

# Gauging Student Interest in a LEED GA Exam Preparation Technical Elective Course

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Being a LEED Green Associate (LEED GA) demonstrates a fundamental understanding of sustainable building principles and practices. Since green building is at the forefront of construction, there is no better way for Construction Management students to enter the industry prepared in this area than by taking the LEED General Associate exam. This paper is a case study that obtains students' perspectives on implementing a new Construction Management technical elective course that will prepare students to successfully take and pass the LEED GA exam. A survey was conducted to gauge student familiarity with sustainability, as well as their interest in earning their LEED GA accreditation. This paper presents and discusses the results of these student surveys. Results provided insight into students' current knowledge of sustainability and their level of desire to learn more on this topic. Results also indicated students' preferences regarding course format and test-taking strategies. This paper aims to provide information and guidance that will allow educators to improve student education and credibility in sustainability and the built environment. This paper serves as research that can be used in reference when potentially implementing this new technical elective course.

**Key Words:** Sustainability, LEED Green Associate, green building, students' perspectives, construction

## Introduction

Environmentally friendly design and green building initiatives are continuing to grow in popularity and necessity. The green building movement is more important now than ever, as we work to overcome the challenges of climate change, the need for resilient structures, the urgency of social equity, and the call to build healthier communities. This crucial movement requires capable and expert leaders to advance its goals. In other words, green jobs are in demand (Benjamin, 2018). Employers are on the lookout to hire qualified staff that is fluent in today's sustainability methodology and practices, so achieving a Leadership in Energy and Environmental Design (LEED) accreditation is key.

Earning a LEED Green Associate (LEED GA) accreditation verifies your green building expertise and knowledge of LEED. As a LEED Green Associate, you are qualified to assist and support others working on LEED projects. The LEED GA credential affirms you have a fundamental knowledge of green building concepts, including transportation, energy, water, and air quality. It indicates your proficiency in today's sustainable design, construction, and operations standards (U.S. Green Building Council, n.d.).

Additionally, the LEED GA accreditation opens you up to a worldwide network of sustainability professionals and advocates. The credential offers an opportunity to join an international community of professionals committed to better building, design, and operations (U.S. Green Building Council, n.d.). LEED credentials are available to all kinds of green building professionals, such as architects, engineers, contractors, and builders. After passing the LEED GA exam, you are one step closer to becoming a LEED Associate Professional (LEED AP).

The LEED GA exam is administered by the Green Business Certification Inc. (GBCI). It is a two-hour-long exam that consists of 100 multiple-choice questions. The exam is offered in-person at a Prometric Testing Center or from home as a remote proctored online exam (U.S. Green Building Council, n.d.). The passing score for the exam is 170 out of 200, which is 85%. In addition to passing the exam, LEED Green Associates must earn fifteen education hours every two years, to keep their credential.

The United States Green Building Council (USGBC) offers multiple study guides for the LEED GA exam that are available for purchase on their website. The preparation guides consist of practice questions, a complete practice exam, printable flashcards, an illustrated glossary, and more, which are to be used in conjunction with the exam primary references, including the LEED Core Concepts Guide (U.S. Green Building Council, n.d.).

While the USGBC offers excellent preparation tools for the GA exam, it requires motivated individuals to dedicate countless hours to independently registering and studying for the exam. Oftentimes, people rely on guidance and/or an incentive to successfully prepare and pass a rigorous exam, such as the LEED GA exam. In other instances, people do not understand the value and importance of obtaining green building knowledge and accreditation. That is why more universities and organizations today are incorporating LEED education into their curriculum.

## **Literature Review**

Higher education has an extraordinary impact on student habits and contributions to society. Because sustainability is becoming increasingly important to be conscious of, it is essential that universities educate their students on sustainable topics today. From 2005 to 2014, the United Nations Decade of Education for Sustainable Development (DESD) declared an emphasis on the importance of education to increase sustainability across the world (UNESCO, 2005). The objective of the DESD was “to integrate the values inherent in sustainable development into all aspects of learning to encourage changes in behavior that allow for a more sustainable and just society for all in terms of environmental integrity, economic viability, and a just society for present and future generations” (UNESCO, 2005). Additionally, in 2015, the United Nations General Assembly adopted seventeen Sustainable Development Goals (SDGs) to be accomplished by the year 2030. The purpose of these goals is to “secure a sustainable, peaceful, prosperous and equitable life on earth for everyone now and in the future” (Thakore & Williams, n.d.).

Government agencies and building owners are starting to require sustainable building. Organizations, such as the United States Green Building Council (USGBC) and its Leadership in Energy and Environmental Design (LEED) program, have played a tremendous part in the growth and expansion of sustainability in the built environment. Today, over 110,000 structures and 24 billion square feet in 167 countries and territories have been registered and certified as LEED projects. LEED provides an excellent framework for healthy, highly efficient, and cost-effective green buildings (Verdinez, 2021).

Historically, only the technical aspects, like the materials, means and methods, schedule, and budget, of construction have been heavily considered in construction projects. Sustainability, if at all incorporated, was typically left to the architect. Today, however, more and more construction companies are prioritizing sustainability. Companies are realizing that they can have a large impact on the environment through waste management strategies, integrated project delivery, as well as careful consideration of materials and methods, and adjusted company philosophy and practices.

Skanska, one of the largest construction companies in the United States, has a mission to “build for a better society” by committing itself to sustainable development and construction and incorporating low-carbon solutions that will help them reach its goal of carbon neutrality by 2045 (Skanska, n.d.). Similarly, Turner Construction quotes, “Turner is enthusiastically seeking new green building opportunities, expanding our range of services and investing in our staff to ensure the success of our green building projects” (Leppert, n.d.). These are consistently two of the top five ENR contractors, so they are actively leading by a great example for other companies to follow (Tinker & Burt, 2004).

Many universities, including Cal Poly SLO, already offer general sustainability construction management courses. Cal Poly’s CM 317: Sustainability in the Built Environment, for example, is an interdisciplinary analysis of sustainable strategies and technologies used to enhance the built environment. The course emphasizes a systems approach to green building that consists of sustainable site development, water use efficiency, renewable energy, improving material use, indoor environmental quality, and design innovation (Cal Poly, n.d.). While courses such as this one are great, they will not prepare students to earn their LEED GA accreditation, which will greatly benefit students when working in the industry on construction projects.

Currently, there are several universities across the United States that offer a preparation course for the LEED GA exam. Some colleges, like Emory University, have an online self-paced course that students can enroll in to learn about LEED. The course covers key concepts and terms to prepare learners to earn their LEED GA accreditation. Modules throughout the course explain LEED processes, LEED certifications, and LEED rating systems in a way that can be easily understood (Emory University, n.d.).

Most of the LEED GA prep courses are held entirely online, however, Austin Community College offers a hybrid course. This course consists of self-paced study materials and real-world LEED project experience, in addition to in-class instruction for exam preparation. Throughout the six-week-long course, there are four in-person training sessions: a mandatory four-hour session on the first Saturday, a four-hour facility tour, a four-hour mock exam preparation, and a four-hour session on the last Saturday. Students take the exam after course completion (Austin Community College, n.d.).

## **Methodology**

Data for this senior project was compiled after performing exploratory research through a student survey. Cal Poly Construction Management (CM) students of all years were invited to participate in this survey through an email sent out by the CM department. The survey was created through discussion with my Subject Matter Expert (SME). The goal of the survey was to look at Cal Poly CM students' perspectives regarding sustainability. The survey helped to gauge students' interest in a new technical elective course that would be created to provide CM students with general sustainability knowledge and proper information to successfully take the LEED GA exam before entering the workforce.

The survey consisted of fifteen multiple-choice questions to understand student demographics in addition to their perspectives on the course topic. The survey first questioned students about their year, gender, and internship experience. The survey then analyzed their interest in and familiarity with both sustainability and the LEED GA exam. Finally, the survey explored students' preferences regarding studying and course instruction.

## **Students' Perspectives of the LEED GA**

This survey that was sent out got exactly 50 student responses. Half of the responses were from fourth-year students, while 12% were third-year students, 28% were second-year students, and 6% were first-year students. Additionally, 2% of the results were from fifth-year transfer students and another 2% were third-year transfer students (Question 1, Table 1). 52% of the students were male, while 48% were female (Question 2, Table 1). The majority, 60%, have had two or more internships in the construction industry. Meanwhile, 26% of the students have had one construction internship and 14% have had none (Question 3, Table 1).

Table 1

## Results of Students' Perspectives

Questions	Scale for Student Responses									
	1st	2nd	3rd	4th	5th+	3rd Transfer	4th Transfer	5th+ Transfer		
1	What year are you at Cal Poly?									
	6%	28%	12%	50%	2%	2%	0%	0%		
2	What is your gender?									
	<b>Female</b>	<b>Male</b>	<b>Other</b>							
	48%	52%	0%							
3	What is your internship experience in the construction industry?									
	<b>None</b>	<b>1</b>	<b>2+</b>							
	14%	26%	60%							
4	How familiar are you with sustainability on a scale from 1-10?									
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
	0%	0%	4%	6%	14%	18%	24%	14%	10%	10%
5	How important do you think sustainability is on a scale from 1-10?									
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
	0%	0%	0%	1%	0%	0%	8%	14%	16%	60%
6	What does LEED stand for?									
	<b>Leadership in Earth and Environment Development</b>			<b>Leadership in Energy and Environmental Design</b>			<b>Leadership in Economy and Entrepreneurship Decisions</b>		<b>Leadership in Energy Efficient Data</b>	
	0%			96%			0%		4%	
7	Have you ever heard of the LEED General Associate Exam?									
	<b>Yes</b>	<b>No</b>								
	90%	10%								
8	What does it mean to have a LEED General Associate credential? Select all that apply									
	<b>Demonstrated knowledge of green building practices</b>			<b>Invented sustainable technology</b>			<b>Demonstrated knowledge of standards related to the design, construction, usage, and maintenance of buildings</b>		<b>Small understanding about sustainability</b>	
	94%			4%			96%		4%	
9	Do you have any interest in taking the LEED GA exam and earning your LEED Green Associate credential?									
	<b>Yes</b>	<b>No</b>	<b>Maybe</b>							
	84%	2%	14%							
10	What is your interest level on a scale from 1-10?									
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
	0%	0%	0%	0%	0%	10%	20%	12%	20%	38%
11	If there was a LEED GA prep course offered as a Cal Poly CM tech elective, would you take it?									
	<b>Yes</b>	<b>No</b>	<b>Maybe</b>							
	84%	6%	10%							
12	If yes, what would you hope to get out of it? Select all that apply									
	<b>Learn about the sustainable building practices that can be used in the industry</b>			<b>Learn about LEED rating systems and the steps to take to get a building LEED accredited</b>			<b>Learn how to prevent waste and occupancy discomfort in a building</b>			
	91.80%			85.70%			75.50%			
	<b>Earn the LEED GA title and have it on your resume</b>			<b>Just get course credit</b>			<b>Be prepared for the exam</b>			
	98%			22.41%			2%			
13	Which LEED topics do you find most interesting and/or relevant? Select all that apply									
	<b>LEED Certification and Branding</b>			<b>Location and Transportation</b>			<b>Sustainable Sites</b>		<b>Water Efficiency</b>	<b>Energy and Atmosphere</b>
	52%			40%			70%		70%	60%
	<b>Material and Resources</b>			<b>Indoor Environmental Quality</b>			<b>Innovation and Regional Priority</b>		<b>Synergies</b>	
	74%			58%			30%		18%	
14	What is the best way for you to study for an exam?									
	<b>Practice Exams</b>	<b>Interactive Activities</b>		<b>Individual Homework Questions</b>		<b>Large Group Discussions</b>		<b>Reading</b>		
	1st choice	35	11	2	1	1				
	2nd choice	8	16	8	14	4				
	3rd choice	5	9	18	13	5				
	4th choice	2	9	13	9	17				
	5th choice	2	3	9	12	24				
15	Which format would you prefer for this tech elective course?									
	<b>In-Person</b>	<b>Hybrid</b>	<b>Asynchronous</b>	<b>Synchronous</b>						
	34%	32%	26%	8%						

## Discussion of Survey Results

There was quite a bit of a range in student familiarity with sustainability. A lot of students felt that on a scale from 1 to 10, they were a 7 in terms of familiarity. 42% of students ranked their familiarity with sustainability lower than a 7 out of 10, and 34% of students ranked their familiarity higher than a 7 out of 10 (Question 4, Table 1). Because a large portion of the survey results was from upper-division students, the mode is higher than 5 out of 10, most likely due to the upperclassmen's increased knowledge and experience in the industry, compared to younger students. However, still, most students felt generally unfamiliar with sustainability (see Figure 1).

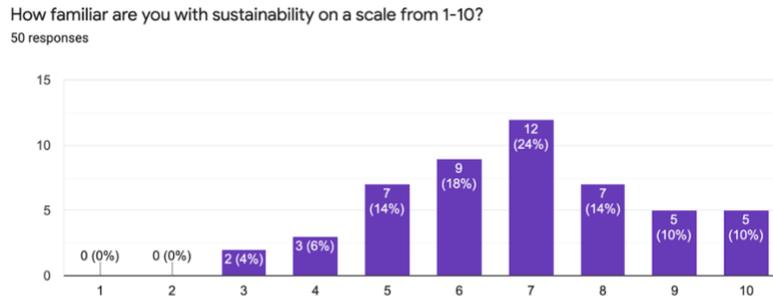


Figure 1 – Student Familiarity with Sustainability

In addition to familiarity with sustainability, the survey also detected student familiarity with LEED and the Green Associate Exam. 96% of students already knew that LEED stands for Leadership in Energy and Environmental Design (Question 6, Table 1), and 90% of students have heard of the LEED GA exam before (Question 7, Table 1). Approximately 95% of students knew that having a LEED GA credential means having demonstrated knowledge of green building practices and demonstrated knowledge of standards related to the design, construction, usage, and maintenance of buildings (Question 8, Table 1). These results are a great representation of how popular LEED is today.

There is excellent student interest in sustainability and LEED. For instance, 98% of students reported that sustainability is important, with over half (60%) of students ranking it a 10 out of 10 in importance (Question 5, Table 1) (see Figure 2). If there was a LEED GA preparation course offered as a Cal Poly Construction Management technical elective, 84% would take it, 10% would maybe take it, and 6% were not interested (Question 11, Table 1). When asked why they want to take the test, almost all students expressed interest in earning the LEED GA title and having it on their resume. Additionally, over  $\frac{3}{4}$  of student responses indicated that through studying for the LEED GA exam, they want to learn about the sustainable building practices that can be used in the industry, learn about LEED rating systems and the steps to get a building LEED-certified, and learn how to prevent waste and occupancy discomfort in a building. There was a wide range of student responses regarding the LEED topics that students find most interesting and/or relevant amongst the following: LEED Certification and Branding, Location and Transportation, Sustainable Sites, Water Efficiency, Energy and Atmosphere, Indoor Environmental Quality, Innovation, and Regional Priority, and Synergies. All topics were found to be interesting and/or relevant to students.

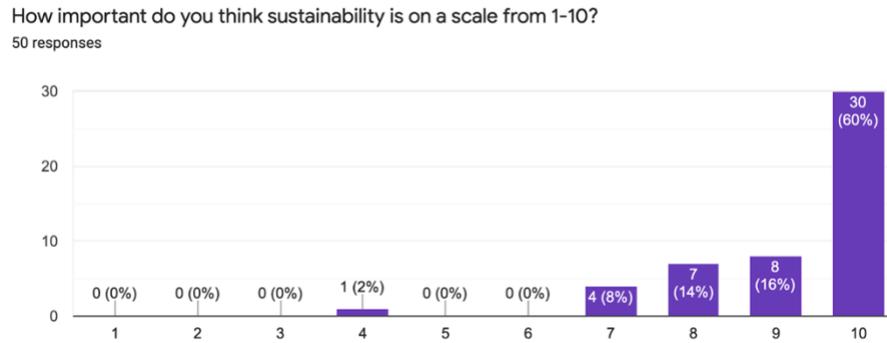


Figure 2 – Importance of Sustainability

To determine the best format for this course, it was necessary to determine students' preferences for course instruction. An overwhelming number of students indicated that practice exams are the best way for them to study for an exam. According to the Learning Strategies Center at Cornell University, when you take an exam under testing conditions, you undergo the “testing effect”, which is when you retrieve information from your memory, making it easier to recall the information later. The act of taking practice exams is part of retrieval practice since you are consistently recalling information, and this enhances your ability to recall later when taking your exam (Karpicke & Blunt, 2011). A lot of students also noted that interactive activities are a great way to study (see Figure 3). Interactive activities make learning fun, so you are naturally more engaged and interested in learning the material.

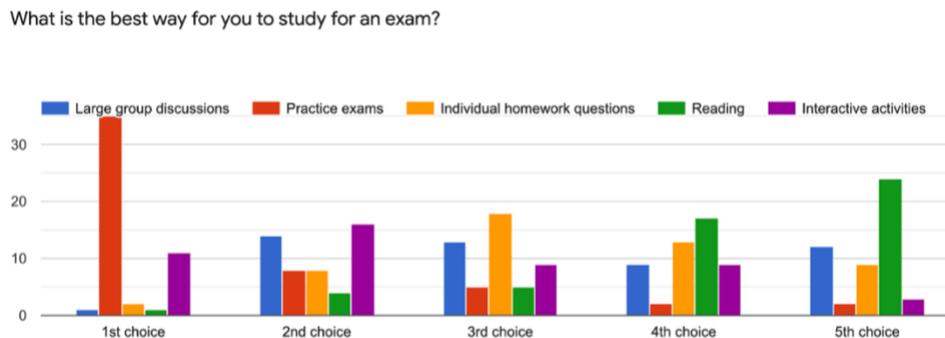


Figure 3 – Student Preferences for Studying

Because the LEED GA exam is taken online and many preparation courses are offered online, it is worth considering whether this Cal Poly technical elective would be most effective online or in person. The survey asked students if they would prefer if this course was asynchronous, synchronous, hybrid, or in-person. Most students, 34%, indicated that they would prefer for this course to be held entirely in person. 32% noted that they would prefer it if it was a hybrid course. 26% would like the course to be asynchronous. Lastly, only 8% wanted a synchronous format.

## Conclusion

A LEED GA prep course is in high demand. Based on the survey results, many students lack adequate knowledge in sustainability yet acknowledge the importance and relevance of sustainability in our world today. A vast majority of students would be eager to enroll in a LEED GA prep course if it was offered as a technical elective at Cal Poly. Based on students' perspectives, the course would most likely function best as a hybrid course. This would incorporate a variety of instruction and student engagement. With a hybrid course, students could take practice exams online on their own, which would prompt the "testing effect" and mimic the real LEED GA exam scenario, in addition to attending class for interactive activities and large group discussions. This course format would ensure that all students are set up for success when preparing for the exam, due to the abundance of learning options and activities made possible with hybrid instruction. Due to strong student interest and sustainability significance, it can be determined that this course would be a huge success as a technical elective for CM students.

## Future Research

Numerous students have expressed interest in the addition of a LEED GA prep course as a technical elective for Cal Poly Construction Management students. Future research on this topic can be conducted through an industry survey. This survey could discover the industry's interest levels in hiring students with knowledge in sustainability and particularly, LEED. The survey could determine the relevance and popularity of LEED buildings and LEED Green Associates in the construction industry today. In accordance with the survey responses, the CM department can work to implement this course into the CM curriculum, so that students can be prepared and well-versed in sustainability before entering the industry. The addition of this course could lay the foundation for a sustainable future. This course has the potential to create a major impact on students' education as well as the built environment. As time progresses, sustainability is only going to become more crucial, therefore it is extremely beneficial for CM students to obtain their LEED GA accreditation and to be able to apply their extensive knowledge and qualification toward green building and saving the environment in the construction industry.

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