

# Determining the Interest for a Drone Certification Course

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The purpose of this study is to explore the interest of the Construction Management students at California Polytechnic State University, San Luis Obispo with drone usage and acquiring a drone license. This research paper analyzes students' prior skill sets that were gained from a past internship or class and if that exposure to drones is sufficient enough to apply those skills to the construction industry. Implementing a drone certification course will benefit both the students and companies in the construction industry. Within the construction industry there is a rise in popularity with using technology devices to track and collect data, implementing a course or elective that help students gain their drone license within the Construction Management Department will better prepare students to apply drone usage to the construction field. A course of this sort will help students create a stronger resume and it may lead to new career opportunities. This paper explores students' interest on the topic and why obtaining a drone license would be beneficial. That was done by conducting a survey that consisted of 12 questions, this survey was shared with Construction Management students at California Polytechnic State University, San Luis Obispo. Based on the study that was conducted the majority of students would be interested in taking a drone certification course.

**Keywords:** Drone Usage, Construction, Drone Course, Career Path, Certification/License

## Introduction

Drones are an upcoming technology device that can be used in all construction sectors, these devices can be applied to complete many tasks within commercial, heavy civil, residential, industrial, specialty, concrete, and renewable energy construction. Within those construction sectors there are many positions that can apply drone usage to their daily task, those positions are Project Engineers, Field Engineers, Virtual Design and Construction Engineers (VDC), surveyors, and superintendents.

Within the degree requirements and curriculum for Construction Management at California Polytechnic State University, San Luis Obispo there is only one course that touches base on drone usage and that is CM 239: Construction Surveying. In CM 239 there is only one virtual lab activity that exposes students to drone usage, this lab does not explain the regulations or laws that a person should follow when flying a drone nor does it train students how to fly drones. The lab implemented into CM 239 only allows students to perform measurements from an aerial shot. Based on the growing popularity of technology devices in the construction industry and how efficient and accurate drones can be to track and collect data there should be more exposure to drones within the Construction Management curriculum.

## **Literature Review/Current Research**

Andrew Lin recently conducted a case study on the “Use of Drone Technology on Commercial Construction Projects”. Andrew teamed up with Robbins|Reed, a central coast commercial construction company, to explore their experience with drones on a commercial construction project. This case study was able to highlight how drones are utilized on their jobsite to track daily progress and site surveillance. The main take aways from this case study are that drones on commercial construction project were able to cut down on cost and wasted time while increasing productivity (Lin,2018).

In a similar case study William Devers explored the use of drones on heavy civil projects by conducting “A Case Study on the Use of Drones on Heavy Civil Construction Projects. William partnered with Ghilotti Bros., Inc. a heavy civil general contractor located in San Rafael, California. The outcome from this case study was that Ghilotti Bros., Inc has revolutionized the way they conduct daily operations because of drone usage, they have been able to eliminate surveying operations during construction, increased planning capabilities, track job progress, identify quantities, improve communication, and improve client awareness while satisfying the client’s needs (Devers,2019).

Another recent study created a “Proposal for Purchase of In-house Drone for Cal Poly’s Construction Management Department” was led by Angel Sanchez. This study consisted of a survey that was shared with industry professionals to explore their thoughts on drones and the cost to implement drones into their company. The results of the survey showed that industry professionals felt that it would be beneficial for the Construction Management Department to invest in drone technology. This survey highlighted the popularity of drones on construction projects and that the Construction Management Department can have a high reward with very little cost if a course were to be implemented (Sanchez,2021).

## **Methodology**

The methodology used for this study was qualitative research. The focus group in this study were Construction Management students at California Polytechnic State University, San Luis Obispo. The survey was also shared with Civil Engineering, Mechanical Engineering, and BioResource and Agricultural Engineering students who have previously interned within the construction industry. The survey consisted of 12 questions, 10 multiple choice questions and 2 short answer questions. To have a higher participation rate this survey was designed to only take 5-6 minutes.

The objectives of this survey were to:

- Identify the skill sets or experience that Construction Management students have with drones.
- If the required course CM 239 or BRAE 239 provided students with sufficient skill sets to apply in the construction industry.
- Determine if students would be interested in taking a Drone Certification course if the Construction Management Department were to implement a course of this sort into their curriculum.
- Which topics students would be interested in learning about.

## Survey

A survey was conducted to inform the Construction Management Department of the student's interest in a Drone Certification course and what topics the students would like to see covered. The survey collected responses from 31 students at California Polytechnic State University, San Luis Obispo and the results prove that the students would want for the department to develop a Drone Certification Course. A copy of the complete survey is provided below in the Appendix A.

## Survey Results

1. What year are you at California Polytechnic State University, San Luis Obispo? (0 point)

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1st Year	2
2nd Year	6
3rd Year	6
4th Year	9
5+	8



Figure 1: Question 1

2. What is your major? (0 point)

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Construction Management	24
Civil Engineering	1
Mechanical Engineering	2
BioResource & Agricultural Engi...	3
Other	1

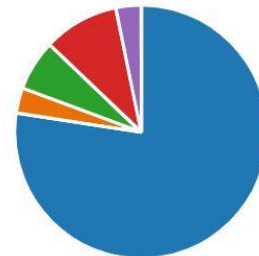


Figure 2: Question 2

Figures 1 and 2 were questions 1 and 2 on the survey, both questions were meant to identify the year and major of the students that completed this survey. The majority of student that participated in this survey were 4<sup>th</sup> and 5<sup>+</sup> years majoring in Construction Management. 77% of students that participated were Construction Management students and 23% of students that participated were other majors that had an internship within the construction industry.

5. From your experience with CM 239 or BRAE 239, do you believe that the skill sets that you gained with drone usage were sufficient enough to apply in the construction industry?

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● Yes	5
● No	25

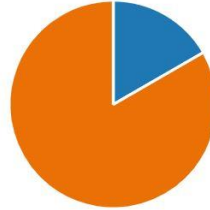


Figure 3: Question 5

Figure 3 refers to Question 5 on the survey, this question was meant to identify if students believed that they could apply the knowledge or skill sets to the construction industry that they gained from taking CM 239 or BRAE 239. CM 239: Construction Surveying is a required course within the Construction Management curriculum, students are allowed to take BRAE 239 to complete the requirement. 83% of students that answered this question believed that they did not gain enough drone knowledge or skill sets from either course to effectively apply to the construction industry.

8. Based on your exposure upon drone usage either through a past internship experience or class, has this sparked an interest in obtaining a drone certification/license?

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● Yes	18
● No	12

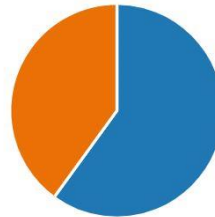


Figure 4: Question 8

Figure 4 represents Question 8 from the survey, this question was used to show if students had an interest in obtaining a drone license from previous drone exposure during an internships or course that they have taken at California Polytechnic State University, San Luis Obispo. Out of the 30 students that answered this question 60% said they did have an interest in obtaining their drone license.

9. If the Construction Management Department would incorporate a Drone Certification course, would you be interested in taking this course?

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 Insights

<span style="color: blue;">●</span> Yes	21
<span style="color: orange;">●</span> No	10

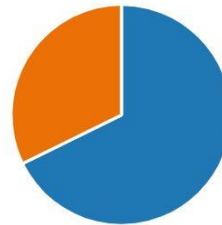


Figure 5: Question 9

Figure 5 refers to Question 9 in the survey, this question confirmed that students at California Polytechnic State University would take a Drone Certification course if the Construction Management department would incorporate a course of this sort.

11. Which of the following topics would interest you if this course were to be created? (Please select all that apply)

[More Details](#)

<span style="color: blue;">●</span> Pre-Construction Site Review	10
<span style="color: orange;">●</span> Aerial Surveying and Mapping	9
<span style="color: green;">●</span> Measurement of Excavation Dep...	9
<span style="color: red;">●</span> Monitoring and Documenting J...	12
<span style="color: purple;">●</span> Safety and Security	6
<span style="color: brown;">●</span> Inspection of Work That Is Diffic...	15
<span style="color: pink;">●</span> All of the above	10
<span style="color: gray;">●</span> None of the above	2

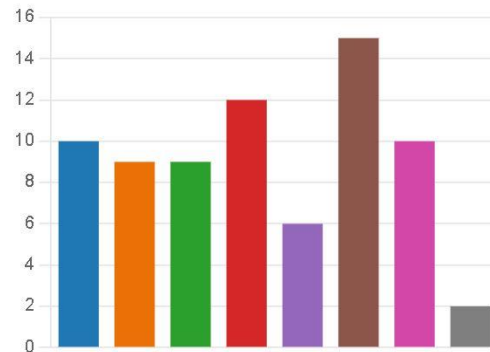


Figure 6: Question 11

Figure 6 represents Question 11 from the survey. This question was created to identify the topics that students would be interested in learning about through a Drone Certification Course. The topics that were included into this question were Pre-Construction Site Review, Aerial Surveying and Mapping, Measurement of Excavation Depths and Material Stockpiles, Monitoring and Documenting Jobsite Progress, Safety and Security, and Inspection of Work That Is Difficult and Dangerous for Humans to Inspect. The topics that received the highest ratings are Inspection of Work that is Difficult and Dangerous for Humans to Inspect, Monitoring and Documenting Jobsite Progress, and Pre-Construction Site Review. There were also many students that would be interesting in learning about all the topics provided.

12. Of the following positions that may deal with drone usage, which career path do you plan on taking?  
(If more than one, select as needed)

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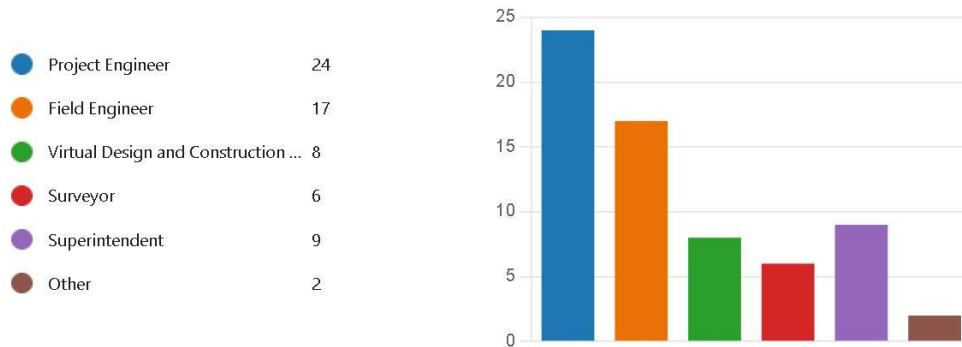


Figure 7: Question 12

Figure 7 refers to the final question, Question 12. This question asked what career path students plan on taking, listed were positions that may apply drone usage to the work they perform. The data shows that most students plan on becoming Project Engineers which can highly benefit from applying drone usage to their daily task.

## Conclusion and Future Research

In conclusion, based on previous case studies showing that drones are effective within the construction industry, studies showing the reward of investing in these technology devices is higher than the cost and that industry leaders are recommending a course within the department, and this study showing that the students would be interested in obtaining their drone license the Construction Management Department at California Polytechnic State University, San Luis Obispo should really consider implementing a course of this sort.

Listed below is a potential course textbook and a brief 10 Week Course Schedule that can be used to create the Drone Certification Course at California Polytechnic State University, San Luis Obispo. For future research a project-based paper can be conducted by a future colleague to make this course happen.

Potential Course Textbooks:

Drone Technology in Architecture, Engineering, and Construction:  
A Strategic Guide to Unmanned Aerial Vehicle Operation and Implementation  
Tal, Daniel; Altschuld, Jon  
ISBN: 9781119545880

Potential 10 - Week Course Schedule		
Week 1:	Introduction to Course	Chapter 1: How to Use This Book
Week 2:	Basic Drone Use	Chapter 2: A Paradigm Shift
Week 3:	The Legal Rules	Chapter 6: Documentation, Permissions, and License

Week 4:	Midterm	Drone Certification Exam: FAA's Small UAS Rule (Part 107)
Week 5:	Flight Operations	Chapter 5: Getting Started
Week 6:	Jobsite Progress	Monitoring and Documenting Jobsite Progress
Week 7:	Drone Data Visualization	Chapter 3: Pre & Post Construction/Visual Communication
Week 8:	Photogrammetry	Chapter 9: Collecting and Processing Data
Week 9:	Inspections	Inspection of Difficult and Dangerous Work
Week 10:	Course Wrap Up	Final Exam

## **Work Cited**

- Andrew, L. (2018) "Use of Drone Technology on Commercial Construction Projects." [WWW Document]
- Angel, S. (2021) "Proposal for Purchase of In-house Drone for Cal Poly's Construction Management Department." [WWW Document]
- William, D. (2019) "A Case Study on the Use of Drones on Heavy Civil Construction Projects." [WWW Document]

## **Appendix A**

### **Survey Questions**

1. What year are you at California Polytechnic State University, San Luis Obispo?
2. What is your major?
3. How many internships have you had within the Construction Industry?
4. If you have had an internship or more than one, what area of construction were they in?
5. From your experience with CM 239 or BRAE 239, do you believe that the skill sets that you gained with drone usage were sufficient enough to apply in the construction industry?
6. Have you been exposed to drone usage based on applying these skill sets yourself or by witnessing a former employer?
7. If "Yes" to question #6, please describe the situation and the purpose for the drone usage. If "No" please state N/A.
8. Based on your exposure upon drone usage either through a past internship experience or class, has this sparked an interest in obtaining a drone certification/license?
9. If the Construction Management Department would incorporate a Drone Certification course, would you be interested in taking this course?
10. If "Yes" please explain why. If "No" please explain why not.
11. Which of the following topics would interest you if this course were to be created?
12. Of the following positions that may deal with drone usage, which career path do you plan on taking?