Introduction to a Demolition Topics Course

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The California Polytechnic State University (Cal Poly) Construction Management (CM) program was created to allow graduates the opportunity to work effectively in practically every part of the construction industry. The curriculum covers a wide range of topics and prepares students with the ability to join various projects, such as residential, commercial, and heavy civil projects. What these projects all have in common, a topic almost entirely ignored at Cal Poly but nonetheless very important and relevant, is demolition in the construction industry. By offering a course focused entirely on the demolition process, principles, and safety, students will be better prepared for the workforce and will have a much broader knowledge on demolition in general. Ensuring smart and safe practices and procedures in demolition is integral and can be applied to the whole industry. This research paper analyzes students’ prior knowledge on demolition and then explains why demolition knowledge is important for the industry. This paper explores students’ interest on the topic and ensures there is a desire for new knowledge. A topics course on the subject will better prepare students as effective construction managers.

Key Words: Demolition, Curriculum, Safety, Survey, Recycling

Introduction

There are countless key aspects that are crucial to the success of a construction project, from design and scheduling to sustainable practices and safety. However, one key aspect that seems to be overlooked is the demolition process. For every construction project, there will certainly be a need for a demolition phase. This demolition phase may be as basic as tearing down interior framing but can also be as complex as the demolition of a major bridge. In each of these cases, the success of the construction project can be determined by the effectiveness of the demolition process used. Despite the importance of understanding the demolition process, the basic principles, safety techniques and construction technology are overlooked in the CM curriculum and are not valued at the same level as the other principles of the construction industry.

In Cal Poly’s CM program, there are three main topics of construction that include commercial construction, residential construction, and heavy civil construction. Each of these different types of construction share the same sub-topics in their given courses; scheduling, safety, estimating, budgeting, and managing. However, the topic of demolition is overshadowed in each of these topics despite the significance it has in all three areas. As a student who is set to fulfill all requirements of a bachelor’s degree in CM at Cal Poly, it is clearly evident that the required courses to obtain this degree overlook the basic demolition principles and practices that are needed before beginning a career in the construction industry. There has not been one required topics course or technical elective that has fully or
even partially focused on the basic design, safety or procedural practices that are crucial to a successful demolition phase.

The benefits of obtaining knowledge on demolition prior to entering the construction industry can allow a student apart from others competing for the same position. Incorporating a demolition topics course into the Cal Poly CM curriculum can allow a student to obtain a competitive edge when considering that very few state colleges or universities offer a topics course on demolition in their curriculum (Interview Citation). Specifically for demolition contractors, since there is little to no knowledge of demolition for recent graduates, they do not consider background knowledge or prior experience in the field of demolition (Interview Citation). If Cal Poly’s CM curriculum were to introduce a demolition topics course, this can drastically improve the ability of recent graduates to succeed in the construction industry.

The primary objective for my research is to: (1) identify whether Cal Poly CM students have obtained any knowledge on the topic of demolition throughout their time attending Cal Poly and (2) to determine whether these students would be interested in a topics course on demolition.

**Literature Review**

The most relevant source for a demolition topic course is, *Demolition: Practices, Technology, and Management – Purdue Handbooks in Building Construction*. This textbook thoroughly covers each key aspect related to the content of this course and exemplifies the past research already established within the demolition industry. The textbook is a sufficient starting point for those seeking to begin understanding the basic demolition practices as it explores the history of demolition, equipment and applications, and recycling. It also breaks up the demolition types based upon the relevant fields one works in, such as selective, building, excavation, industrial, implosion and marine.

This textbook helps to develop a topic course on demolition by establishing a proper order of topics and information related to demolition. It begins with the history and basic pretext, followed by basic demolition practices, types and applications. It also incorporates recycling, material handling, hazards and project management associated with demolition. These sections build together to provide plenty of information to develop the baseline structure of a demolition topic course.

There are several other literature sources the author used to gain background knowledge on the demolition process prior to writing this paper. These sources are *Cal/OSHA pocket guide for the Construction Industry*, *815 Demolition Safety - Osha Training*, and *Safety and Health Training for Demolition and Reconstruction Activities*. These sources contain valuable information and are helpful in understanding the demolition process.

**Methodology**
The methodology of research for this project consisted of a combination of qualitative and quantitative data. The quantitative data was collected from a survey sent strictly to students in the Cal Poly Construction Management program. The survey consisted of questions that gauged the current knowledge students had on demolition and asked if students thought having more knowledge on the subject would better prepare them for the industry. The qualitative data was derived from an interview with three individuals from Silverado Contractors, a large demolition contracting company. The interview focused on questions surrounding the demolition process, whether they saw the benefit in creating a demolition topics course, and what that topics course would look like.

