

Construction Estimating: Student Perceptions vs. Industry Reality

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Construction estimating is a critical component of the construction education curriculum. Construction companies must be able to accurately forecast costs to succeed in their demanding industry. Although the methods used to introduce students to construction estimating seem to be somewhat antiquated, it is necessary for the students to understand the basics of estimating before they can master more advanced estimating techniques. The time spent learning the basics of construction estimating and the pedagogy used may lead to the development of false perceptions and negative attitudes towards construction estimating by students. This paper examines whether students do indeed have false perceptions of the job duties of professional estimators, and if these false perceptions lead to the development of negative attitudes towards entering the construction industry as a professional estimator.

Key Words: Construction education, estimating, attitudes, perceptions, job satisfaction

Introduction

Accurate construction cost estimating is critical in order for construction companies to succeed in the highly competitive construction industry. Cost estimating is a foundation for many of the courses taught in all construction education curriculums. Universities use proven methods to teach students the basics of working drawings and to accurately estimate the quantities of the components that make up a structure. The methods used to teach these skills are proven, yet it could be argued that these methods are somewhat antiquated given the transformation of the education process due to technology. Computers and computer aided software have simplified some processes, but it could also be argued that it has made some students indolent or unmotivated to perform tedious tasks without relying on computers or the software. Regardless of the method used, it is necessary for students to have a strong foundation in working drawings, quantity takeoff, and pricing by hand before they can rely on technology to aid them in the process.

The amount of time spent performing quantity takeoff and pricing by hand varies both in the educational setting and in the industry. However, the time spent learning the skill in an educational setting could influence a student's desire to become a professional construction estimator. Students can easily develop false perceptions of the job duties that are actually involved with an estimator's day-to-day work activities. False perceptions of an estimator's job duties lead to the development of negative attitudes towards the career that many professional estimators find very rewarding. Once these attitudes and opinions of construction estimating are formed, it can be difficult to change them. Therefore, the educator might help to prevent the formation of these attitudes by exposing students to the actual work activities of a professional estimator.

Literature Review

Actual research on student perceptions and attitudes towards construction estimating is virtually non-existent. However, various related sub-topics exist and do give us some information to examine while researching this subject matter. These topics include job satisfaction, attitude formation, and construction education.

The steady growth of the construction industry throughout the 1990's has heightened demand for managerial and craft-level labor (McGraw-Hill 2002). Historically, construction managers have risen through craft level jobs to attain management positions in the industry (Rosenbaum, Ruben, and Powers, 2001). That trend is shifting, as labor shortages exist and are predicted to worsen at the craft level, and construction education programs continue to grow (Swoboda and Cieslik, 1997).

During the 2000-2001 school year, 88 construction education programs enrolled nearly 17,500 students (Rosenbaum 2001). Construction education programs cover a wide range of educational topics including estimating, scheduling, project management, and law; thus employment opportunities exist for graduating students in several areas of the construction industry (Rosenbaum 2001).

Industry growth is a driving force behind an increased demand for construction cost estimators. The accurate forecasting of project costs is critical to the survival and financial growth of a construction company. Estimators must gather, analyze, and compile information on materials, labor, equipment, and subcontractors for each job that a company attempts to be awarded (US Dept. of Labor, 2001).

All cost estimators employ the same basic skills, but the actual methods and job descriptions of estimators can vary significantly from one company to another. Some organizations are much more dependent on information technology, which relieves the estimator of some of the drudgery associated with quantity takeoffs, computations, and calculations (US Dept. of Labor, 2001). The outlook for construction cost estimators is positive because of industry growth.

Job satisfaction and perceived job satisfaction are important factors for employees choosing to gain employment or remain employed by an organization. Bavendam Research Incorporated has researched and determined five factors that are critical to employee job satisfaction. According to BRI, the six factors are as follows:

- *Opportunity*

Employees report more job satisfaction when they are presented with challenging opportunities. This includes interesting projects that provide challenge and increased responsibility.

- *Stress*

Continual stress correlates to lower levels of job satisfaction. Jobs that interfere with employees' personal lives ultimately lead to lower job satisfaction.

- *Leadership*

Employees exhibit higher levels of job satisfaction when their managers exhibit good leadership skills. Employees respond to managers who inspire them to achieve and who are considered trustworthy.

