

Undergraduate Student Assessment of Construction Education: A Case Study

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Education

Ph.D. Civil Engineering, Major: Structure, Minor: Geotechnical, University of Ottawa, ON, Canada(2010)
M.S. Civil Engineering, Hydraulic Structures, Construction, Sharif Univ. of Technology, Tehran, Iran (1996)
B.S. Civil Engineering, Sharif University of Technology, Tehran, Iran (1993)

Appointments

Assistant Professor, Engineering Technology, Florida A&M University, Tallahassee, FL (8/14 - Current)
Lecturer, Department of Mechanical Eng., Behrend College, Penn State University, Erie, PA(8/12 - 8/14)
Associate Professor, Engineering Tech. Department Com. College of Allegheny County, Pittsburgh, PA (8/10 - 8/12)
Visiting Research Assistant Professor, Research on concrete structures retrofitting, University of Pittsburgh, PA, USA (1/12 - 8/12)
Part Time Professor, Research Assistant, Teaching Assistant, University of Ottawa, Canada (1/04 - 8/10)
Part-Time Lecturer, University of Water and power technology, Tehran, Iran (8/99 - 8/01)

Engineering Experience

Consulting engineer, Structural, concrete & Geotechnical, Achievement Eng. Corp., CA (PT 04/10-Current)
Professional Structural Building Design, in collaboration with R. Muhammad, Tallahassee, FL (PT Since 9/15)
Project manager, in construction of buildings, dams, and bridges, Sadr Sazeh Co., Tehran, Iran (04/98-10/08)
Project deputy manager and supervising engineer, Karkheh dam project, Mahab Ghodss consulting eng. Co., Tehran, (04/96-04/98 Full time) and (04/98-01/04 PT)
Internship program, Sewage and road construction, asphalt and concrete, City of Ottawa, Canada (6/10-8/10)
Engineer and researcher (Int. Inst. of earthquake eng. and seismology (IIEES), Tehran (04/95-04/96)

Dr. Yves J. Anglade, Florida A&M University/Florida State University

Dr. Yves J. Anglade received his Bachelor of Science degree in Architectural Engineering from the Milwaukee School of Engineering, after completing six years of military service in the United States Marine Corps, where he served with distinction and was three times meritoriously promoted. Dr. Anglade obtained his first professional employment opportunity with the R. A. Morley Company in Northbrook, IL as a project engineer. He moved to Florida in 1985 and worked as a structural engineer for Prestressed Systems, Inc, Spancrete, Inc, and Sterling Prestressed, Inc. as a plant manager. In 1991, Yves joined the University of Florida, College of Engineering, Civil Engineering Department, as a graduate student. He subsequently received his Master's and Ph.D. degrees. While working on his doctoral degree, he taught undergraduate civil engineering students for three years. He also assisted in developing and managing the STEPUP (Successful Transition through Enhanced Preparation for Undergraduate Programs) program. Dr. Anglade joined Florida Agricultural and Mechanical University in 1999, and in the fall of 2000 was appointed Chair of the Construction Engineering Technology program. For the past eight years, he has served as the Director for the Division of Engineering Sciences and Technology. He continues to be involved in outreach activities involving underrepresented and underserved minority groups. Yves' fields of specialization and interests include: Quality Control (Economic & Statistical Methods); Infrastructure Development and Maintenance; Concrete Technology; Construction Management; Estimating and Cost Control; Scheduling; Optimization; and Life Cycle Cost Analysis; Structural Design.

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Mr. Emmanuel Cofie, Florida A&M University/Florida State University

Undergraduate education in Construction Engineering Technology and Architecture.

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UNDERGRADUATE STUDENT ASSESSMENT OF CONSTRUCTION EDUCATION: A CASE STUDY

Introduction

This paper presents the opinions and viewpoints of the current students to assess the perceived quality and adequacy of the program's education in Construction Engineering Technology program at Florida A&M University. Some of the published researches focused on the perspective of engineering educators, construction employers or graduate students on construction education. Torres-Machí, et al. (2013) pointed that conducting a survey of graduate construction management (CM) students can be helpful in collecting their opinions about the program and the employability of the graduates. Ahn et al. (2012) utilized recruiters from construction companies to gauge skills needed for success in the construction industry. So "Researchers continue to recommend involvement from the industry, a balance of technical and non-technical courses, and professional and leadership experience to enhance construction education" (Walewski and Kim, 2011).

