Teaching Methods Improvement Using Industry Focus Groups: A Case Study in Construction Financing

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More than 50 percent of new contractors fail within the first five years of operation. This paper attempts to address the financial characteristics distinguishing successful firms from those less fortunate in an effort to improve instructional competencies and better prepare students for careers in construction. To accomplish this objective, benchmarking data from the Construction Financial Management Association (CFMA) and the Fails Management Institute (FMI) have been complemented by University of Florida focus group research of construction industry experts to identify key financial competencies related to contractor success. A case-study project was then developed to provide delivery and reinforcement of key competencies in business start-up, project financing, and construction business operations. Next, an outcome assessment survey was administered to construction financing students to evaluate key competency levels obtained. To test the relative success of the case-study project, course evaluations for three consecutive semesters during 2002-2003, prior to project implementation, and three semesters during 2003-2004, following project implementation, were compared. Outcome assessments found that students acquired significant competencies and skill sets identified as critical by construction industry experts as well as CFMA and FMI. Course evaluations further improved nearly 30 percent when compared to evaluations prior to teaching methods improvement.

Key Words: Break-even Sales, Construction Loan Agreement, Construction Finance Education, Income Capitalization, Pro Forma, Teachings Methods Improvement, Working Capital.

Introduction

Accounting and other related financing control disciplines are among the most neglected control functions in contracting firms (Milliner, 1988). Many business owners have little financial background and fail to realize the importance of key financing issues either unique to or greatly magnified by construction contracting such as bonding, progress billings, retainage, working capital, cash-flow and subcontracting. In spite of overwhelming evidence that suggests financial misfeasance on the part of the contractor is responsible for the vast majority of business failures, many construction education programs have three or fewer credit hours of upper division study in this area. This is one-third or less of the concentration usually given to structures, project management and mechanical, electrical, plumbing (MEP) coursework. In fact, many schools choose to defer finance instruction to general business education programs. As a result, many graduates receive added education in entry-level estimating, scheduling and field supervision, but lack the basic financial competencies needed to lead construction organizations as future executives and business owners.

Literature Review

Financial Failures

Since 1987, the U.S. construction industry has generated some $6 trillion in sales, accounting for 4-5 percent of the U.S. gross domestic product each year (U.S. BEA, 2004). Yet, in spite of being the nation's largest industry and largest source of employment, more than 50 percent of new contractors fail within the first five years of operation, and most of these fail within the first two (Milliner, 1988). These "upstarts" usually have good field knowledge and field cost controls, but they have little knowledge of the business and financial environment. New contractors often underbid projects in an effort to break into the market, use "rule-of-thumb" markups instead of carefully calculated pricing that allows them to generate sustainable profit, or, are unaware of their "break-even" point, leaving them with insufficient volume and subsequent gross profit to cover fixed overheads (Milliner, 1988). Those that are able to formulate a competitive and profitable pricing strategy may still fall prey to the "capitalization trap", where working capital and lines of credit are insufficient to meet current liabilities and complete what otherwise would have been a profitable job (Jackson, 2002). Overcapitalization, or the under-utilization of favorable credit terms and debt leverage, strands limited cash-flow and reduces return-on-investment (Jackson, 2002). Other pitfalls include an inadequate understanding of the time-value of money, leaving the contractor to make poor investment and financing decisions, from equipment purchases to supplier credit options.

Competitive Pressures

The costly and adversarial notion of "checks and balances" between owners and contractors under the traditional design-bid-build arrangement is giving way to new delivery methods focused on accountability, value, and client retention (Good and Tyler, 2003). Construction management (CM), invited bid, and design-build delivery systems have emerged as effective alternatives for a new age of owners who are more interested in the timely delivery of an income-generating asset than a low-budget building. Realizing limits to traditional sum, scope and schedule management, many contractors are turning to turnkey services to differentiate themselves from the competition. By 2015, more than 55 percent of all contracts let will be full-service design-build, outdistancing hard-bid and CM at-risk delivery methods combined (Good and Tyler, 2003). This trend shows that owners will increasingly turn to the contractor to provide, among other turnkey services, pre-construction site selection and negotiation, income capitalization and project feasibility, design, and finance packaging. Still, many other contractors will continue to test the speculative market, where mastery of construction financing skills is essential.