- *Work Standards*

Employees report higher levels of job satisfaction when fellow co-workers take pride in their work. Higher levels of quality are linked to higher levels of job satisfaction.

- *Fair Rewards*

Employees report higher levels of job satisfaction when they feel that they are adequately rewarded for the work that they perform. (Bavendam Research Inc., 2002).

The Harvard Professional Group's research into job satisfaction has led them to come up with three hallmarks of career satisfaction. Employees who are presented challenges exhibit higher levels of job satisfaction because they are able to apply their experience and abilities. Furthermore, successful completion of challenging work leads to a sense of achievement, which according to The Harvard Professional Group is the essence of job satisfaction (Harvard Research Group 2001).

Frederick Herzberg, one of the most recognized theorists on job satisfaction, suggests that employee satisfaction is made up of two dimensions: Hygiene factors and Motivation factors. Hygiene factors are factors that cannot motivate and satisfy employees, but can indeed dissatisfy employees if the factors are not addressed. Hygiene factors include company policies, salary, management hierarchy, and working conditions (Hertzberg, 1968).

Herzberg's theory on motivating factors is that they are the factors that actually lead to job satisfaction. Motivating factors address individual needs for meaning and personal growth. Motivating factors, according to Herzberg, are factors such as achievement, recognition, responsibility, and advancement (Herzberg, 1968).

An attitude is usually defined as an enduring disposition or tendency to respond either positively or negatively towards a certain situation, idea, or object. They are closely related to our opinions and beliefs that are based on our past experiences (Triandis, 1971). According to the findings of Kenneth Williamson and Phillip Grankowski, students enter into construction education coursework with negative attitudes and motivation concerning their education. Students develop opinions throughout the education and socialization process. Williamson and Grankowski find

that these cultural values and opinions influence students' desires to enter into certain professions (Williamson and Grankowski, 1997).

According to Janis Hovland and H. Kelley (1953), attitudes can be learned and formed from opinions. They suggest that learning new attitudes is similar to learning any other verbal or motor skill. The change of opinion, and thus the change of attitudes, is dependent upon the presentation and incentives that are offered (Hovland and Kelley, 1953).

Methodology

Two surveys were deployed via Zoomerang.com on the World Wide Web. The first survey was administered to Auburn University Building Science students (n=108) enrolled in Project Controls 1, Project Controls 2, Project Controls 3, and Thesis. The Project control series of classes starts with a student's first semester in the AUBSC program and concludes with Thesis during their final semester. The project controls series is estimating and scheduling, and thesis is a culmination course that uses everything that the students have learned in the program to manage a theoretical project from start to finish.

The student survey consisted of eight questions that probed the attitudes that the students hold regarding a career in estimating. Three of the eight questions were based on a Likert scale of 1 to 5. 1 equaled "No Interest" and 5 equaled "High Interest". The first question was asked to establish the breakdown of the students by their class enrollment. Question #5 was asked to establish in which area students would prefer to start their construction careers. Question #7 was used to establish how much work experience the students had. Finally, question #8 was asked to determine what the students actually believe are an estimator's job duties. A description of all eight questions can be seen in the results section.

The industry survey was also deployed by the Zoomerang.com service and targeted professional estimators (n=54) currently active in the construction industry. The thirteen question survey attempted to determine the average age, job satisfaction, upward mobility, length of time as an estimator, typical work activities and time allotment of each activity, and percentage of executives within their organization that were promoted through the estimating career track.

One day was spent at a medium-sized general contractor's office on bid day, in an attempt to capture some of the work activities on film. A short film was created to show some of these activities, and it attempted to capture some of the excitement of the office in a bid day situation.

Results

The results of the survey yielded good information regarding the students' attitudes towards a career in estimating. The first question on the student survey determined which class the students were currently enrolled in. 22 students in each of the Project Controls 1 and Project Controls 2 classes responded, which is equivalent to 20% of the total respondents for each class. 48 students

responded from the Project Controls 3 class, or 44% of the total respondents. Finally, 16 of the thesis students responded, making up 15% of the total number of respondents.

The second question on the student survey asked the students about their level of interest in career in estimating. 42% of the students responded with only medium interest, which was #3 based upon a Likert scale of 1-5. 32% responded with low interest (2), and 11% responded with no interest (1). These results total 85% of the respondents, and show that 85% of the students have a medium to low interest in the estimating career. Only 14 % of the students indicated a medium high (4) or high (5) interest in a career in estimating.