The objectives of the survey were to…

- Identify Construction Management Majors prior knowledge of demolition
- Assess the interest Construction Management Majors have on demolition
- Determine the usefulness of a demolition topic course for the Cal Poly Curriculum

The objectives of the interview were to…

- Identify the interest General Contractors have on new hires being knowledgeable on demolition
- Determine the significance of demolition knowledge in the industry
- Determine the primary factors to be discussed in a demolition topics course
- Decide what content to be included in the class structure

Survey

This survey was created for Cal Poly Construction Management majors only. It consisted of 16 multiple choice questions with topics ranging from identifying the student’s interest in demolition, the prior knowledge they may have obtained on this topic and demolition specific questions. When giving this survey, it was crucial to obtain responses from all different levels of Cal Poly Construction Management students to decipher whether there exists a correlation of demolition knowledge and how far along they are in the Cal Poly CM Curriculum. Out of the 31 responses received, there were 4 first year students, 3 second year students, 3 third year students, 13 fourth year students and 7 fifth year students.

Survey Results

The first few questions of the survey were meant to decipher the student’s current knowledge on demolition and whether they believe it to be a necessary tool to be successful in the construction industry.
Figures 1 and 2 were questions from the survey meant to determine the student’s current knowledge on demolition. As shown in figure 1, less than one third of the students surveyed believed to be informed on the topic of demolition. This demonstrates that there is a lack of knowledge in this area of construction. Figure 2 portrays that these students believe there is a need to obtain demolition knowledge despite not acquiring this throughout the Cal Poly CM curriculum.

The following questions were meant to assess whether these students have been exposed to the demolition process in their construction management classes and the interest they would have if a demolition topics course was implemented into the Cal Poly curriculum.
Figures 3 and 4 consist of polar questions to address the demolition process in relation to the current Construction Management curriculum at Cal Poly. Figure 3 was a broad-based question to determine whether demolition was brought up in any course the students have completed while at Cal Poly. The results illustrate that less than 20% of the students surveyed recall learning anything about demolition in their previous courses at Cal Poly. The following image, figure 4, is meant to determine the student’s interest if there were to be a demolition topic course in the curriculum. The results were heavily in favor of being interested in the implementation of a demolition topics course. These figures show there is a lack of resources in the current CM curriculum for students to gain the proper knowledge of demolition prior to entering their chosen field of work.

The following two figures were in the survey to directly assess the knowledge these current students have on demolition specific questions. These questions were not meant to be overly difficult, but instead rather general in nature as relating to the demolition process.
In regards to demolition safety, what is the leading cause of death in demolition work? 17% of respondents (5 of 30) answered this question correctly.

![Figure 5: Question 15 of the Survey](image1)

- Electrocution: 9
- Building collapse: 5
- Heavy Equipment accidents: 9
- Slip and fall: 7

Figure 5: Question 15 of the Survey

Which two of the following documents refer to the specific hazards associated with demolition work in confined spaces?

13% of respondents (4 of 30) answered this question correctly.

![Figure 6: Question 16 of the Survey](image2)

- Hot-work permit: 12
- Permit to work: 13
- Risk assessment: 23
- Safety policy: 15
- Scaffolding permit: 4

Figure 6: Question 16 of the Survey

Figures 5 and 6 were questions meant to determine the knowledge current CM students at Cal Poly have regarding demolition in the construction industry. As indicated above, only 17% of the respondents answered question 15 correctly and a mere 13% answered question 16 correctly. The correct answer to question 15 is building collapse. This was the least answered option of this question, proving that even the simple questions on demolition are unknown to these students. The responses to these questions provide sufficient evidence that Cal Poly CM students do not have a proper grasp on the demolition process and need further training. Also, due to the miniscule number of correct responses, these questions in the survey portray that the level of education received in the CM program at Cal Poly is irrelevant to the knowledge one may have relating to demolition. This further shows that there is not enough exposure to the demolition process while obtaining a degree in CM.
The individual I chose to interview works for Silverado Contractors based out of Oakland, California. Silverado is a large-scale demolition contractor that has completed more than 800 demolition projects. The author’s main point of contact with Silverado was Peter Knuth, Vice President, who has worked in the field for a majority of his professional career. Also in attendance was Peter Leonardi, Senior Project Manager, and Joe Capriola, President. Identifying competent professionals to interview for this demolition topic course concept was crucial to obtain sufficient knowledge on why demolition is a key part of construction and to know what the key factors of the demolition process are.

Interview Results

One of the first questions I asked the Silverado team was “what made you get into demolition construction rather than simply working as a general contractor?” Leonardi responded by explaining that back in the early 1990’s, there was a slowdown in work for building contractors and an increase in demolition work. This was due, in part, to the devastating effect of a major earthquake that hit the Bay Area in 1989. Knuth was already working in the demolition industry and recruited Leonardi to join the demolition industry, which was initially intended to be a temporary move. After a few jobs, Leonardi realized the potential opportunity demolition contracting could bring and has worked in the industry ever since. It remains incongruous that still to this day, a majority of CM graduates shy away from demolition jobs even though it can offer great opportunities.

“There was so much more to demolition than I ever imagined, and as all of us got into it, we realized it was a more challenging and rewarding part of construction,” explained Leonardi. I then inquired about the hiring process at Silverado and if prior experience in demolition is necessary. In answering, Leonardi gave us an example of the recent hire of a CM graduate from Cal Poly Pomona, who was interested in working for a demolition contractor. The new hire realized that he needed more industry experience, so he worked in the field directly after college. This could mean that not only Cal Poly San Luis Obispo, but CM programs across the state lacked sufficient teaching of demolition in their curriculums. The CM program should prepare students to join every aspect of the construction industry, not just commercial, civil and residential jobs.

The next major question for the Silverado team was if they believed it would be helpful to incorporate a demolition class into the Cal Poly CM curriculum. Leonardi answered the question and explained that it would be beneficial to have a class that provides a general knowledge of the demolition industry, even if it's brief. There is currently almost no exposure to demolition in the curriculum, so a topics course on demolition would most definitely provide that general knowledge. “Everything that needs to be built has to be unbuilt,” explained Capriola. He agrees that a demolition course would be helpful and relevant indefinitely, due to the fact that buildings will always need to be demolished as technology and society advances. All three interviewees agreed that a demolition course at Cal Poly would be very beneficial.
The rest of the interview focused on the content that a demolition topic course should require if implemented into the Cal Poly CM curriculum. I then asked, “what are some topics that you believe a demolition class would need to cover?” Capriola responded with a breakdown of what the course should look like from start to finish, including course topics, textbooks, and case studies. A discussion of this information is included in the conclusion and final research portion of this paper.

**Conclusion and Future Research**

Based on the information gathered from the survey and the interview, implementing a demolition topics course into the Cal Poly CM curriculum would be beneficial to all graduate students planning to enter the Construction Management industry. This course should begin as a technical elective, therefore both students and faculty can treat the new curriculum on trial-basis to analyze whether the requisite student interest exists and to determine how beneficial and feasible a course on demolition could be. If the results are significantly positive, this course could eventually transfer to a full lab, thus, becoming a required course for the degree.

With the average number of correct responses on the demolition related questions regarding current knowledge from the survey (Figures 5 & 6), the average correct response from the students were an underperforming 15%. This illustrates that current CM students at Cal Poly are not being educated on a significant aspect of the construction management industry and it would be very beneficial for these students to be immersed into this aspect of construction prior to beginning their careers. Also, based on the interview, there is an obvious lack of prior knowledge from recent graduates entering the field of construction. Silverado illustrated their concern for the lack of demolition knowledge of undergraduates and their desire for Construction Management Programs to implement a topics course on the subject. There is clearly a demand from both students and contractors to create a demolition course.

Capriola and the rest of the Silverado team worked with us to create a basic breakdown of what such a course might entail, including course topics, textbooks, material, assignments, and specific examples of case studies. To create a course on demolition for the construction management program here at Cal Poly, the following information will give future students and faculty a great starting point. Below, represents a few options for textbooks and source materials for the course:

1. Demolition: The art of demolishing, dismantling, imploding, toppling and razing— By Helene Liss
4. Excavation and Grading Handbook
A potential 10-week course schedule with topics is outlined as follows:

- Week 1: Intro / History of Demolition
- Week 2: Equipment & Demolition Attachments
- Week 3: Safety
- Week 4: Abatement
- Week 5: Types of Demolition - Selective
- Week 6: Types of Demolition - Building Demolition
- Week 7: Types of Demolition - Excavation & Earthwork
- Week 8: Types of Demolition - Industrial Demolition / Demolition by implosion
- Week 9: Types of Demolition - Marine Demolition
- Week 10: Recycling

This weekly breakdown structure includes all the major aspects of demolition a topics course would need to cover. Like any course, beginning with the history of the topic is always a great place to begin. The course will quickly transition into equipment and safety spread over the next two weeks. This will give students good background information and prepare them with the tools they would need to tackle the rest of the course. Abatement, an integral part of any demolition project, then follows. The next five weeks will cover different types of demolition with applications for each. It is in these sections where case studies will be implemented into the course. Examples of case studies include the demolition of the Bay Bridge, the Mexican Museum, and the World Trade Center. The case studies will allow students to relate the course information with real life examples and will help illustrate the demolition process. The class will commence with recycling, reusing and the proper discarding of material waste. While technology is constantly changing and always improving the demolition process, these topics will remain relevant and serve as a great starting point for creating this class.

References