Government Regulation

States that have professional licensing requirements understand that the individuals responsible for a construction project should have minimum competencies, including bonding and financial standing to protect the public from unnecessary risks. Although human health and safety remain the most obvious priorities in construction contracting, an often overlooked objective of licensure is ensuring financial responsibility. When a contractor fails, the cascading economic

impact to the owner, subcontractors, suppliers, creditors and their employees can be catastrophic. Financial malfeasance in construction often costs the taxpayer in terms of unemployment compensation and bankruptcy protection as well as reduced tax revenue from loss of productivity, reduced purchase power and damaged consumer confidence (Foster, 2000). In response, Florida codified a statewide competency examination for construction practitioners in which one-half of the 2-day exam is dedicated solely to business and financial management in construction (Florida CILB, 2004).

Methodology

Industry Advisory Focus Group

The Building Construction Executive Advisory Committee (EAC), comprised of 15-20 industry practitioners representing general contractors, construction managers and subcontractors, are invited to the University of Florida each semester to participate in a program review of estimating, structures, management, MEP, computers and technology. During one visit in August 2002, a focus group review of the undergraduate Construction Financing course (BCN 4753) was conducted to identify key financial competencies expected of construction program graduates, from entry-level positions to executive management and business ownership. Realizing "the question often determines the answer", focus group participants were encouraged to discuss topics related to construction financing openly and without the use of a scripted agenda or a written survey instrument. In addition to synergies with the existing EAC process, this survey method was selected because focus groups often suggest issues, concerns, or points of view about a topic the researcher had not considered (Ary, Chester & Razavieh, 1996).

Teaching Methods Improvement

As a result of the EAC focus group and a literature review of recommended resources from the Construction Financial Management Association (CFMA) and the Fails Management Institute (FMI), key areas for curricula emphasis and modernization were identified. A semester project was developed as an instructional medium. This consisted of a cumulative case study of key competencies learned in project financing and business start-up and operation, with the goal of developing a successful loan application package, complete with project site-selection and feasibility studies, an income capitalization budget, a construction estimate and schedule, a draw schedule, and an amortization schedule, as well as a company pro forma and business plan. The objective of this approach was to expose students to the full spectrum of construction financing, particularly those financial activities during preconstruction that are invaluable assets to the CM, design-builder, and speculative builder, or, to the general contractor who desires a better understanding of a typical project from the owner's financial perspective.

Student Outcome Assessment Survey

A knowledge assessment survey (Appendix A) was administered to University of Florida students enrolled in the Construction Financing course (n = 50) at the beginning of the Spring 2004 semester and again at the end of the semester, to assess cumulative skills obtained.

Questions were developed from key competency topics identified from the focus group's research and literature review and subsequently adopted into the Construction Financing curricula using the project case study. Respondents were asked to assign a value of 1, 2 or 3 to a total of ten (10) questions. A value of 1 meant that the student could not answer a given question; a value of 2 meant that a student could partially answer a given question; and a value of 3 meant that a student could completely answer a given question. The objective of the assessment survey was to determine the level of student knowledge entering the course and improvements, if any, in student knowledge once completing the course. In addition, lower relative outcome scores in specific areas of instruction would provide focus for continued teaching methods improvement. Surveys were anonymously administered in order to reduce bias.

Course Evaluation Survey

Course evaluations for three consecutive semesters during 2002-2003, prior to project implementation, and three semesters during 2003-2004, following project implementation (n = 248) were compared to assess the change in student satisfaction following teaching methods improvement. The standard University of Florida, Office of Academic Affairs faculty evaluation form was used. Of nineteen total questions, Questions 1 through 9 pertained to qualitative instructor attributes such as communication skills, respect for students, stimulation of interest, student encouragement, and enthusiasm for the subject. Questions 11 through19 pertained to course organization and structure, effectiveness of instructional material, time management, and representativeness of course projects and examinations to course goals and objectives. Question 10 stated "Overall, I rate this instructor as". Respondents were given values ranging from 1 through 5, from poor to excellent, and were then asked to assign a value to each of the questions. Since the same faculty member served as instructor for all semesters surveyed, and since no appreciable changes to the course other than the implementation of the project case-study occurred during this period, it can be hypothesized that changes in student perceptions would likely be the result of teaching methods improvement recommended by the EAC focus group and implemented through the project case study.