Case Study

The mission of the Florida A&M University Construction Engineering Technology program is "to produce highly competent and technically trained graduates who possess a solid understanding of the fundamental[s] of engineering and construction/civil concepts." The program is designed to prepare graduates with the ability to work in the construction industry alongside various stakeholders. Graduates of the program are expected to be capable to work along-side contractors, engineers, architects, operators and owners in the various phases of the construction process. The program offers instruction in modern techniques of construction to provide students with competent technical and management skills needed in the construction industry.

The graduates are granted a Bachelor of Science degree accredited by ABET. The curriculum still fuses engineering principles and coursework with a CM education. Recently, the School of Architecture and Engineering Technology recognized the need to expand its program beyond the undergraduate level to offer a Master's degree in Construction Management and Engineering Technology. To improve the current undergraduate education, and to develop a graduate program sufficient in preparing students for an advancing industry, research regarding the current state of the program was necessary. This research included input from current

Construction Engineering Technology students and their assessment on the current condition of the undergraduate studies.

Methodology

The procedure of this research was to administer a questionnaire to enrolled junior, senior, and some of the sophomore students in the Construction Engineering Technology (CET) program (April 2016). The group was asked to participate due to their experience and familiarity with the program in addition to their active search for construction related employment.

The questions were primarily designed to garner qualitative answers from the students as it pertains to their views of the program. Students were required to select the best answer representing their sentiments. The questionnaire was multiple choice and featured questions in the form of statements. Multiple choices were chosen for its ability to grant respondents quick choices. The researchers took carefulness to give respondents a variety of choices.

For most questions, the options given were the standard selections for such a survey: strongly agree, agree, fair/neutral, disagree, or strongly disagree. Some questions offered a range of options pertaining to each specific question; a few of these questions asked students to select more than one option.

An initial questionnaire was created as a “test survey” for students. It was administered in a class to sophomore students noted as being primarily. The students were asked to answer a set of questions regarding their perception of the program’s education. Additionally, they were inquired about their future education and career plans. The students completed the questionnaires promptly and returned them. After reviewing the first questionnaire, the researchers examined students’ responses. The researchers concluded to slightly modify the survey, to iron out some possible misrepresentations in the existing questions, and to enhance the question articulation with the expectation of soliciting more accurate responses from future respondents. Like the initial survey, the second survey was administered to the students in other classes, but primarily to those who were identified as “junior” or “senior”.

Results

The sample group included 36 students overall between both questionnaires (n=36). The group represented more than 50% of the CET program’s total enrollment. . Not all of the questions received a response from the students. Nevertheless, each received enough responses to infer and develop an educated and reasonable assessment of the students’ collective sentiment.

Education & Job Preparation

Figure 1 shows that all of the students responding stated that they agreed that their education was adequate.

**Adequacy of Education Received at FAMU
(36 Respondents)**

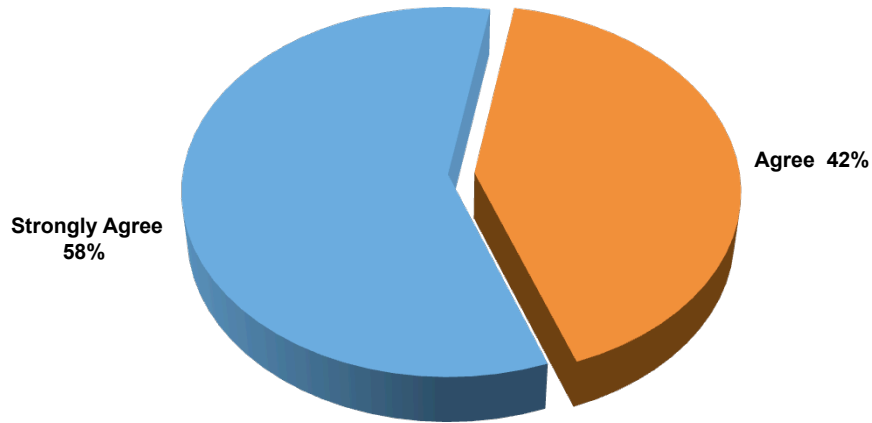


Figure 1. Adequacy of Education Received at FAMU (36 Respondents)

Further, 97% of the 35 respondents either agreed or strongly agreed that their undergraduate education in construction has prepared them for employment as a “successful professional” in the construction field. Only 3% of the students gave a fair assessment on the issue (Figure 2).

