

Site Visit Application in Construction Education: A Descriptive Study of Students' Perspectives

Ricardo Eiris Pereira, PhD Student, and Masoud Gheisari, PhD
University of Florida
Gainesville, Florida

Site visits in construction education are learning experiences that aid the students to better understand real-world construction practices. These field trips create a guided interactive environment for students, enabling awareness of spatiotemporal challenges present in a construction project. This research uses descriptive research to explore construction site visit application as an educational component in the construction curriculum. An online survey was distributed to assess the benefits and barriers of site visit implementation on real-world classrooms. This study focused on the perspective of university students in construction programs across the United States. The results of the research show that the respondents indicated that observing/ interacting with the construction environment and the construction professionals is a crucial benefit of site visits. The respondents also stated that short duration of site visits and the substantial amounts of information required to be absorbed in such a brief time were the most significant barriers in the site visits.

Keywords: Construction Site Visits, Experience-based Learning, Construction Education.

Introduction

Site visits or fieldtrips are one of the fundamental components of the construction educational curriculum. These experiences deliver spatiotemporal interaction with the ever-changing construction environment by allowing communication with professionals about the challenges present on field (Blinn et al. 2015). Previous research has shown the benefits of observational learning in a real-world environment (Singh 1992; Senior 1998; Kajewski 1999; Gunhan 2015). On-site learning during site visits offer students a spatiotemporal awareness, uniquely present on real construction contexts. There students are able to observe different trades and practices with a hand-on approach (Mills et al. 2006, Ashford and Mills 2006). Learning on the field has been found to be an effective method to aid the students to reinforce and understand the core concepts taught in class, and as help to increase their overall interest in the subjects (Manzanel et al. 1999; Janovy and Major 2009). These fieldtrips additionally allow students to conversate, interact, and network with professionals in a setting where all parties involved in a construction project are available.

A plethora of challenges have been identified in the implementation of site visits as teaching methodology. Exposing students to situations that are potentially hazardous is one the main challenges of utilizing site visits. Having numerous students on a congested construction site restricts the frequency of site visits possible, as the site is busy and often inaccessible (Kajewski 1999; Mills et al. 2006). Moreover, this reduces the usefulness of the education content provided on those visits since the environment might be too noisy or hard to observe. Alternatively, exposing students to specific contexts and professionals that conductively lead to learning experiences is another challenge (McClam et al. 2008). Often, it is assumed that the site visits directly translate to meaningful experiences that significantly impact student learning (Blinn et al. 2015), but this is difficult to accommodate as there are competing objectives for the visits (e.g. learning objectives, and networking). Additional limitations are found in the availability of construction jobsites in terms of distance. Some universities are located in areas with limited access to construction projects or long commutes to construction sites. Online or distance-learning students present these same barriers due to the absence of construction site visit learning, as it is not physically feasible to attend those opportunities. Site visits also present institutional challenges that limit their use in construction education such as: large class size, tight class schedules, and time/resource limitations accompanied with the support-intensive nature of site visits, which requires intensive support from the institutions (Kajewski 1999; Mills et al. 2006; Farrow et al.

2012). These barriers prevent a considerable number of students' from having an adequate site visit learning experience and introduces difficulties to integrate site visits in courses on the construction curriculum.

Although the existing body of knowledge has investigated in depth the site visits within the construction curriculum, the gap in knowledge remains regarding the perspectives of faculty members, the students, and the industry professionals in relation to the practical setting of real-world site visits education. Eiris and Gheisari (2017), previously investigated the faculty member perspective on the application of site visits. This portion of that overall research elaborates on the perspective of students using a pilot study to explore the benefits and the barriers of site visits implementation.