Results

Industry Advisory Focus Group

Outlined below are the summarized comments from EAC participants in the Construction Financing course review held at the University of Florida Rinker School of Building Construction on June 12, 2002.

- Explain and show examples of a construction loan agreement. Discuss lien subordination, retainage, and requirements to notify lender of changes in contract.

- Discuss the contractor's pro forma, financial ratios, and progress billings. Discuss the importance of these benchmarks in securing financing and establishing bonding capacity.

- Discuss labor burdens such as Worker's Compensation rates, modifiers, classifications, frequency and severity issues and how they impact cost to the contractor.

- Include Florida Construction Industry Licensing Board (CILB) business and financing examination topical content in the course. Consider a balance of closed and open book examinations as is typical in industry licensing.

- Suggest FMI and CFMA be used as a source of material for the class. Discuss the possibility of utilizing the Associations of Builder's and Contractor's Institute (ABCI) manual entitled, "The Contractor's Guide to Construction Management".

Teaching Methods Improvement:
A Case Study in Project Financing and Construction Business Operations

At the beginning of the semester, students were randomly placed into groups of four to five students each. Student groups were then assigned a semester project wherein they would assume the identity of a design-build firm that had selected a site for speculative development. The goal of the project was for each group to develop a successful construction loan application using information from cumulative lectures and assignments that would embody the key financial competencies identified by the EAC focus group and literature review.

Part I: Construction Project Financing (weeks 1-7)

Groups were provided design-development drawings complete with site plan, elevations, floor plans, sections and details within the first week of the semester. Groups were then instructed to develop a preliminary project plan to include the use designation of the space to be built (office, retail, medical, mixed-use, etc.) and a rationale for how the project would be successful based on economic growth trends, a low vacancy ratio, favorable absorption rates and pre-lease contracts. Students were then asked to determine land acquisition costs, using available market data from select areas of the U.S. where they planned to build. Students were also asked to provide a detailed construction estimate using Walkers or Means resources for location adjusted pricing on take-off items they planned to self-perform (CSI Divisions 3-9) and Means costs per square foot averages for the remaining work to be assigned to subcontracts. Since construction documents were approximately 75 percent permit-ready, students were given some flexibility to "build-out" the shell space to accommodate their use designation and adjust their estimates and lease rates accordingly. Estimating activities were moved forward in sequence since students had previously acquired estimating competencies in prerequisite coursework and could accomplish a major deliverable of the project early in the course.

Next, groups were instructed to develop a project budget using income capitalization. Students compared the project estimate to the project budget. Project estimates that exceeded the project budget were adjusted accordingly through various combinations of scope reduction, value-engineering, lease-rate adjustments, etc. Groups were then asked to prepare a construction schedule and a schedule of values showing planned monthly cash-flow requirements for land acquisition, design and construction. Given specific information on financing rates, term and loan-to-value (LTV) ratios, students determined how much of the project could be financed and

the amount of debt service on the construction financing. Groups then determined the equity investment required of their "company" including closing costs, points, interest carry and the net effective interest rate of the financing. With all major sources of project income and expense identified, students were then able to assemble a project feasibility analysis that would compare the project's return-on-investment to the student's minimal acceptable rate of return (MARR). MARR was defined as the weighted-average cost of capital (WACC) adjusted for risk and inflation. Specifically, students were asked to determine project net operating income (NOI), after-tax cash flow (ATCF), and after-tax equity reversion (ATER) for a 20-year holding period. Projects failing to meet the MARR or the lender-specified debt-service coverage ratio (DSCR) would be rejected.