**Employment Preparedness of CET Program
(35 Respondents)**

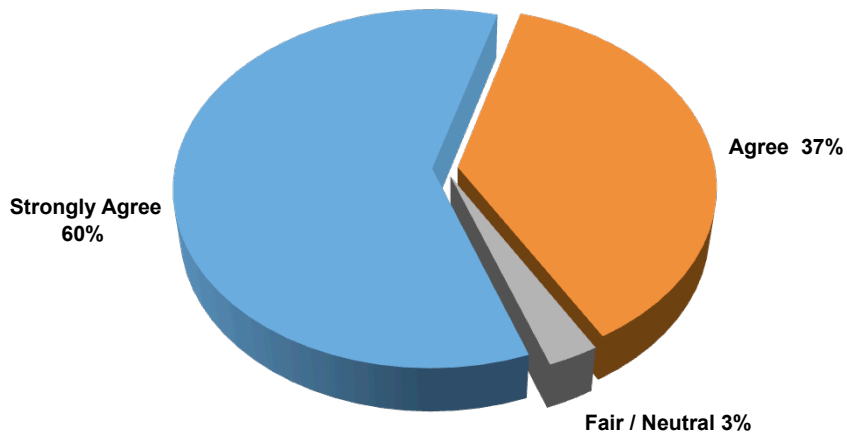


Figure 2. Employment Preparedness of CET Program (35 Respondents)

Student opinions on the adequacy of the CET program’s current curriculum varied as it is demonstrated in Figure 3. 83% percent of the respondents either stating that they strongly agree

or agree that the current undergraduate curriculum is adequate. 11% graded the undergraduate curriculum as fair. However, 6% of the students disagreed.

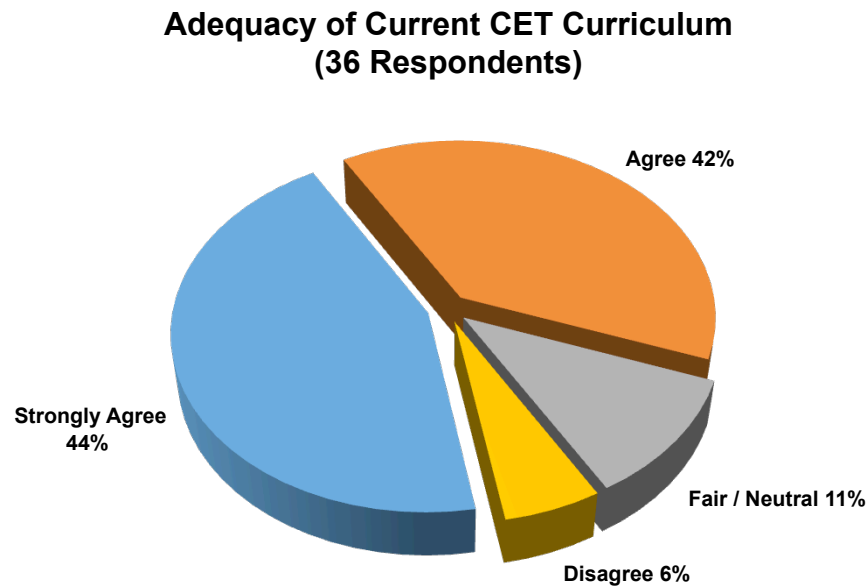


Figure 3. Adequacy of Current CET Curriculum (36 Respondents)

Employment Attained

Of the students who were asked either strongly agreed or agreed that they were confident in attaining a professional position in construction soon after graduation. Ironically, the same proportion answered that they were confident they would find their “ideal professional job” in the industry after graduating from the CET program.