The third question was asked to support the results of question #2. It asked about the students' interest in a career in project management in the same format as the previous questions. The results were nearly opposite. 95% of the students responded with a medium to high interest in this career. Only 5% had a low interest, and 0% of the students showed no interest.

The fourth question asked about the students' interest in attaining a position as a construction executive. The same Likert scale from the previous two questions was used, and the responses showed that 96% of the students had a medium (3) to high interest (5) in attaining an executive position in the construction industry.

Question #5 asked the students in what position they would prefer to start their career if given the choice. Only 8% of the students responded in estimating. 51% responded in project management, and 43% responded in fieldwork.

Question #6 was asked to the students who answered project management or fieldwork on question #5. The question probed their reasons for choosing project management or fieldwork over estimating. The general consensus among the respondents was a dislike of the work activities.

Question #7 asked about their amount of relevant work or co-op experience to determine if their was a link between any of the previous question based upon work experience. After cross tabulating there does not appear to be a strong link to any of the previous responses.

The final question is the most important for our research. It asked the students to list three to five activities that they believe make up a majority of an estimator's job duties, and to indicate a time allotment to those activities. Only 74 of the 108 responses to this question were considered valid for various reasons. The percentages based on the 74 valid responses are listed below.

97 % of the valid responses included quantity takeoff as a perceived work activity. The students' perceived time allotment to this activity averaged 44.2%.

16% of the valid responses included scheduling and planning as a perceived work activity. The students' perceived time allotment to this activity averaged 27.6%.

59.5% of the valid responses included pricing as a perceived work activity. The students' perceived time allotment to this activity averaged 31.8%.

35.1% of the valid responses included bidding as a perceived work activity. The students' perceived time allotment to this activity averaged 24.3%.

16.2% of the valid responses included subcontractor correspondence as a perceived work activity. The students' perceived time allotment to this activity averaged 48.8%.

51.4% of the valid responses included scheduling and planning as a perceived work activity. The students' perceived time allotment to this activity averaged 29.4%.

The students perceived "Other" activities included the following: field correspondence, travel, job site visits, submittals and shop drawings, and owner / architect correspondence.

The industry surveys asked 13 questions that probed the areas that included age, company information, career track within their organization, job satisfaction, and work activities. Here again the most important question for our research was the question that asked about their actual work activities and time allotment to those activities. The answers were organized so that they could be compared to the student responses.

82.5% of the valid responses from the professional estimators included quantity takeoff as an actual work activity, yet on average only 29.5% of their time is allocated to this activity.

37.5% of the valid responses included scheduling and planning as an actual work activity. The estimators' time allocation to this activity averaged 28.2%.

7.5% of the valid responses included pricing as an actual work activity. The estimators' time allocation to this activity averaged 10%.

17.5% of the valid responses included bidding as an actual work activity. The estimators' time allocation to this activity averaged 19.7%.

62.5% of the valid responses included sub correspondence as an actual work activity. The estimators' time allocation to this activity averaged 30.6%.

45% of the valid responses included "Other" as an actual work activity. The estimators' time allocation to these activities averaged 36.8%.

The "Other" activities listed by the estimators included the following: Purchasing contracts / buying out jobs, plan / specification review, compiling data for operations, researching potential jobs, site study, negotiations, meetings with project managers and superintendents, and value engineering.

The students' perceptions do not exhibit an accurate knowledge of what construction estimators actually do. The following graph illustrates the difference between the student perceptions of the estimators' job duties and the actual job duties as described by the estimators.

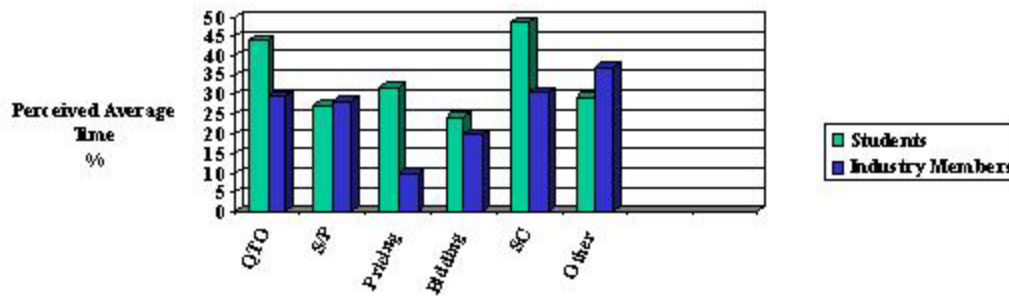


Figure 1: Student Perceptions vs. Industry Reality

The breakdown of the “other” work activities as described by both the students and industry members is as follows:

Table 1

<i>Students Perceptions</i>	<i>Industry Reality</i>
<ul style="list-style-type: none"> • Field Correspondence • Travel • Job Site Visits • Submittals and Shop Drawings • Owner and Architect Correspondence 	<ul style="list-style-type: none"> • Plan and Specifications Review • Compiling Data for Operations • Researching Potential Jobs • Site Study • Negotiations • Meetings with field team • Value Engineering

Several other questions were asked of the estimators while we had the opportunity to survey such a large number of industry members. 92% of the professional estimators report medium (3) to high (5) job satisfaction based upon a Likert scale of 1 to 5. Conversely, only 8% reported low to zero job satisfaction.

75% of the industry members also feel that conceptual estimating should be addressed at the university level.

94% of the industry members also feel that successful advancement through the estimating career track serves as a stepping-stone to get involved with conceptual estimating, design-build projects, conceptual project planning, and negotiation situations.

The 54 industry members surveyed were asked to estimate what percentage of the executives within their organization were promoted through the estimating career track. On average, 38% of the executives were promoted through this career track. The statistical information for this question was as follows:

Median = 28%

Mode = 50%

Min = 0%
Max = 100%

The average age of the 54 respondents was 33.5. The oldest was 53 and the youngest 23. The statistical information for this question was as follows:

Median = 31
Mode = 25
Min = 23
Max = 53

Conclusions

The overwhelming conclusion from this study is that the majority of students do indeed have false perceptions regarding the work duties of professional construction estimators. This assumption is derived from the data presented in Figure 1. These false perceptions likely influence attitude formation and prevent students from wanting to enter the profession of construction estimating.

Furthermore, the Occupational Outlook Handbook 2002-03 Edition printed by US Department of Labor Bureau of Labor Statistics, states that regardless of the industry in which they work, estimators compile and analyze data on all the factors that can influence costs—such as materials, labor, location, and special machinery requirements, including computer hardware and software. This description of an estimator’s job is indeed accurate, but it does not truly indicate what is involved to perform these tasks. The activities that the industry members gave in response to the survey may be a more accurate portrayal of their actual job and work activities.

According to some, a “glass ceiling” for construction estimators exists that prevents them from attaining some of the high level executive positions in the industry. The results of this research indicate that a “glass ceiling” for estimators may not exist, given the percentage of estimators who were promoted to executive positions in the companies of the industry members surveyed. The estimators also indicate good job satisfaction.

Given these results and conclusions, it is imperative that construction educators attempt to educate students not only on the methods of estimating but also on the work activities of professional construction estimators. This paper should help educators be aware of students’ perceptions of estimating as a career versus the reality in industry. Some educators, I am certain already realize this, however, the information in this paper may help those who do not realize these false perceptions exist to help prevent these false perceptions by the students. If educators are more aware of these false perceptions, we are more likely to benefit the students by helping to present the reality of estimating as a career. I think this effort on the educators’ part will help create a different attitude on the part of the students and help create a greater desire to learn estimating instead of the students desiring to simply make it through the class.