Part II: Construction Business Organization and Operation (weeks 8-14)

Following EAC recommendations in June 2002, the Associations of Builder's and Contractor's Institute (ABCI) manual entitled "The Contractor's Guide to Construction Management" was adopted to lead students through the construction business organization and operation phase of the course. Students were provided instruction on the basics of business start-up and organization followed by the development of a balance sheet and general ledger for recognizing start-up capital, asset acquisition and financing of start-up assets. Together with general and administrative overheads, groups were asked to formulate an operating budget identifying their break-even point and profit-maximizing sales volume. Students were then given a series of assignments simulating job income, bad debts, equipment purchases, inventory, in-house payroll and subcontractor payments. Specifically, students learned percentage-of-completion accounting and methods for calculating progress billings. Students also studied Worker's Compensation, payroll taxes and many other labor burdens used to calculate job mark-ups. Students were responsible for tracking all income and expenses within accounts receivable, accounts payable, payroll, equipment and inventory ledgers as well as their group general ledger. This enabled students to see how cash flows and cash commitments changed their financial position and profitability on their income statements. Students were then asked to calculate and analyze various liquidity, profitability, capital structure, activity and capital turnover ratios from their group's pro forma to determine their bonding capacity and financial position. Specifically, students were asked to compare their capitalization, fixed asset investment, net profit margin (NPM), return on investment (ROI), leverage, and agings to actual construction firms considered "best in class" by CFMA's 2003 Annual Construction Industry Financial Survey (CFMA, 2003).

Part III: Commercial Loan Application Package (weeks 15-16)

Following business organization and operation, groups were instructed to prepare a business plan that would include fictitious narratives of the "company's" history and purpose, goals and strategies, marketing plan, organizational plan, and financial plan. Students understood that the success or failure of the loan application would depend on the financial strength of both the project and the company. Although reversed in sequence of instruction, the proposed project developed in Phase I would have to be a logical implementation of the business plan. Similarly, the goals and strategies addressing the company's financial strengths and weaknesses, as well as the company's organizational plan and pro forma developed in Phase II, should communicate the

character, capital and capacity of the company to successfully complete the project and service the debt.

The final task in the project case study was the preparation of the loan application, which consisted of an actual construction loan agreement from Compass Bank, a commercial lender. As is typical, the application consisted of three parts; a general product overview, an application and a loan covenant. Students were introduced to the content of each, although special emphasis was drawn to the loan covenant which included the terms and conditions of the agreement or loan commitment. Specifically, attention was placed on contract language that could either constitute a material breach or potentially place the contractor at unnecessary risk, such as prepayment penalty, lien subordination, securities, retainage, indemnification, material changes and contract assignment.

To encourage active participation among group members, all of the project tasks were first issued as individual student assignments. As an added incentive, students were advised at the beginning of the semester that self- and group-member evaluations (Appendix B) would be used as a basis for project grading, which, in addition to individual assignments, would constitute 40 percent of their final course grade. Specifically, the evaluation asked students to score their individual level of participation in addition to that of each group member and to provide specific justification for exceptionally high or low scores. Scores could range from 1 (lowest) through 5 (highest). Student project submissions received a "base" grade, for which a graduated scale was applied to reward or penalize students for incremental deviations in individual performance above or below the group average. Students were also encouraged to provide feedback on the project and recommendations for how the project could be improved. Evaluations were submitted electronically and kept strictly confidential. As a further incentive, 10 percent of the final project grade was based on submission of the evaluation.

Part IV: Final Examination

Students were also tested at four-week intervals to validate progressive learning. The final examination consisted of a two-hour, 100 question open-book test patterned after the Business and Financial Administrative section of the State of Florida General Contractor licensing exam. Having obtained professional licensure in August of 2002, the course instructor was familiar with the requirements and subsequent subject matter largely drawn from the ABCI Contractor's Guide to Construction Management, which again, was adopted as the course text. Results of the "licensing" examination (Table 1) show significant pass rates, although comparisons cannot be drawn to pre-teaching methods improvement since the examination itself was adopted as part of the teaching methods improvement process.