Students replied to a statement on whether or not they had already secured professional employment in construction. Of the 14 students replied who qualified as senior, 50% stated that the statement was true in their situation, and 50% stated that it was false. Among the 11 respondents who qualified as junior, all replied that they had not yet secured any such position.

For those who had not already secured employment, in response to the comment if they were confident in finding a professional construction job subsequent to graduation, 85% of them answered true. Among these were 35% of the students in senior level and half of them in junior level. 15% of the students responded false, indicating, that they were not confident that they would attain professional employment after graduation.

Student Success

Students were asked to rate their own attitude and that of their fellow students towards success in the program. Over 80% of the students either strongly agreed or agree that the overall student

attitude toward being a successful student is either fair or good. However, 6% of the students disagreed. The results are summarized in Figure 4.

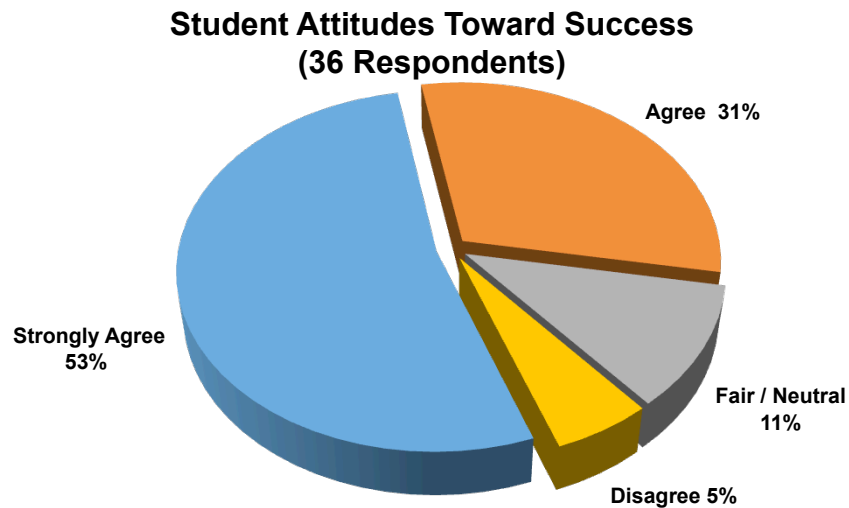


Figure 4. Student Attitudes Toward Success (36 Respondents)

Researchers inquired about financial support - a facet of education that can be critical to a student's success. The primary factor for under-enrollment of minority students from of a low-income background is the absence of knowledge of how to pay for college and accessibility of financial aid. Thus, misinformation about financial matters negatively affects the ambitions of African American and Latino students more so than white students (McDonough and Calderone, 2006).

In response to the statement: "While in the program, I did not receive sufficient financial aid/scholarship opportunities," of the 35 responding students 31% of the students stated that they either strongly agree or agree, correspondingly. 17% of the students of them had a fair or neutral sentiment to the statement. While 20% of the students either disagreed or strongly disagreed, collectively (Figure 5).

Continuing Education

In terms of continuing their education at the graduate level, most of the students (70%) affirmed that they are likely to pursue a graduate degree in the future (Figure 6). Further, only 61% of the students agreed to or strongly agreed the possibility of pursuing a graduate degree specifically in construction management (CM), while a significant percentage of 31% of the students had a fair or neutral assessment. A majority of 70% of the students collectively agreed and strongly agreed to pursue a Master's in CM within the engineering technology department at FAMU.

Though over 60% of the students at least agreed to consider attaining a graduate degree in CM via online or distance learning, over 1/3rd of the respondents remained neutral, while 8% of the

students disagreed with pursuing this option (Figure 7). This is despite, 85% of the students agreeing that this degree will greatly benefit the undergraduate CET program and the joint school in general (Figure 8).