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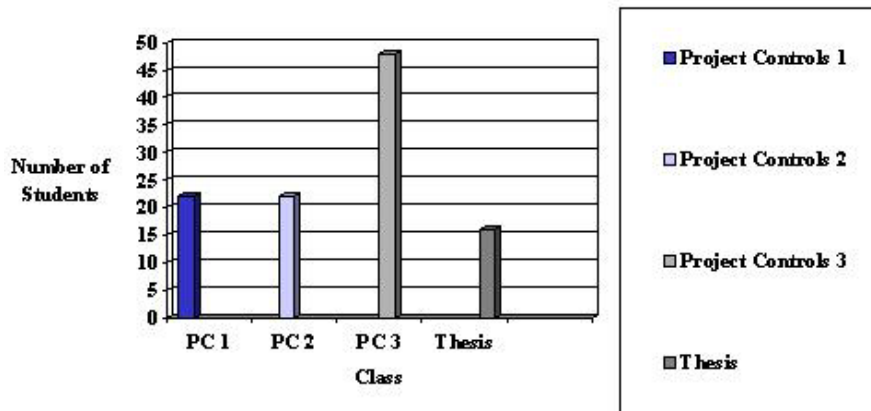
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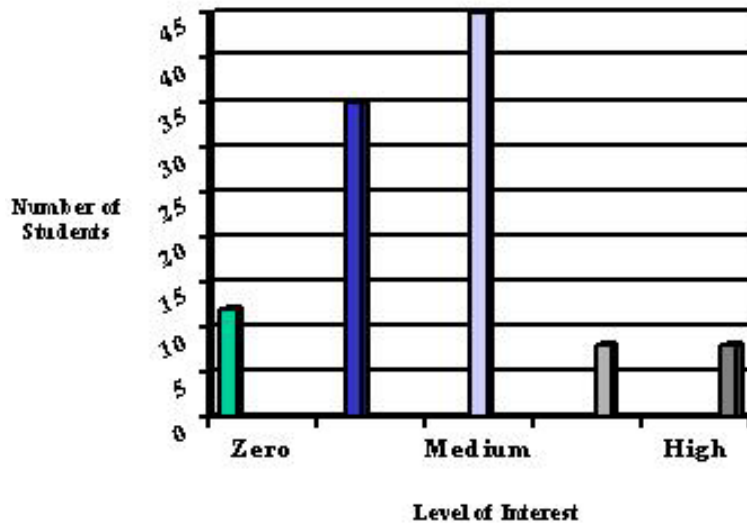
Appendix A

Breakdown of Students by Class



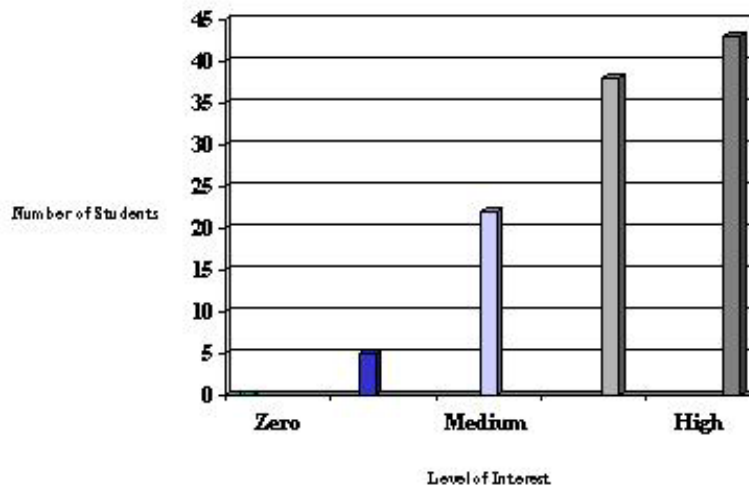
Appendix B

Students Level of Interest in Estimating Career



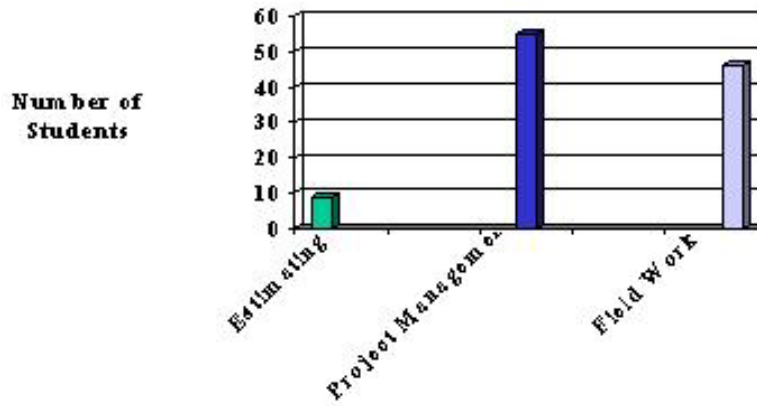
Appendix C

Students Level of Interest in Project Management Career



Appendix D

Students preferred starting point for career



Appendix E

Professional Estimators' Reported Job Satisfaction