Table 1

Results of Simulated State of Florida General Contractor Licensing Exam, Business and Financial Management Section

Semester	*n*	Pass	Fail	Average Score
Fall 2002	58	56 (97%)	2 (3%)	87%
Spring 2003	53	53 (100%)	0 (0%)	92%
Fall 2003	70	64 (91%)	6 (9%)	84%

Note: Passing score ≥ 70%

Student Outcome Assessment Survey

Results of the student outcome assessment survey (Appendix A) showed, on average, students entering the course were largely unable (68.3 percent) or to a limited extent, partially able (29.6 percent), to answer questions related to financial competencies identified as key by construction industry experts and literature sources (Table 2). Students exiting the course were either completely able (51.1 percent) or partially able (40.0 percent) to answer questions related to key financial competencies (Table 3).

Table 2

Incoming Knowledge Assessment Survey, Spring 2004

Question	1	2	3	4	5	6	7	8	9	10
Mean	1.11	1.15	1.33	1.52	1.11	1.57	1.39	1.11	1.17	1.93
Mode	1	1	1	1	1	1	1	1	1	2
“1”	41	39	32	24	41	22	29	41	38	7
“2”	5	7	13	20	5	22	16	5	8	35
“3”	0	0	1	2	0	2	1	0	0	4

Average 1.34

Table 3

Outcome Knowledge Assessment Survey, Spring 2004

Question	1	2	3	4	5	6	7	8	9	10
Mean	2.56	2.36	2.67	2.67	2.31	2.33	2.33	2.28	2.11	2.61
Mode	3	3	3	3	2	2	2	3	3	3
“1”	0	4	1	2	2	2	3	6	12	0
“2”	16	15	10	8	21	20	18	14	8	14
“3”	20	17	25	26	13	14	15	16	16	22

Average 2.42

Based on an average entrance skill level of 1.34 out of 3.00 points possible, survey results showed an average increase of skills attainment of 1.08 points, or, an average exit skill level of 2.42. As a result, student knowledge of financial competencies identified as key by the EAC focus group and literature review improved 80.6 percent in relation to the student's skill level entering the course, or, 65.1 percent of the remaining 1.66 improvement points possible. The mean grade point average (GPA) for students completing the course during the Spring 2004 semester survey was 3.20.

Course Evaluation Survey

Since student outcome assessments were not begun until Spring 2004, course evaluations were the only means available to assess change, if any, in student satisfaction as a result of teaching methods improvement. Again, the same faculty member served as instructor for all semesters surveyed and no appreciable changes to the course other than the implementation of the project case-study occurred during this period.

On a standard scale of 1 (poor) to 5 (excellent), student satisfaction improved on average from 3.49 during 2000-2002 to 4.41 from 2003-2004 following EAC focus group's recommended changes implemented through the project case study. In addition to a 26.4 percent increase in mean teaching evaluation score, teaching methods improvements can be considered responsible for 0.92 (60.9 percent) of 1.51 improvement points possible (Tables 4-5).

Table 4

Pre-Implementation (Fall 2000-Fall 2001) Course/Instructor Evaluations for BCN 4753 Construction Finance

Semester	Questions 1-9	Question 10	Questions 11-19	Average
(pre-implementation)				
Fall 2000	3.42	3.39	3.63	3.48
Spring 2001	3.96	3.98	3.96	3.97
Fall 2001	2.96	2.95	3.17	3.03
			Average	3.49

Table 5

Post-Implementation (Fall 2002-Fall 2003) Course/Instructor Evaluations for BCN 4753 Construction Finance

Semester	Questions 1-9	Question 10	Questions 11-19	Average
(post-implementation)				
Fall 2002	4.27	4.35	4.21	4.28
Spring 2003	4.47	4.72	4.55	4.58
Fall 2003	4.37	4.42	4.34	4.38
			Average	4.41

Note: Instructor did not teach course in Spring 2002.