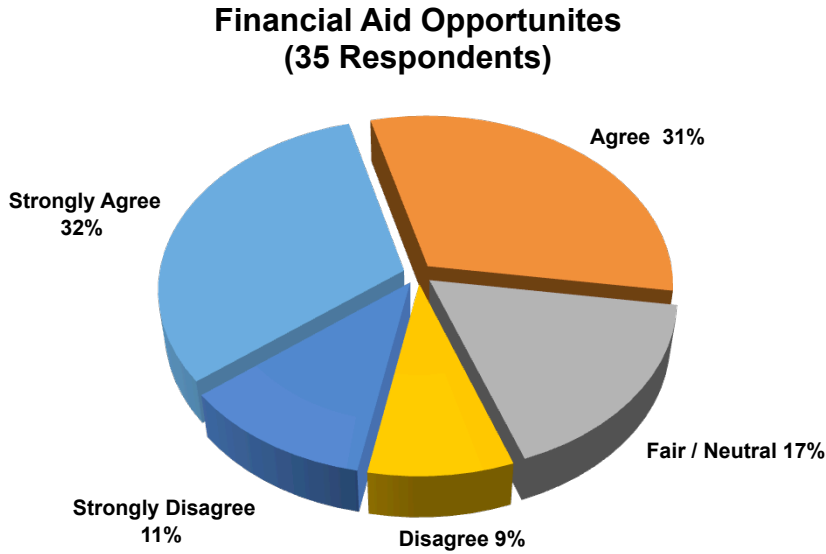


Figure 5. Financial Aid Opportunities (35 Respondents)

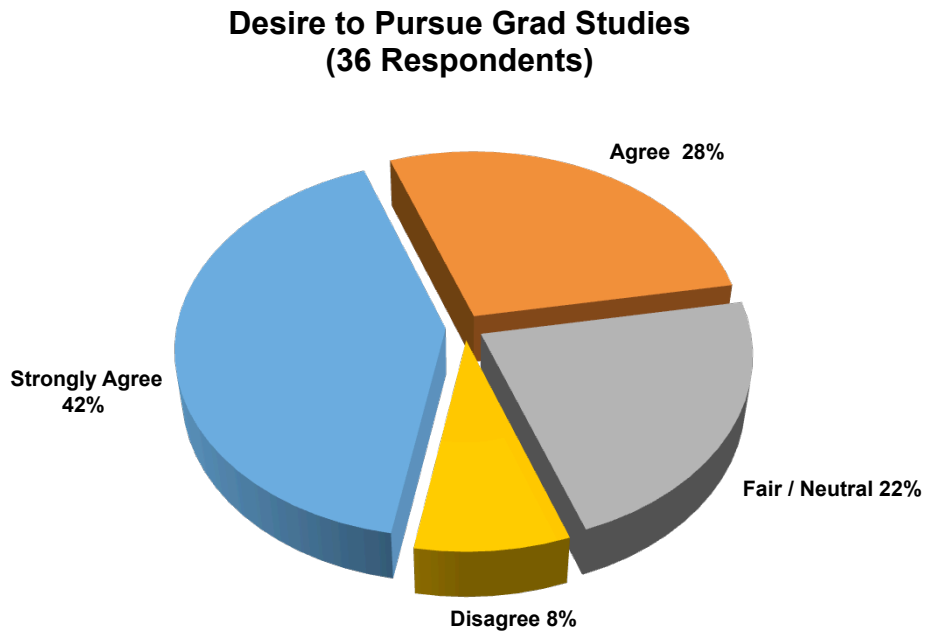


Figure 6. Desire to Pursue Grad Studies (36 Respondents)

