

# The Construction History Textbook Project: A Case Study of Scholarship and Study Abroad

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Often, a faculty member's excitement over the opportunity to organize and lead a study abroad program is offset by justifiable concern that necessary research work has to be put on hold. This case study highlights a major research initiative known as the Construction History Textbook Project that is an effort to develop and publish a textbook for the purpose of teaching the history of construction to college freshmen. This Project used a study abroad program to provide its initial research effort. This approach is unique in that the study abroad experience was not a stand-alone activity; it was an integral part of a larger research initiative. Even after the completion of the Study Abroad Program, the further development and refinement of the textbook, as well as additional research, is continuing. The Construction History Textbook Project has received national recognition for its successful combination of international and U.S. travel and study, undergraduate research, and the development of writing skills.

**Key Words:** study abroad, undergraduate, research, construction history, textbook

## Introduction

The link between scholarship and the 2008 Summer Study Abroad Program of the McWhorter School of Building Science at Auburn University started with a need. The need presented itself in the course "History and Introduction to Construction", the first course within the School's curriculum. The class is offered both semesters of the academic year and average enrollment per semester is 150 students. It is a required course for Building Science majors, but is available as an elective to all students throughout the University. Therefore, the class is comprised of those students who have already decided to pursue a professional career in the construction industry (90%), those who are considering declaring or switching majors to pursue such a career (3%), and those who take the class as an elective and are curious and interested in architecture and the built environment (7%). The introduction to construction portion of the class includes introducing students to the major aspects and issues of today's construction industry; types of constructors and construction companies, the educational path of a constructor, different careers and responsibilities in construction, various project acquisition and delivery methods, and current issues such as the use of building information modeling and sustainability. The history component of the course surveys significant milestones and issues in construction technology and project management throughout history and ends with a survey of contemporary architecture and architects to allow students to be conversant on the topic.

It was during the preparation of the course that the need for a textbook that chronicles the history of construction became evident. In 2007, Bill Addis, a consulting engineer wrote and published *Building: 3000 Years of Design Engineering and Construction* (Addis, 2007). However, while the book documents an impressive amount of research, the presentation of the material is not in a textbook format and is best understood by the advanced student or practitioner in engineering. The book is not appropriate for use at the undergraduate level. The textbooks that most closely address the topic at a level that is appropriate to the class are architectural history books. These textbooks describe in great detail the architects' thought process behind the design of a building, the reasoning behind its aesthetics, and an analysis of its context and design. The construction of the building, if addressed at all, is done so in a parenthetical manner and is not the main focus of the text.

Architectural history books also document well the architectural heroes throughout time. But rarely are the names of the builders mentioned. Perhaps this is because the names of the builders of many of the world's most significant structures are not known. But, this lack of knowledge only serves to highlight the fact that while architecture

students are taught about the legacy of their profession and those that contributed to it, construction education students are not provided with the same sense of heritage and connection with builders throughout history. Yet, for over 4,000 years, builders have encountered and resolved the same issues; preparing a site for construction, having materials at the jobsite when they are needed, supervising labor, scheduling activities, and adapting when things do not go as planned. The problems are the same; it is the solutions that have changed with time and technology.

## Method

The opportunity to tackle the lack of a construction history textbook began with the 2008 BSCI Summer Study Abroad Program. Since the summer of 2000, Auburn's Building Science program has conducted eight summer study abroad experiences and has become a leader in providing students with opportunities to travel and study abroad. (Kramer, 2004). Two faculty members, one being the lead faculty and the other assisting, direct each Program. Although several graduate students have been able to participate in the Programs, the majority of students are in the last semester of their undergraduate degree and receive four hours credit for Undergraduate Thesis and two hours of credit for Temporary Structures. The lead faculty decides the format for delivery of these courses as well as the focus and requirements for the Undergraduate Thesis, both of which are presented to the faculty for their approval.

It was through the coupling of the Study Abroad Program with the need of a construction history textbook that both the Construction History Textbook Project was begun and the direction of the 2008 BSCI Summer Study Abroad Program was established. The structure of the Thesis portion of the Study Abroad Program was that each student be assigned an iconic architectural structure or building that he or she would visit and research, and then write its history from the viewpoint of a constructor. The process was dubbed "deconstructing construction". The student's papers were developed as chapters that are being compiled to create a textbook for use in the Department's freshman-level History and Introduction to Construction course. Using the Study Abroad Program in this manner allowed for the initial work on the Construction History Textbook Project to consist of a substantial amount of material due to the number of students that would be involved.

In the spring of 2007, one year before the Study Abroad Program, the focus of the proposed Study Abroad Program and the work that was to be undertaken by the students to begin the process of writing a construction history textbook was presented to and approved by the Building Science faculty. The approval process from Department Head, to faculty, to University administration came rather easily due, in no small part, to the fact that even apart from the value of the resulting textbook, the process included three activities that are have recently become highly valued on college campuses throughout the U.S.; international study (Bellamy & Weinberg, 2006), undergraduate student-faculty collaborative research (CUR, 2005), and the development of writing skills (Warner, 2008).

With the necessary approvals, next came the complicated task of developing an optimal Study Abroad itinerary that would accomplish the most possible for the Construction History Textbook Project while keeping the cost of the Study Abroad Program at an acceptable and marketable level. It was decided to organize the contents of the textbook by architectural time periods. This would allow the freshman students to become familiar with the architectural vocabulary used to describe certain design periods and the related elements of each. However, instead of a survey of the numerous buildings that fall within each category, the most iconic structure from each time period was selected and used as the subject for that chapter and its construction described in detail. Due to the limitations of time and cost of the Study Abroad Program, it was determined that the study of construction history in the development of only western civilization could be addressed. Table 1 shows the final periods of architectural history and the iconic structure from each period and its location that have been selected for inclusion in the first edition of the History of Construction textbook.

Table 1

*Proposed Chapters in First Edition of the Construction History Textbook (Chapters not developed as part of the 2008 Study Abroad Program in italics)*

Chapter	Architectural Time Period or Issue	Iconic Structure	Location
1	<i>Neolithic</i>	<i>Stonehenge</i>	<i>Amesbury, England</i>
2	<i>Mesopotamian</i>	<i>Ziggurat of Ur</i>	<i>Ur, Iraq</i>

3	Egyptian	Great Pyramid	Giza, Egypt
4	Egyptian	Hypostyle Hall at Karnak	Luxor, Egypt
5	Early Greek	Palace of Knossos	Knossos (Crete), Greece
6	Greek	Parthenon	Athens, Greece
7	Roman	Colosseum	Rome, Italy
8	Roman	Pantheon	Rome, Italy
9	Byzantine	St. Mark's Basilica*	Venice, Italy
10	Romanesque	Tower of Pisa	Pisa, Italy
11	Gothic	Cathedral of Notre Dame	Paris, France
12	<i>Gothic</i>	<i>Borgund Church</i>	<i>Norway</i>
13	Early Renaissance	Dome of the Florence Cathedral	Florence, Italy
14	Late Renaissance	Villa Rotunda	Vicenza, Italy
15	Baroque/Rococo	Piazza of St. Peter's Basilica	Vatican City, Italy
16	<i>Early Industrial Revolution</i>	<i>Crystal Palace</i>	<i>London, England</i>
17	Late Industrial Revolution	Eiffel Tower	Paris, France
18	1900's Modern	Sagrada Familia	Barcelona, Spain
19	<i>Arts &amp; Crafts</i>	<i>Fallingwater</i>	<i>Bear Run, Pennsylvania</i>
20	<i>Skyscrapers</i>	<i>Empire State Building</i>	<i>New York City, New York</i>
21	Modern	Palazetto del Sport	Rome, Italy
22	Post Modern	Pompidou Centre	Paris, France
23	<i>Contemporary</i>	<i>Millenium Dome</i>	<i>London, England</i>
24	Digital	Guggenheim Museum	Bilbao, Spain
25	<i>Green Building</i>	<i>30 St. Mary Axe</i>	<i>London, England</i>

\* Hagia Sophia in Istanbul, Turkey was originally selected to represent the Byzantine period, but was replaced in an effort to reduce the cost of the Study Abroad trip.

It was determined that an 8-week period of travel abroad would optimize the number of sites that could be visited while also keeping the cost of the Program within a marketable range. A Work Week in the middle of the Study Abroad Program where the group was stationary and did not travel was also included for four reasons. Foremost, it allowed the students to settle in and accomplish a great deal of writing that was difficult to accomplish while traveling. Secondly, through a Memorandum of Understanding between Auburn University and Franklin University in Lugano, Switzerland, classroom space and accommodations were provided. The classroom allowed for the completion of the academic requirements for the Temporary Structures course that the students were getting credit for in addition to their Special Thesis credit. Thirdly, the Work Week, while certainly not to the degree of a stationary Study Abroad Program, allowed the students to get a sense of living in a foreign locale. The Franklin College accommodations provided a kitchenette in each student room. This allowed the students the opportunity to shop for groceries and develop the routine of a resident. Lastly, the Work Week allowed for the textbook's Graphic Designer, Ross Heck, to join the group and begin to produce schematic layouts for the chapters based on the type of information and graphics that the students were developing. Following the Work Week, students were given a week for independent travel before resuming the final portion of the Study Abroad Program. Table 2 shows the final 8-week itinerary that was developed and the structures that were researched in each location. The final itinerary was a synthesis of numerous factors including the location of the target buildings to be studied, cost, and the inclusion of the Work Week and independent travel week.

Table 2

***Final Itinerary of the 2008 Summer Study Abroad Program and the Buildings Researched at Each Location***

Dates	Location	Research Focus
May 25 – May 28	Cairo, Egypt	Great Pyramid
May 29 – May 31	Luxor, Egypt	Hypostyle Hall at Karnak Temple
June 1 – June 4	Athens, Greece	Parthenon
June 5 – June 7	Heraklion (Crete), Greece	Palace of Knossos
June 8 – June 12	Rome (& Vatican City), Italy	Colosseum Pantheon

June 13 – June 16	Florence (& Pisa), Italy	Piazza of St. Peter's Basilica Palazetto del Sport Dome of the Florence Cathedral Tower of Pisa
June 17 – June 21	Venice (& Vicenza), Italy	St. Mark's Basilica Villa Rotunda Work Week
June 22 – 27	Lugano, Switzerland	Independent Week
June 28 – July 4	-----	Sagrada Familia
July 5 – July 9	Barcelona, Spain	Guggenheim Museum
July 10 – July 12	Bilbao, Spain	Notre Dame
July 13 – July 19	Paris, France	Eiffel Tower Pompidou Centre

## Student Selection

In addition to the large amount of time spent developing the research project and the itinerary, and extraordinary amount of time was dedicated to the process of selecting the students to participate. To allow students and their parents as much time as possible to contemplate the student's participation and plan for its financial implications, the Study Abroad Program was presented to prospective students in the Spring 2007 semester, four semesters before the start of the trip. Although minor modifications were still being made to the itinerary, the focus of working on the Construction History Textbook Project and the cost of the Program, with a comfortable contingency, were provided. Providing students with this information at such an advanced date prior to travel allowed them and their families to thoughtfully consider and plan for the financial and educational ramifications of participation.

At the start of the following Fall 2007 semester, a competitive five-stage process of selecting students began. Each stage and its respective value in the process are listed in Table 3.

**Table 3**

### *Process of Selection of Students for 2008 Summer Study Abroad Program*

Stage	Activity	Value
1	Faculty Approval	30%
2	Mini-sleuthing Exercise	25%
3	Extemporaneous Writing Exercise	20%
4	GPA	15%
5	Interview	10%

First, students that were interested in the Program were asked to send an email to the Director that indicated their interest and included the letter grades earned in the Building Science courses completed to date. Currently, in the Building Science curriculum at Auburn the last semester undergraduate Thesis course is structured to be a synthesis of all the material learned from previous Building Science courses. Students who, by their performance in previous coursework in the curriculum have shown an understanding of the content, can be considered by the faculty for a Special Thesis project that allows the student to work with a faculty sponsor on a project that seeks new knowledge or is an application of knowledge distinctly different than that used in the traditional thesis. The work completed as part of one of the Study Abroad Programs is viewed as a Special Thesis and therefore, interested students are presented to the full Building Science faculty for discussion as to whether it is felt that any of the students would benefit more from the School's traditional on-campus Thesis process or to determine if there were any concerns regarding a student's collegiality or maturity based on the student's performance in Building Science classes. Of the nineteen students that expressed interest in participating in the 2008 Study Abroad Program, seventeen received unanimous approval by the faculty and two received partial approval; one due to concerns of his ability to function well in a group setting and the other due to academic concerns.

The second step toward selection was a Mini-Sleuthing Exercise. This was an activity to gauge each student's ability to conduct research. Each student was assigned an iconic structure in the U.S. and asked to research and write a report on its construction with a special focus on the people, process, materials, and equipment. The Exercise served as a smaller version of the type of research and writing that would be required for the Thesis. Each student's paper was evaluated for its quality of writing and the variety of sources listed in the Bibliography, with the students who assessed library books and databases being scored higher than those that used only internet sources.

In order to assess the amount of editing for style that would be required of each student's work, the third stage toward selection consisted of an extemporaneous writing assignment. The student candidates were given two hours to answer the question, "Why do you want to have a Study Abroad experience and what attributes or skills do you have that will be a positive contribution to the group and enhance the group's experience?" The replies mirror those found in other studies of why college students wish to participate in study abroad programs; namely, because it is a once-in-a-lifetime opportunity, enhances future career opportunities, and an opportunity to experience different cultures. However, those students that mentioned being part of the Construction History Textbook Project were scored higher than those that did not. An interest in the work that was to be done was seen as critical to elevating the quality of work that would be generated as well as offsetting the fatigue factor that often develops when people travel together for extended times. These essays were blind-reviewed and scored by the Director and the other two faculty members that would serve as assistant faculty during the eight-week travel time. All three scores were combined to generate each student's final score on this portion of the application process.

The fourth stage of the selection process was the evaluation of each student's current overall GPA. The School's Academic Advisor provided this information. The fifth component of the selection process was a personal interview with the students to appraise their communication skills, overall attitude, and demeanor.

Of the nineteen students who completed each portion of the selection process, fifteen were chosen without reservation and two were selected after a second meeting to address concerns that were raised during the extemporaneous writing exercise and the interview process. Two students were not selected to participate; one due to poor writing skills and one due to a lack of interest in the research project. The final group of twenty was composed of seventeen undergraduate students (fourteen males and three females), one undergraduate student, the Director, and two assisting faculty members that would each travel with the group for four weeks, swapping places with each other midway through the trip.

After being selected, each student was asked to submit their top three choices of buildings that they would like to research. This information, along with the scores they earned from the writing portions of the selection process (Stage 2 and Stage 3) were used to pair the students with the structure that they would be assigned for their Special Thesis. Higher profile buildings, such as the Pantheon and the Parthenon, were assigned to the best writers.

## **Preparation**

A preparatory class for two credit hours was a mandatory requirement of the students for the Spring semester immediately prior to travelling. During this time, skills for travel in Europe, such as reading subway maps, security precautions, and learning basic words in each of the languages that would be encountered, were taught. Students were also required to read R. A. Scotti's *Basilica: The Splendor and the Scandal – Building St. Peter's* (Scotti, 2006) as it would prepare them for their visit to St. Peter's and because the book reflected the type of construction information that they would be including in their chapters. Preliminary research and literature reviews for the Special Thesis projects were also conducted.

During this time and later during the Work Week in Switzerland, opportunities to create sidebars were identified and were added to the content of each chapter. The chapter content provided a springboard to sidebars that link the historic project to basic modern day construction activities and issues and expand on certain caveats of each project that students found of particular interest and worthy of elaboration. The proposed sidebars are listed in Table 4.

Table 4

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### ***Iconic Buildings and Chapter Sidebar Topics***

<b>Building</b>	<b>Sidebars</b>
Great Pyramid	Development of the Pyramid Shape Imhotep & Snefru
Hypostyle Hall at Karnak Temple	Estimating Earthwork
Palace of Knossos	Legend of the Minotaur Passive Sustainability
Parthenon	Classical Orders Tale of the Elgin Marbles Reading Orthographic Drawings
Colosseum	History of Concrete Construction of Elevated Slabs Historic Stadium 'Firsts'
Pantheon	Development of the Dome Other Notable Roman Constructions Temporary Structures
St. Mark's Basilica	Key Features of Byzantine Architecture Other Famous Byzantine Buildings Venice in Peril Building Foundation Typologies
Tower of Pisa	Key Feature of Romanesque Architecture Other Famous Construction Failures Soil Typologies
Notre Dame	Key Features of Gothic Architecture Other Famous Gothic Buildings The Guild System The History of Project Delivery Systems
Dome of the Florence Cathedral	Key Features of Renaissance Architecture Brunelleschi Famous Domes
Villa Rotunda	Antoni Palladio to Thomas Jefferson Quantity Take-Off and Pricing
Piazza of St. Peter's Basilica	Key Features of Baroque & Rococo Architecture Other Famous Baroque Buildings Change Orders Modern Surveying
Eiffel Tower	Gustave Eiffel Other Famous Iron Structures History of Steel
Sagrada Familia	Antoni Gaudi Other famous Arts & Crafts and Art Nouveau Buildings Jobsite Safety
Palazetto del Sport	Other Famous Thin-Shelled Concrete Structures Other Famous Structure-As-Architecture Buildings
Pompidou Centre	The Importance of MEP
Guggenheim Bilbao	Frank Gehry Building Information Modeling

### **Study Abroad Program Enhancements**

Several activities and events served to enhance the 2008 Summer Study Abroad Program and enrich the students' experience beyond the task of research and writing. These included meetings with scholars and experts, field trips, and the use of students as tour guides.

### *Meetings with scholars*

In several locations, either the student researcher or the Program Director arranged for meetings with scholars and experts that were well versed in the history of the building being researched. These included Engineer Giuliano Molon of Insula in Venice, Italy; Cesar Caicova Gomez Moran, Production Architect and Construction Manager of the Guggenheim Museum in Bilbao, Spain; Davide Vitali, Architect and former colleague of Pier Luigi Nervi; Jordi Fauli I Oller, Lead Architect and Construction Manager of Sagrada Familia; Nabil Labib, Architect and Egyptologist; and internationally renowned, Dr. Zahi Hawass, Secretary General of the Supreme Council of Egyptian Antiquities. Dr. Hawass provided the group with full access to the Sphinx, to the interior of the Great Pyramid, and to the excavations of the recently discovered Workers Village adjacent to the Giza Plateau Pyramids that have not been opened for public viewing.

### *Field Trips*

Apart from the trips made as a group to each of the buildings being researched for the textbook, additional field trips were arranged to the Gotthard Base Tunnel, the longest and deepest tunnel in the world being constructed by Hochtief and partners in Switzerland; the headquarters of the Organization for Economic Cooperation & Development (OECD) in Paris being constructed by GEMO International, one of France's largest construction companies, the Rome Subway Expansion – Line C being constructed by Salini Costruttori in association with RockSoil S.p.A.; and the Phillip Morris Manufacturing Plant being constructed by The Arab Contractors in Cairo, Egypt. Apart from one field trip that was scheduled by one of the students, these field trips were arranged by contacts made by colleagues in the construction management programs at Georgia Tech (Professor Brian Bowen) and Southern Polytechnic University (Professor Ismail Basha).

### *Student Tour Guides*

Instead of, and in some cases in addition to, hiring tour guides at the sites of the buildings being studied, the student researchers were required to serve as tour guides for their fellow students during the group's visit to the building that they were researching. This insured that students were provided information about the construction of the building instead of only the historical and architectural history that is usually provided by hired tour guides.

## **Results**

The Construction History Textbook Project and the Study Abroad Program that provided its initial momentum produced both a research initiative and a study abroad program with many unique and successful caveats that enhanced the experience for the faculty, the study abroad program, the research, and the students. The post-experience comments from students regarding the benefits that they received as part of their participation in the 2008 Summer Study Abroad Program were similar in nature to those of other college students that have had an opportunity for foreign travel and study. They appreciated the experience as a once-in-a-lifetime chance and felt they had grown as world citizens through their knowledge and value of cultures that are different than their own. However, in addition to the comments regarding the international travel, many expressed pride in knowing that their Senior Thesis would be useful beyond their graduation as a way of giving back to the School.

The Construction History Textbook Project has received a large amount of attention within the College of Architecture Design and Construction at Auburn and in numerous publications of the University. The Project also received national attention when it was featured in *Engineering News Record's* 2008 special issue on construction education.

## **Future Research**

The ending of the 2008 Summer Study Abroad Program did not represent the end of the Construction History Textbook Project. In the Fall of 2008, three more students were selected to participate in a Study Abroad Experience embedded within the academic semester. The following Spring 2009 semester, three more students were selected to write for the Construction History Textbook Project. However, the work of this latter group focused on the contributions to construction that are part of America's history. Therefore, the travel was not abroad, but to U.S.

destinations. It was also during this last effort that a trial of having a student research the construction of a building that no longer exists was tried. It is the only chapter to date that has been written by a student that has not visited the building or site. It was determined that this was a major detriment to the student's work. The research and writing became more of an academic process and seemed to lack the passion that was in the writing of those students who were able to visit their projects. Two final chapters remain to be written in order to complete the first edition of the textbook which will focus on the development of Western civilization. Because one of the remaining projects is in Iraq, visiting that project will also not be possible. Instead of a Special Thesis project, it is planned that the development of this chapter will be a collaborative effort of the freshmen students in the History and Introduction to Construction course. The visit and research for the lone remaining project is planned to occur in the Fall 2010 semester. A listing of the projects that have been completed or are planned outside the venue of the 2008 Summer Study Abroad Program are shown in Table 5.

Table 5

***Chapters Completed Outside of the 2008 Summer Study Abroad Program***

Venue	Dates	Location	Research Focus
Fall 2008 Embedded Study Abroad	Oct. 10 - 16	London, England	Millennium Dome 30 St. Mary Axe
		Amesbury, England	Stonehenge
Spring 2009 Embedded Travel	March 28 – 31	New York City, New York	Empire State Building Crystal Palace (London)*
	April 1 – April 2	Bear Run, Pennsylvania	Fallingwater
Future		In-class research & writing project** Borgund, Norway	Ziggurat of Ur Borgund Stave Church

\* As this building was lost to fire in 1936, the student researched its construction, but was unable to visit the site.

\*\* As this structure is located in the Dhi Qar Province of Iraq, travel to the site is not possible. It is anticipated that this chapter will be developed as part of a class project.

It is planned that the Construction History Textbook Project will produce not one, but a series of several textbooks with each focusing on a different time period, geographic region, or construction method. Future editions covering iconic civil engineering projects such as dams, tunnels, and bridge projects, as well as editions that will focus on the architectural and construction heritage found in Eastern and pre-Columbian cultures are planned.

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