Methodology

This pilot study aims to provide an exploratory overview of the benefits and barriers of site visit application from the student's perspectives. This is achieved using the descriptive research methodology that examines the factors observed in the data collected, instead of trying to generalize using predictive indicators on cause and effect. The population targeted for this study consist of students in the United States at universities that are members of the Associated Schools of Construction (ASC). Data was collected by using the email list from ASC, where faculty members were sent a survey to get their feedback (Eiris & Gheisari 2017) and were also asked to share the survey with their students. Two emails were dispatched (March 23rd, and April 7th, 2016) to perform a random sampling of the population and then the survey was closed on April 23rd, 2016. After a screening to remove errors in data entry, a sample of 79 responses were found to be suitable for analysis.

A survey was designed as an instrument to collect descriptive qualitative and quantitative data regarding the perspective of students over the benefits and the barriers of site visits implementation in the construction education curriculum. The students were asked for demographic information that included: university, state, type of teaching program, academic level. Later, the students were asked to express their opinions on a series of benefits and barriers that were found on the literature. The students were requested to rate the importance of statements about site visits using a Likert scale from 1 to 6. Moreover, for this section, an open-ended question was also provided to obtain supplementary qualitative information regarding the benefits and barriers they consider relevant for site visits.

The online platform Qualtrics (Qualtrics 2016) was used to develop and administer the survey, simplifying the data collection. The data was analyzed through descriptive statistics using SciPy for IPython (Pérez and Granger 2007). The quantitative data was used to obtain descriptive statistics such as: mean, median, and interquartile ranges (IQR). Frequency of appearance was used to rank the data with the objective of observing importance relative positioning. No inferential statistics were calculated from the sample data as this is a descriptive study. The qualitative data obtained from open-ended questions was utilized to support the quantitative observations.

Results and Discussion

Respondent Demographics

The respondent's universities were used to classify the demographic data. From the examination, 8 states and 9 different universities in the United States were found. Figure 1 displays the number of responses obtained from the survey each university, with 30% of the respondents located at the University of Florida and 28% located at Southeast Missouri State University.

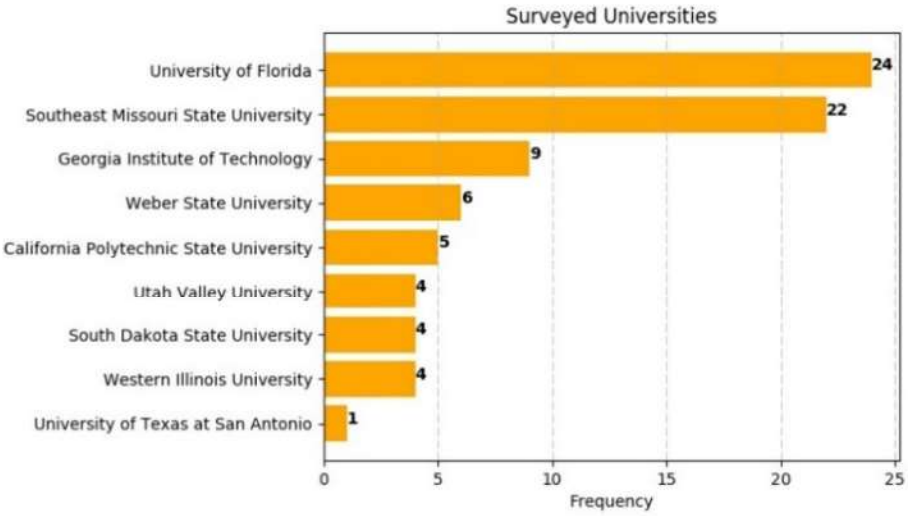

Figure 1. Universities of respondents.