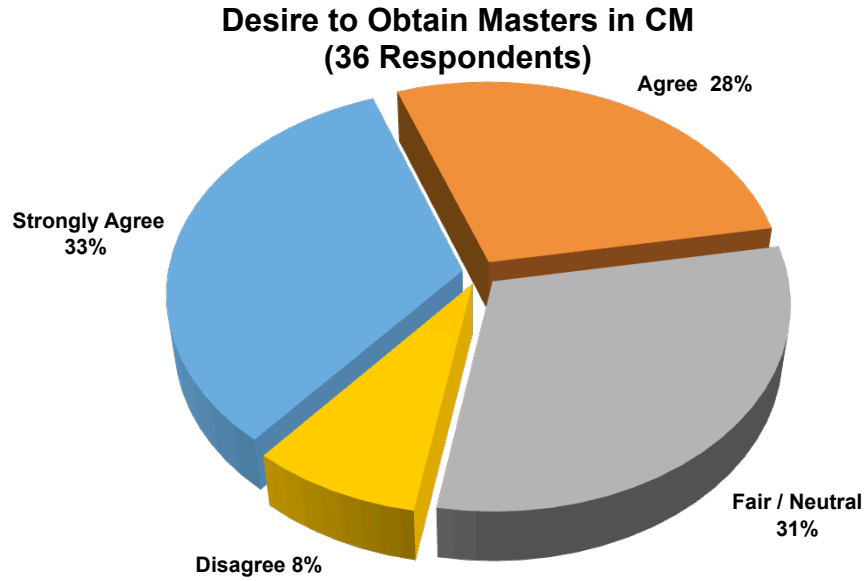


Figure 7. Desire to Obtain Masters in CM (36 Respondents)

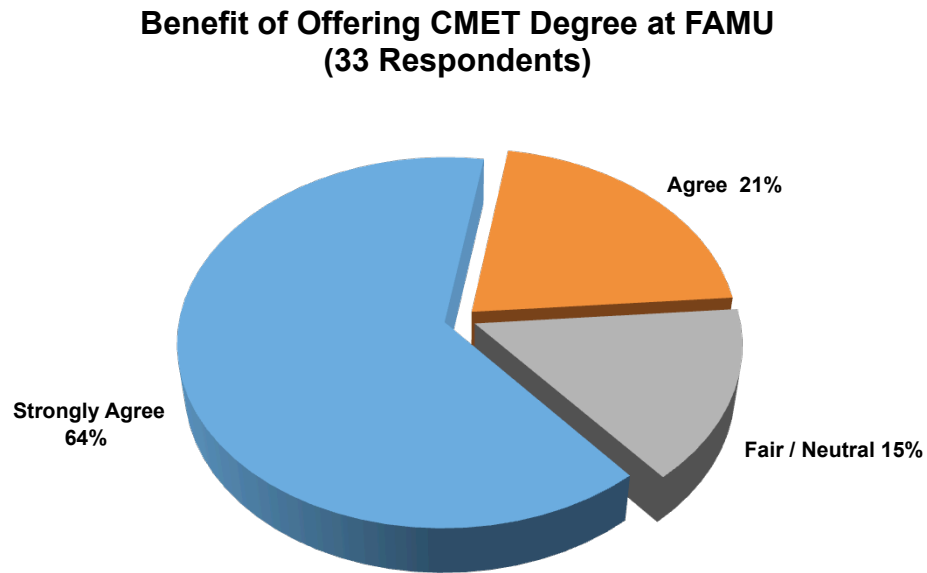


Figure 8. Benefit of Offering CMET Degree at FAMU (33 Respondents)

Degree Concentration

The multiple choice questions for this section is provided in table 1.

Table 1. The two questions about the degree concentration of the students in the questionnaire

In retrospect, I would have preferred to receive a construction education with a concentration in ----- -----during my undergraduate studies: (Select 2 of the following)				
Construction Management	Building Construction	Civil / Highways	Commercial / Institutional	Heavy Engineering / Industrial

Taken the previous question into account, if I choose to pursue a graduate degree I would prefer to obtain a graduate construction education with a concentration in: (Select 2)				
Construction Management	Building Construction	Civil / Highways	Commercial / Institutional	Heavy Engineering / Industrial

Students were asked if there were an option, what two sector(s) of the construction field they wished to concentrate studies on during their undergraduate education. 34% of the students chose construction management as one of their preferred selections. Among the respondents, 25% of them stated that they would've also liked to focus their education in the areas of building construction and 20% of them liked civil and highway construction. A minority of the students chose heavy engineering/industrial (14%), and commercial and institutional (7%). When asked about the possible concentrations for their graduate studies, 40% of the students selected CM for one of the selections. Whereas 21% of them selected heavy engineering and industrial construction, and 11% chose civil and highways.

Future Employment

In addition to education, the researchers inquired about their future employment plans. Students responded to a statement about which area or sector of the industry they would desire to work in the future by picking their 3 preferred sectors. 21% of responding students chose commercial and institutional construction, 16% picked residential and resort/recreation construction. To add, 15% and 13% of those who responded, stated civil construction and heavy engineering/industrial construction among their top 3 choices, respectively.

Additionally, the students responded to the size of the company by which they would desire their future employment. The largest percent (37%) out of the 35 students selected a company with between 50-200 employees. The smallest portion, only 14% of the students wished to work for a firm with 200-1000 employees and none wanted a company with 10 or less.

Responding to whether or not they would prefer to start their own construction firm, 46% of the students stated that they strongly agreed with the statement, 26% agreed, 22% felt the statement was fair, and 6% disagreed altogether.

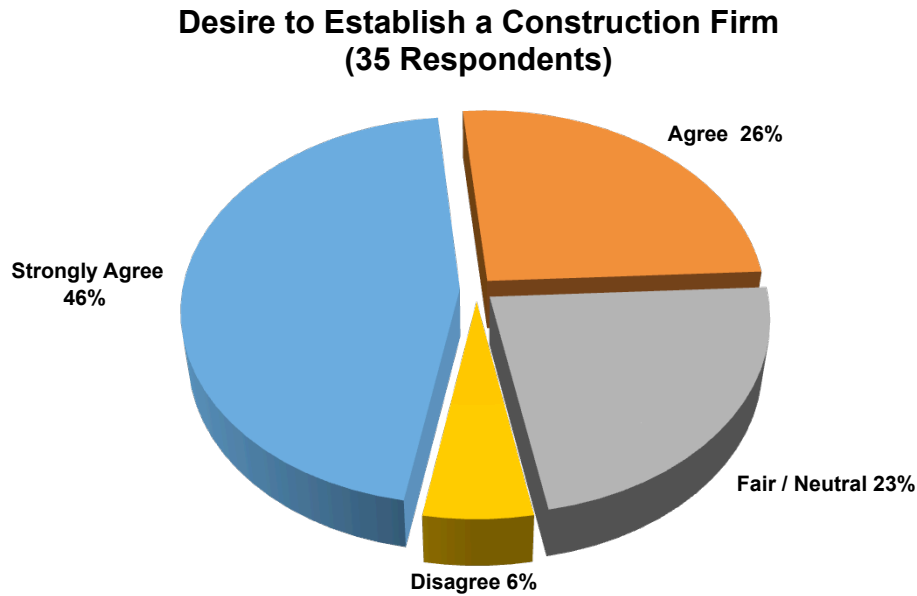


Figure 9. Desire to Establish a Construction Firm (35 Respondents)

Analysis

Education & Job Preparation

The results illustrate that the students overwhelmingly believe that they have received a quality construction education. There are some plausible reasons that could contribute to the students belief that they are receiving a good education such as (i) Positive feedback given by construction employers about the performance of former students, (ii) first hand correspondence with former students who are currently employed, and finally (iii) a lack of knowledge about the quality of construction education offered at other institutions.

Employment Attained

Students displayed a high sense of efficacy in their ability to attain a professional position in construction. This can be linked to the fairly high and consistent employment rates of their fellow former students due to their access to the leading construction firms in career fair events.

Among the senior students, half of them state that they had already attained employment. Graduation could also be crutch for students who fear committing to an employer without being sure of their exact date of graduation. This may be evidence of a significant percentage of junior students not finding employment.

Student Success

It appears that students perception of their own overall attitudes were great. However, the statement posed was “attitude of fellow student toward being a successful fair or good”. The fair or good part implies a moderate attitude, and not the best. That may be influenced by the wording.

Continuing Education

Students clearly showed an interest in continuing their education. Their responses demonstrated a high interest in them continuing in construction at the graduate level. The option for a student to continue his or her education is not presently available in the department. Those who disagreed with pursuing a graduate CM education could be the very students who disagreed with pursuing a graduate education of any type. A significant portion of the students had a neutral assessment in doing so. Various hypotheses from the students having little knowledge of value of such a degree to simply being unsure about attending graduate school can be formulated.

What is evident is the increase in student interest in a CM Master’s degree offered within FAMU’s Engineering Technology Division. Familiarity with the department and the professors, and students having an established academic record at the institution and feeling the school as their comfort zone could be the pivotal factors.

Degree Concentration

When asked if there were an option, in which two sectors would students. One third of the students preferred to concentrate their undergraduate studies on CM. It seems that they would rather focus their studies on the general management of the production side. However, building and civil construction were a close second and third on the list. There is a likelihood that students may have picked CM based on their understanding of its general application to all forms of construction, but also picked building and civil construction as specific areas of interests. In regards to graduate studies, the students still preferred CM, but also heavy engineering / industrial as opposed to the building and civil construction sectors.

Future Employment

The employment choice the students favor civil/highway and resort / recreation construction. Civil/highway construction plays a major role in Florida as cities expand and new communities built. Resort / recreation construction was highly selected in all three picks. It was included into the survey due to the growing presence of the leisure industry, and the specialization that derives from experience in constructing amusement park facilities. Had this selection been excluded, preferences may have been swayed to pick another choice such as commercial and institutional or heavy engineering / industrial.

The data states that students desire to work for medium-sized or larger firms - companies with over 50 employees, where students, in general, picked areas of construction such as civil, heavy engineering, and resort construction work typically completed by larger firms as their top choices.

Students' high desire for self-employment is very likely be due to its mention on the survey. One may conclude that the statement's presence sparked an awareness of this career option among students whose prior knowledge is almost certainly slim due to the emphasis within the program to attain employment at major construction and engineering firms.

Discussion

36 undergraduate students responded the survey questionnaire which was prepared to understand their perception towards their education by looking at the responses directed at their academic experience. One can conclude that the curriculum is not the sole reason for the students to believe that their education was decent. It can be deduced that students' opinion of the education quality are a result of factors beyond the curriculum; factors not included in the survey. A different study could be conducted to clarify the student attitudes toward the curriculum.

Knowing what is needed for Master's program in construction could be useful in helping to develop the undergraduate program. Engineering technology is primarily an undergraduate major and tends to offer no direct correlating degree at the graduate level. Though it is often

Programs in engineering technology grant students a technical base education. However, it does not completely prepare students to handle the breadth of the material instructed in engineering courses. A Master's degree offered in the engineering technology department will have to be tailored to match qualifications the undergraduates while also meeting the changing demands of and the progress of the industry .

Conclusion

The researchers examined students' responses and found that they reflect an overall positive attitude toward their own education in the construction engineering technology program at FAMU. The student responses derived a reasonable assessment of overall student sentiment. The results indicated that the students overwhelmingly believed their education is a quality construction education. They displayed a high level of confidence in their ability to attain a professional position in construction. It appeared that the students' view their personal overall attitudes and that of their fellow students, as fair or good. Most of the students were strongly interested in continuing their studies, especially in a CM Master's degree offered at FAMU's campus. Furthermore, their future employment plans in construction tend to favor resort and recreation area but also civil/highway. However, the student plans were not limited to employment at large or medium sized firms but open to self-employment.

References

- Yong Han Ahn, Annie R. Pearce, Hyoksoo Kwon. (2012) “Key Competencies For U.S. Construction Graduates: Industry Perspective.” *Journal of Professional Issues Engineering Education Practice*, ASCE, 138 (2), pp. 123-130
- [http://ascelibrary.org/doi/10.1061/\(ASCE\)EI.1943-5541.0000089](http://ascelibrary.org/doi/10.1061/(ASCE)EI.1943-5541.0000089).
- Torres-Machí, C., Carrión, A., Yepes, V., and Pellicer, E.. (2012) “Employability of Graduate Students in Construction Management.” *Journal of Professional Issues in Engineering Education and Practice*, American Society of Civil Engineers, n139 v(2) pp163-170.
- Walewski, J., & Kim, A. A. (2011). “Tomorrow’s University Graduate: Construction Industry Needs And Curriculum Enhancement”, ASEE Annual Conference & Exposition, Vancouver, BC. <https://peer.asee.org/18442>
- McDonough Patricia M., Calderone Shannon. (2006) “The Meaning of Money: Perceptual Differences between College Counselors and Low-income Families about College Costs and Financial Aid.” *American Behavioral Scientist* n49. pp1703-18.