc-tech programs were paid an average of only $5.56 per hour upon graduation. Low wages were rated as the chief reason that about 23 percent of the graduates of carpentry training programs in community colleges and vocational centers chose alternative occupations to the carpentry trade.

Summary Statement

In summary, construction contractors and carpentry educators perceive a definite shortage of skilled carpenters in Florida. Despite the need, training programs are not utilized efficiently. This investigation has revealed several factors that contribute to the discrepancy between the low utilization of carpentry training programs and the high industry demand for skilled carpenters. The most significant factors include the following: lack of agreement between what is taught in the curriculum and the requirements of an industry that is becoming increasingly specialized; lack of on-the-job training as a curricular component in community college programs and voc-tech programs; low level of communication between personnel from the training programs and construction contractors; and a tendency of graduates to choose an alternative to carpentry upon graduation due to low wages paid to carpenters in Florida. Personnel in apprenticeship programs are concerned about lack of contractor cooperation. Many contractors are unwilling to pay for apprentice training, contributing to the problem of low supply from training programs. The dramatic decline in enrollment in the last few years indicates that recruitment is unsatisfactory and is contributing to the shortage.

Recommendations

The following recommendations are offered by the principal investigator to alleviate the shortage of skilled carpenters:

- A joint council should be formed (see Figure 3-1), consisting of representatives of the following: the four major construction groups, the Division of Vocational, Adult, and Community Education, the Florida Bureau of Apprenticeship, and the administration of the various building trades training programs. Formal ongoing meetings should be held to modify the curriculum, incorporate on-the-job training, and improve communication and interaction between the employers and trainers. The development of effective training programs in the building trades will succeed only as a result of a joint effort between educators and representatives of the construction industry. Cooperation and interaction between these parties will result in the production of quality craftsmen trained to meet the current as well as the future needs and requirements of the Florida construction industry.
- In addition to the efforts of the joint council, the four construction groups (ABC, AGC FHBA, union contractors) should, through their regional organizations, establish or improve communications with training program personnel in their regions. The contractor associations furnish the recommended communication channel for the contractors because they have the knowledge and resources to see that contractors' needs are met. This could be achieved by contractors

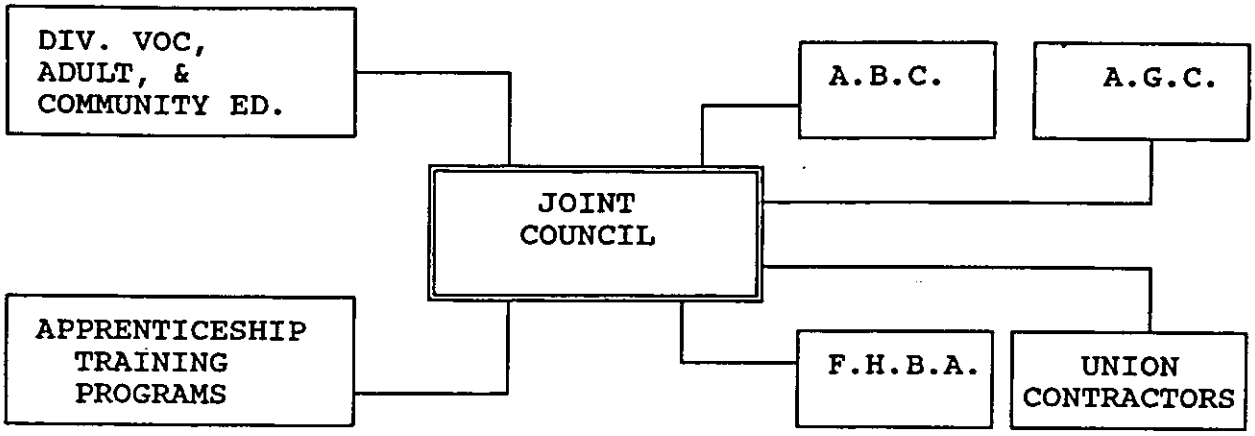

FIGURE 3-1. Formation of Joint Council. Abbreviations: ABC = Associated Builders and Contractors; AGC = Associated General Contractors; FHBA = Florida Home Builders Association.

becoming actively involved on advisory committees of training programs.

- Vocational educators should ensure that the advisory committees are active and that they continuously support interaction between personnel from the training programs and industry. Local contractors should be encouraged to become active in training programs, they should be invited to visit the facility, to provide input, and, if appropriate, assist in providing on-the-job training. Furthermore, educators should attend industry functions to promote their programs; they should schedule field trips for their students to local job sites. When contractors are made aware of the progress of training programs or, better yet, are encouraged to take active roles in the programs, they will be more likely to hire graduates and promote training programs to other interested individuals.
- Educators in all carpentry training programs must recognize that the carpentry trade is becoming increasingly specialized. They should subdivide their curriculum and training into three separate categories: Frame carpentry, Form carpentry, and Finish carpentry.
- It is imperative that vocational educators in community colleges and voc-tech centers develop and incorporate on-the-job training as part of their curriculum. However, it is important to note the difference between on-the-job training by construction contractors and on-the-job training offered through community college and voc-tech training programs. On-the-job training offered by contractors generally has no structured rotation of tasks or systematic evaluation and is not complemented by classroom or shop training.

Therefore, on-the-job training must be developed by vocational educators, with input and coordination from industry, ensuring that a training sequence is structured systematically, that a trainee's tasks are rotated, and that periodic evaluations of tasks performed by the trainee are conducted, in addition to classroom instruction.

- Contractors should include classroom and shop training in their on-the-job training. Community colleges and voc-tech centers should provide classroom training to complement contractors' on-the-job training.
- Competency-based training will enhance transferability of carpenter skills, which in turn could be recognized by national and state employers. Competency-based training and the standardization of skills could lead to the use of carpenter certificates at certain stages of training and a card at the end of the apprenticeship. This should not be used as a method of licensure, but rather as a device to ensure training transportability. The lack of training documentation is an impediment to the current production of carpenters. The use of this system should also help link and coordinate the various training programs available in Florida.
- A more aggressive and creative recruiting program should be set up by the construction trade associations and the Division of Vocational, Adult, and Community Education to promote carpentry as a positive career choice. Target institutions should be established, such as high schools, where workers of the future can be interested in the carpentry trade.
- An increase in wage rates is necessary to attract enough manpower to

fulfill the demand. A low wage scale is one of the most negative influences causing graduates of community colleges and voc-tech centers to choose other occupations. Manpower and training committees of the construction associations need to determine whether contractors are concerned enough with the supply of skilled manpower to increase wage rates.

Recommendations for Future Research

During the course of research for this study, the following areas were identified that need further investigation:

- An in-depth study to investigate the opinions of carpenters in the field to determine whether their views regarding skills and training differ from the opinions expressed by building contractors.
- Application of the methodology developed in this study to research other construction crafts that are affected by a similar manpower shortage in the State of Florida.
- Application of this methodology to investigate the carpentry trade nationwide and develop recommendations that will alleviate the nationwide shortage of skilled carpenters.

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