Participants with different academic levels and from a variety of programs in the field of construction were part of survey. Senior students formed 42% of the total responses. Moreover, 90% of the respondents identified that they were studying in a Construction Management program. This is illustrated on Figure 2 with the frequency of responses of the survey for academic levels and programs

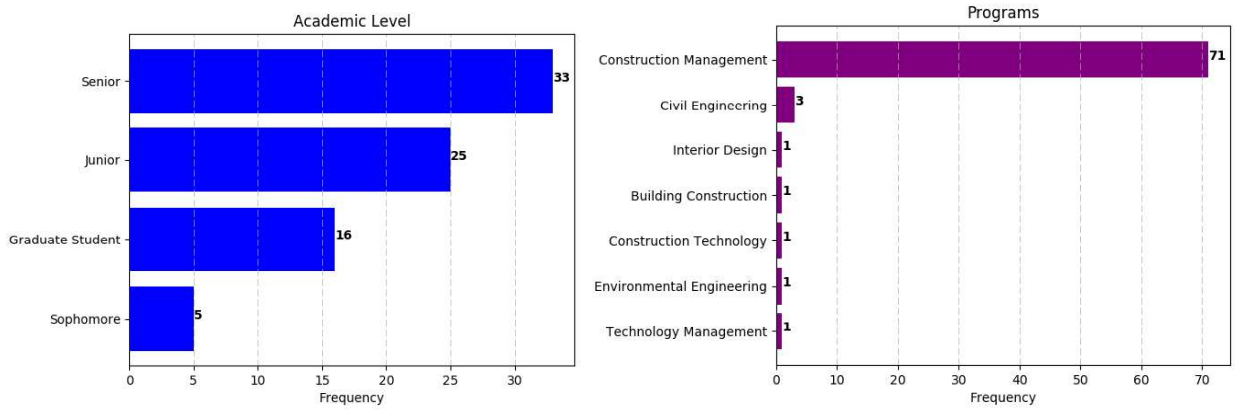

Figure 2. Academic level of respondents and programs majored by the respondents.

Benefits of Site Visit Application in Construction Education

The responses from students were analyzed and reported using boxplots. With the objective of visualizing the distributions for the obtained data, this statistical technique was used as it is shown on Figure 3. From this analysis, it was found that observing construction practices in a real-world environment (Mean: 5.7, Median: 6, IQR Low Bound: 6, IQR High Bound: 6) was the highest scored benefit statement. The statement had high responses and very low dispersion (over 70% of "High" responses), implying that students perceive that observing the construction environment is crucial. The open-ended question also supported this benefit. Students noted that site visits could provide a "*visual representation of processes that you [students] may not understand by reading a book.*". Moreover, students indicated that site visits can provide opportunities for construction students that are *"visual learners to be able understand information quickly"*.

Students perspective about visiting construction jobsites to provide observation opportunities for students on construction industry practices while comparing it to the theoretical concepts learned in classroom (5.5, 6, 5, 6) and getting direct/multi-sensory experience of construction job site environment (5.3, 5, 4, 6) were rated with high scores, but the direct/multi-sensory experience statement had a large data spread. This suggests that student site visits connect the concepts taught in class with a hands-on experience of the real construction environment. On the

open-ended questions, students noted that site visits *"help [to] combine classroom theory with real world scenarios"* and "*relate in-class education with practical skills.*".

Furthermore, it was also identified from the students' responses that site visits opportunities enable direct/face-to-face interaction with construction professionals (5.3, 6, 5, 6), which is unlike to be available in regular classroom sessions. Student remarked in the questionnaire. that *"[the] perspective of what can be expected in a particular role can be attained*" and they can also *"[learn] job site etiquette*" by interacting with professionals. Finally, the statements regarding career tracks in construction domain (e.g. project engineer track, superintendent track, …) (5.2, 6, 5, 6) and the increment in chances for future internships or job opportunities (5, 6, 5, 6) were the lowest scoring statements, identifying them as potentially low relevance in relation with site visits.

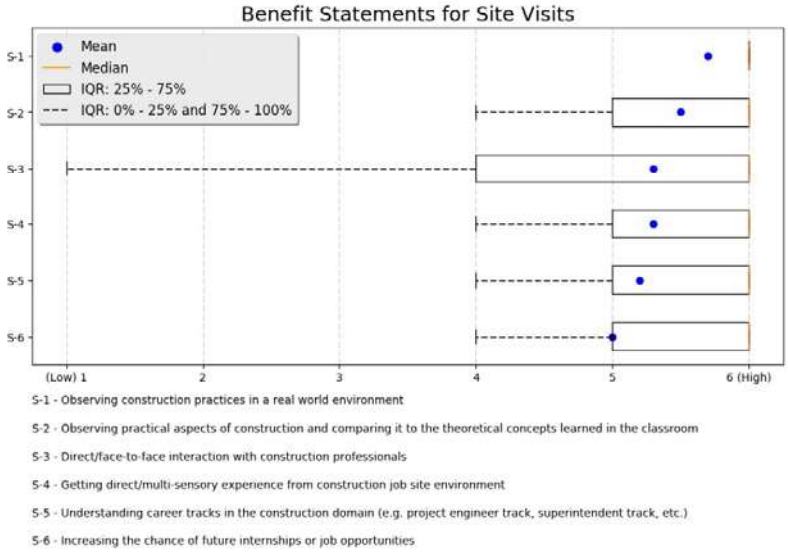

Figure 3. Benefits for Site Visits

Barriers of Site Visit Application in Construction Education

Student perceptions regarding the barriers of site visits were analyzed and reported in the same manner as the previous section. From this analysis (Figure 4), it was found that the highest rated barrier (Mean: 3.9, Median: 4, IQR Low Bound: 3, IQR High Bound: 5) indicated that site visits duration is short and having longer duration site visits would be beneficial. Students commented that "*[the] limited amount of time during the tour [makes it difficult to learn] all the information needed for that particular site*" and that "*time crunches limit the amount of explanation professionals on-site can provide*". The second highest rated statement referred to the time conflict with other classes (3.6, 3, 2, 5). For example, one student noted that "*my biggest problem with site visits is schedule clash. It is hard to make it to a site visit when 70% of your classes don't care about your schedule".* Comments for this statement also included concerns about transportation logistics and site proximity to the university, as several students indicated that *"transportation can be a problem"*, *"[problems with] getting the entire class there [jobsite] and back"*, and *"expecting students to drive to sites can cause problems".*

Students reported that large class sizes (3.3, 3, 2, 4) and inexperience or unknowledgeable contractor or owner representative as tour-leaders of site visits (3.2, 3, 3, 5) scored over 3 and that not being able to see or hear in a crowded or noisy jobsite environment (3, 3, 2, 4) and that it takes too much time organize or plan site visits scored at 3. No comments in the open-ended section were obtained to support any of these statements. All the remaining statements were assigned low scores with means and medians between 2 and 3. These low scores suggest that students do not perceive them as significant barriers for site visits. The statement regarding safety concerns surprisingly received a low score (2.7, 3, 1, 4), as it was suspected to receive a high score as the literature indicated. Nevertheless, some students perceived safety as one of the potential issues that limit site visit opportunities. For example, one student indicated that *"some projects don't allow outside personnel, and others are too dangerous for*

visitors" and another student further noted that a limiting factor might be *"[the] liability that construction managers assume allowing students into the sites"*.

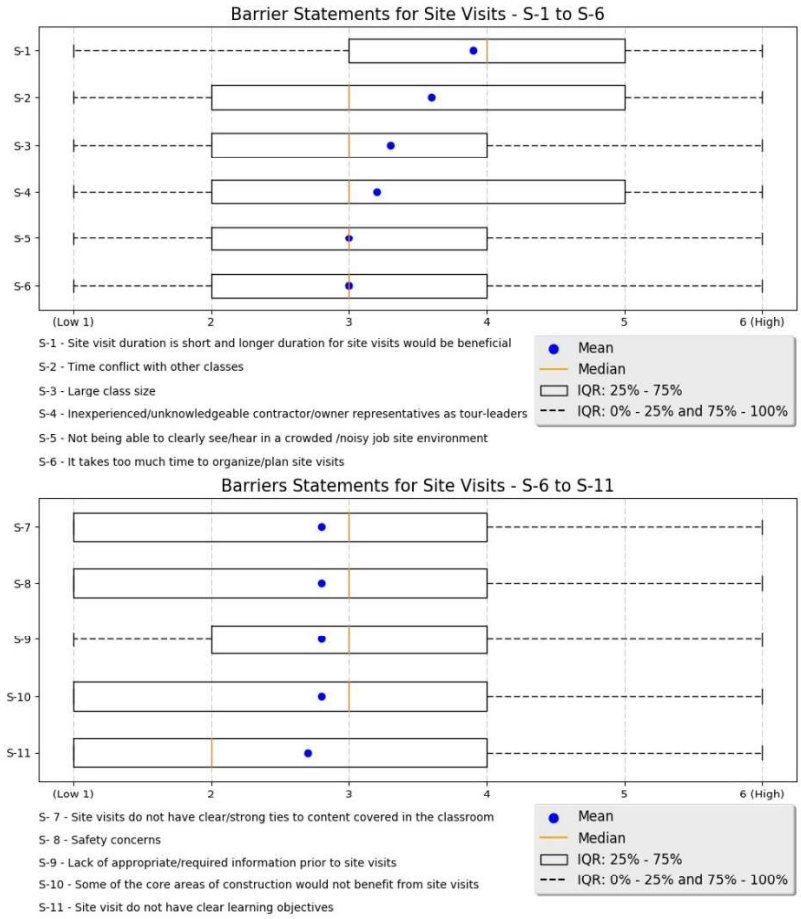

Figure 4. Barriers for Site Visits.

Finally, the lowest scoring statements tied to the content that the site visits provide for the students. The low scoring in the statements about site visits not having clear/strong ties to the content covered in the classroom (2.8, 2, 1, 4), lack of appropriate or required information prior to site visits (2.8, 3, 2, 4), core areas of construction would not benefit from site visits (2.8, 3, 1, 4), and site visits do not have clear learning objectives (2.6, 2, 1, 4), suggests that students clearly understand and recognize the value of the interconnection between the class contents and the site visits. One student indicated that *"[instructors] have to make sure that certain points are covered [on the visit] for us to learn the class lessons"* and another student recognized this importance by stating that *"if [site visits] don't add to our knowledge base and don't clearly show something we're learning, it's more of a useless field trip"*. It noteworthy that all the question on this section presented large spreads in the collected data, signifying that there might be disagreement among the respondents regarding these perspectives.

Research Limitations

This research has limitations due to the selected research design. As descriptive research was used to analyze the results obtained data collected, these cannot be used to provide generalizations over the population of the study. As this is a pilot study of exploratory nature, a general overview of the variables and factors affecting the topic is presented as it was directly reported by the respondents. Additionally, the open-ended qualitative section of the survey is non-replicable, as this data exclusively represents the respondents for the collected sample.

Conclusion and Further Work

Site visits in the construction domain are interactive learning experiences that allow students to better understand class related concepts and provide opportunities to communicate with professionals. This research aimed to explore the benefits and barriers of site visit application from the perspective of students. It was observed that students find great value in observing the construction environment and interacting with construction professionals in a real-world context. By getting this hands-on experience students are able to relate concepts obtained in traditional classroom settings with on-site experience of the real construction environment. This also adds value to their education as they have the opportunity to interact with construction professionals who might not be available in regular classroom session. Alternatively, the students perceived that the highest impacting barriers for site visits were related to the short spans of time spent on the sites and the substantial amounts of information required to be absorbed in such a short visit. Additionally, it was indicated by the students that time conflict with other classes, and large class sizes, limited the ability of students to better understand the entire construction processes or activities. The outcome of this study is to offer insight regarding the information to be collected in larger-scale study from students, faculty, and industry professionals in relation to site visits.

As it is recognized that site visits are essential for the student understanding of construction-related concepts both in practice and in the literature, further study is necessary to identifying how the application of these visits impact different core subject areas in the construction curriculum. This assessment must accurately measure the importance of the benefits and the barriers of site visits using inferential statistics which requires a longitudinal study with larger samples of the targeted population. Moreover, to identify new opportunities to improve construction education, the perception of the industry professionals must be also taken into consideration, comparing student, faculty, and industry perspectives. Finally, additional research is required to establish correlations between the need for site visits and core subject areas in the construction curriculum, the cause and effects of these visits to the benefits and barriers, and the other possible external and cultural factor (e.g. weather, teaching philosophy, previous site visit experiences, internships/co-ops, or workshops, and local culture) that might influence the site visits.

Acknowledgements

Thanks to Jim Sullivan, Bryan Franz, and Hashem Izadi Moud from Rinker School of Construction Management at the UF for helping with the survey review and development. We would also like to acknowledge to all ASC members that provided their responses for the survey.

References

Ashford, P. and Mills, A. (2006). Evaluating the effectiveness of construction site visits as a learning experience for undergraduate students enrolled in a built environment course. In Experience of Learning. Proceedings of the 15th Annual Teaching Learning Forum, 1-2.

Blinn, N., Robey, M., Shanbari, H., and Issa, R.R.A. (2015). Using Augmented Reality to Enhance Construction Management Educational Experiences. Proceedings 32nd CIB W078 Workshop, Eindhoven, The Netherlands, 8 pp.

Eiris Pereira, R., and Gheisari, M. (2017). Site Visit Application in Construction Education: A Descriptive Study of Faculty Members. International Journal of Construction Education and Research. (ACCEPTED, PUBLICATION PENDING).

Farrow, C.B., Tatum, M.C., Michael, M. and McCabe, C. (2012). A Preliminary Study to Enhance Communication on Construction Field Trips. 48th ASC Annual Int. Conf. Proc., Associate Schools of Construction, Windsor, CO.

Gunhan, S. (2015). Collaborative Learning Expericen in a Construction Project Site Trip. Journal of Professional Issues in Engineering Education and Practice, 141(1):04014006 DOI10.1061/(ASCE)EI.1943-5541.0000207

Janovy, J., & Major, K. M. (2009). Why we have field stations: reflections on the cultivation of biologists. BioScience, 59(3), pp. 217-222.

Kajewski, S. (1999). Virtual construction site visits via the World Wide Web. Australasian University Building Educators Association conference (pp. 125-129).

Knupfer, N. N., and McLellan, H. (1996). Descriptive research methodologies. In D. H. Jonassen (Ed.), Handbook of research for educational communications and technology (pp. 1196–1212). New York: Macmillan.

Manzanel, R. F., Rodríguez Barreiro, L. M., & Casal Jiménez, M. (1999). Relationship between ecology fieldwork and student attitudes toward environmental protection. Journal of research in Science Teaching, 36(4), pp. 431-453.

Mills, A., Ashford, P., & McLaughlin, P. (2006). The value of experiential learning for providing a contextual understanding of the construction process. AUBEA 2006: Proceedings of the 31st Australasian University Building Educators Association Conference, 1–13.

McClam, T., Diambra, J., Burton, B., Fuss, A., and Fudge, D. (2008). An Analysis of a Service-Learning Project: Students' Expectations, Concerns, and Reflections. Journal of Experiential Education, vol. 30(3), 2008, pp. 236-249.

Pérez, F., Granger, B. (2007) IPython: A System for Interactive Scientific Computing, Computing in Science and Engineering, vol. 9, no. 3, pp. 21-29, May/June 2007, doi:10.1109/MCSE.2007.53. URL: http://ipython.org

Senior, B. A. (1998). “Infusing practical components into construction education.” J. Constr. Educ., 3(2), 92–101.

Singh, A. (1992). “Experience-based issues in construction education.” J. Prof. Issues Eng. E