Results from a senior survey conducted independently of this research found that BCN 4753 Construction Finance was one of five program courses 2003 graduates perceived to have improved competency levels (3.79) when compared to previous graduating classes (3.33) on a scale of 1 (poor) to 5 (excellent). Results also found that Construction Finance course experienced the second largest margin of improvement and the third highest competency score of the 21 required undergraduate courses surveyed at the School.

Conclusions

The goal of this research was to address the critical financial characteristics separating successful firms from those less fortunate in an effort to improve instructional competencies and better prepare students for successful careers in construction. From industry focus group feedback and literature review data, a semester project was successfully developed as an instructional medium and as a cumulative case study of key competencies learned in project financing and business start-up and operation. Culminating in the development of a successful construction loan agreement, the objective of the project was to expose students to the full spectrum of construction financing, particularly those competencies during pre-construction that are invaluable assets to the CM, design-builder, and speculative builder, or, to the general contractor who desires a better understanding of a typical project from the owner's financial perspective. Outcome assessments found that students acquired significant competencies and skill sets identified as critical by construction industry experts as well as CFMA and FMI. Course evaluations further improved nearly 30 percent when compared to evaluations prior to teaching methods improvement.

In addition, the project served to reinforce competencies gained in prior coursework such as estimating, scheduling, computer applications, plan reading and technical writing in a comprehensive, real-world context. Students were also exposed to basic market research tasks and creative thinking. Perhaps most important, students were placed into an environment where teamwork and leadership skills could be cultivated and developed.

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Appendix A

BCN 4753 Construction Financing Outcome Assessment Survey

The purpose of this questionnaire is to help assess the effectiveness of this course. You will be asked to complete this form at the beginning and the end of the semester. Please respond with a **1**, **2** or a **3** if;

1. **You could not answer the question**
2. **You could answer the question, but not completely**
3. **You could completely answer the question**

1. ☐ Define WACC, MARR, IRR and NPV and discuss how these metrics are used to make investment decisions such as the financial feasibility of a development project, major equipment purchases, market expansion, etc.

2. ☐ Define the term "income capitalization" and explain how a commercial lender uses LTVR in establishing the loan amount for a speculative construction project.

3. ☐ Define the difference between nominal and effective interest rates and explain how lenders use origination fees, compensating balances, commitment fees and compounding periods to change the effective interest rate in a loan agreement.

4. ☐ Explain how a lender and contractor use a construction schedule and schedule of values to develop a draw schedule, and how interest reserve and interest carry are determined, as part of the loan agreement.

5. ☐ Define the term "pro forma" and explain how financial statements are used to in the course of construction business operations such as preparation of bids, break-even sales volume, budget forecasts, profit projections, bonding capacity and line of credit.

6. ☐ Explain the difference between cash (completion) and accrual (progress billings) methods of accounting and which provides a more accurate picture of the contractor's financial position at any point in time.

7. ☐ Explain how a contractor can show a profit but be working capital constrained. List five (5) methods at the contractor's disposal to improve cash flow.

8. ☐ Define the term "relevant range" and explain how this concept relates to fixed overheads, sales volume and net profit.

9. ☐ Define the term "fully burdened labor" and explain how this concept relates to the estimating and bidding process.

10. ☐ Define the term "depreciation" and how it relates to income recognition. List three (3) methods of depreciation and explain the IRS limitations of each.

Appendix B

BCN 4753 Construction Financing Project Peer Evaluation

Self Evaluation:

1. Please rate your level of participation and contribution to your group project. Choose from 1 to 5 using the following criteria:

1	3	5
Minimal contribution. Partial completion of assigned tasks. Work product late and of poor quality.	Average contribution. Near full completion of assigned tasks. Work product timely and of good quality.	Provided group leadership while setting group standard for work productivity and quality.

Your name: _____.

Your group number: _____.

Your self-evaluation rating:_____.

Group Evaluation:

2. Please rate the level of participation and contribution for each group member. Choose from 1 to 5 using the criteria above:

Group member name:_____ Rating:_____

Group member name:_____ Rating:_____

Group member name:_____ Rating:_____

Group member name:_____ Rating:_____

Comments: