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Research Article

Construction Sites Visits for Civil Engineering Students: Gains, Barriers, and Suggestions

Ehab Soliman[1]*, Khaled Alrasheed[2], Tarek Zayed[3] and Eslam Mohammed Abdelkader[3,4]

[1]*Lecturer, Civil Engineering Department, Faculty of Engineering and Petroleum, Kuwait University, P.O. Box-5969, 13060 Safat, Kuwait*

[2]*Associate Professor, Civil Engineering Department, Faculty of Engineering and Petroleum, Kuwait University, P.O. Box-5969, 13060 Safat, Kuwait*

[3]*Professor, Department of Building and Real Estate, Faculty of Construction and Environment, The Hong Kong Polytechnic University, Kowloon 999077, Hong Kong*

[4]*Assistant Professor, Structural Engineering Department, Faculty of Engineering, Cairo University, Giza, Egypt*

***Corresponding author:** Ehab Soliman, Lecturer, Civil Engineering Department, Faculty of Engineering and Petroleum, Kuwait University, P.O. Box-5969, 13060 Safat, Kuwait

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Abstract

Visiting construction sites is essential for civil engineering students' university education. This study aims to assess the experiences of various civil engineering students during their conducted visits to construction sites. This study also aims to build a suitable and effective instrument for an effective site visit and evaluate the impact of a construction site visit to bridge the theory and practical bases for civil engineering students. A questionnaire is designed to collect students' perspectives to identify their gains, barriers, and recommendations to the conducted site visits. Participants were divided into two distinct groups: male, and female groups, and one-visit or no-visit groups of respondents. Statistical analysis was done to evaluate response data normality and check the statistical difference between the groups of respondents. To ascertain research results, a site visit checklist is proposed and verified to ensure the students' site visit will succeed. Results of the study revealed that there are many gains the students acquired from the site visit, and they recommend having more organized site visits. Consequently, this paper also emphasizes that male students dealt positively more than the female group of students. The study demonstrates that conducting site visits for civil engineering students effectively acquires knowledge about construction site works and highlights the areas to be improved in the visit. It also proposes a checklist for more efficient site visits for civil engineering students.

Keywords: Construction; Civil Engineering Students; Site Visits, Questionnaire; Weighted Average; Female

Introduction

The construction site visit is very important, especially for civil engineering students. The site visit has many advantages that can be useful for civil engineering stents such as gap the distance between theories that have been taught in classes and the practical applications in real life [1,2]. Construction site visits also provide an opportunity for students to directly interact and communicate with all groups involved in the construction site. Construction management (CM) education exemplifies how to apply principles of project management in a construction site [3]. Construction Management is a lecture-based course and includes many project-related administrative topics. Most students who take this course have no previous construction project experience. This type of course is typically

instructor-centered, i.e., it is taught with passive learning methods [4]. Too many strategies are developed to make this type of course more interactive, applying a site visit is one of them.

Hence, construction site visits will enhance the educational component in teaching and learning CM in general. The student can learn about project management practices related to health and safety, environmental issues, and logistics management on the visits. It also helps students through exposure to the technical language used in sites [5-7]. This study is an evaluation for conducting a site visit which is one part of the construction management course in one of the largest public universities in the Gulf area. This Study information was gathered in the fall and spring semesters 2022-2023. The CM students are directed to conduct a construction site visit for an under-construction project. The students were asked to write a report showing their visited project in terms of general project information, owner, contractor (s), main project complements, comments for project site organization, time status, and safety issues. Furthermore, the students were asked to communicate with construction personnel in order to identify the major problems that projects face and how to solve or deal with them. In the light of foregoing, the prominent objective of this study lies in evaluating the student point of view regarding the importance and efficiency of conducting site visits during the studying period and measuring site visit effect on their educational level enhancement.

Study Objective

The purpose of this study is to build a suitable and effective instrument for an effective site visit as well as to evaluate the impact of a construction site visit as a means of bridging the theory and practical bases for civil engineering students.

Research Background

Civil engineering education needs to visit a construction project site to better understand theories and principles that the civil engineers learned in their universities [8]. Civil engineering students must be supported with technical and practical engineering knowledge apart from the theoretical principles [9]. Construction site visits are one of the approaches that endorse that job site visits combine theory with practice [10,11] recommended learning from construction site visits which can utilize the experience-based learning style, whereas this type of interaction renders an opportunity for students to observe, reflect, process, and comprehend real-world situations and views associated with the construction practices. Olayiwola et al. [12] investigated construction-relevant topics that need to complement site visits through semi-structured interviews, focus groups, and online questionnaires. They suggested that the most demanding construction disciplines are in relation to equipment, excavation and foundation, safety, logistics and methods of building.

Several studies discussed the benefits of learning by observing real-world practices [13]. Site-based learning has been recognized to be a powerful tool in helping students to better understand the core concepts and raising their enthusiasm [14]. Bamberger and Tal [15] reported that site visits have improved students in terms of recalling facts and details of the experience that students have gained during the site visit. Construction engineers spend a lot of time on-site visits, but visit effectiveness has not been explored, and its effect on project performance remains unclear [16]. Ismail et al. [17] studied the effectiveness of the site visit approach in teaching and learning construction site safety and compared the achievement and understanding between male and female students. The result showed that students with one site visit have better achievement and understanding compared to students with zero site visits. There are some barriers that can hinder the implementation of too many sit visits for civil engineering students such as unawareness of safety regulations that are followed in construction sites [14], remoteness from university locations or online education [18], or time out deducted from educational time [19].

These barriers and others result in preventing students from having site visit learning experiences, and to alleviate these barriers, digital or virtual construction sites can be employed for construction technology education [7]. Too many attempts are proposed to apply virtual site visits, for example, Lin et al. [20] developed a videogame platform allowing students to know the role of a safety inspector to identify hazards in a virtual environment. Testing of the proposed preliminary game system showed that the platform can increase learning interest, create a joyful learning process, and motivate students to refresh their safety knowledge. Eiris et al. [21] developed a web-based virtual environment that offers a social field trip experience for large groups of students that resembles real-world job site conditions. The use of this web-based virtual model enables a significant increase in student-perceived knowledge of construction work during the virtual site visit. Goedert and Rokooei [22] created a simulated environment for students to learn estimating and scheduling. The objective of the game was to provide an effective and engaging real-world contextual construction experience in a safe environment. The game was demonstrated to be an effective educational tool as it had a positive effect on participants' expedience of the construction context. Hernandez-Carrasco et al. [23] looked into the educational and motivational implications of virtual site visits on students. Their analysis showed that virtual learning encouraged students to keep perceiving new construction-related topics. Additionally, it enabled them to lessen their anxiety and distraction during the COVID-19 epidemic. Eiris et al. [24] investigated the utilization of iVisit for teaching problem-solving skills to students. It was opined that no significant differences were exhibited between paper-based learning and iVisit in perceiving abstract knowledge of construction engineering. However, significant differences were present between the two learning ways in promoting the problem-solving skills of students.

Kim et al. [25] analyzed the differences between VR and 360^0 photogrammetry in teaching construction management courses. Students reported that both modalities were able to render proper simulation of an actual construction environment. Moreover, Oculus Go was able to create more interaction and realism than iPad. Sun et al. [26] created an online location-independent site visit, where contextualized learning is dangerous, unsafe, or impossible to achieve such as in the pandemic environment during

the COVID-19 period. The outcome of the study manifests that such virtual collaborative site visits present unique opportunities to enable online delivery of spatiotemporal contexts of sites and offer an effective remote alternative when these learning opportunities are not available. Sami Ur Rehman et al. [27] explored the potential use of immersive virtual reality (IVR) in educating students on construction planning and control. Results demonstrated that IVR was significantly more efficient than 2D documents in pinpointing schedule conflicts and errors. It was also suggested that dizziness, motion sickness, and lack of IVR knowledge were the hurdles of implementing IVR in construction education.

In the same vein, An et al. [28] studied the use of VR in teaching construction engineering curriculum. The participants were divided into 50 students and they were taught using VR and traditional teaching modes. It was argued that VR teaching sustained a positive impact on amplifying the students' enthusiasm for learning. Nevertheless, it did not hold an advantage in pursuing immediate theoretical knowledge. Shojaei et al. [29] investigated three kinds of video formats in the delivery of construction management courses, namely 2D flat, 180 degrees, and 360 degrees. In this context, students seconded virtual visits as informative and mesmerizing delivery methods and they preferred 360-degree video formats over 180 degrees and 2D flat. Chen et al. [30] developed The Project Live Platform that aimed to immerse students in construction technology education through virtual site trips. Afterwards, students' learning experiences were appraised according to quizzes and questionnaire surveys. It was argued that students who engaged in virtual tours managed to attain higher marks than their counterparts who used lecture notes.

Alternatively, Salman [31] compared the significance of actual field and virtual field trips in engaging students in construction management education. In this respect, the steel sculpture application was exploited to examine the validity of students' learning in virtual reality. Their study was executed on a control group of students in structural-related courses. In addition, the Oculus Quest headset was used to provide proper structural learning for students. Results pointed out that students who attended virtual trips scored higher quiz marks than students who participated in actual site trips. Similarly, LoPiccolo [32] assessed the significance of actual and virtual field trips based on qualitative surveys filled by students in the architecture and construction management domain. It was indicated that students preferred and benefited from field trips. In addition, actual site visits encouraged students to learn about sustainable construction-related topics.

Despite the usefulness of virtual learning, they still cannot fully deliver the needed learning outcome on their own. In a study by Seifan et al. [33], they examined the usefulness of virtual and real construction site visits. Their results indicated that virtual construction site visits are an enjoyable way of learning. Nonetheless, they cannot stand as a substitution for real construction site visits. In addition, real site visits could endorse the students in selecting the path of their careers. Similar conclusions were drawn by Kline et al. [34] scrutinized the perspectives of students towards virtual construction trips. In their study, a virtual environment was designed using Struction Site, Inc. and 360^0 digital camera. Pre- and post-surveys showed that students perceived virtual trips as an important tool for skill and knowledge acquirement besides being a prominent source of education and knowledge gaining in commercial construction. Moreover, they saw virtual trips as a quintessential complement to real trips.

The construction management education course is a core course for many universities providing civil engineering education programs. Construction is understood as a very hands-on industry and, as a result, this is also a feature expected by the students [35,36]. There are a variety of construction management education technologies. The normal one is providing lectures, with textbooks visual presentations, and small group tutorials. However, critical thinking and contextual engagement require a changed teaching strategy such as frequent site visits and construction personnel seminars [37,38]. In view of the above, this study aims to evaluate the site visit conducted by civil engineering students from the university in the fall and spring 2022-2023 semesters.

Research Methodology

The ultimate objective of this research study lies in exploring and analyzing the impact of real site visits on construction students' knowledge. The conceptual framework of the present research methodology is explicated in Figure 1. The present research study starts by reviewing previous literature pertaining to the importance of site visit in construction management education and identifying the barriers that can be encountered during the site visit. To evaluate students' site visit efficiency, a set of questions are designed in a survey questionnaire distributed to the students who conducted the site visit. The questions are retrieved from previous research work and a group discussion with civil engineering professors. Most of the questionnaire questions were from closed type questions. Students are asked to answer the questionnaire questions after they conducted the site visit. The collected data were gathered in two academic semesters: fall and spring 2022-2023. The next step involves questionnaire results analysis starting by the demography analysis of respondents. The collected data are then analyzed using statistical analysis of weighed average method to determine the benefits, barriers, and recommendations from participants students. The participants then are divided into two groups: male and female students, and who visited construction sites before or not. The hypothesis testing is carried out to study the differences between the aforementioned groups in the third step. The fourth step encompasses exploiting Kolmogorov-Smirnov test [39], Wilcoxon rank-signed test [40], Binomial sign test [41] and Mann-Whitney U test [42] to appraise the differences between students' responses in years of 2022 and 2023. The fifth step includes deriving conclusions and recommendations according to the gathered results. Table 1 shows the distribution of number of students participated in the study questionnaire.

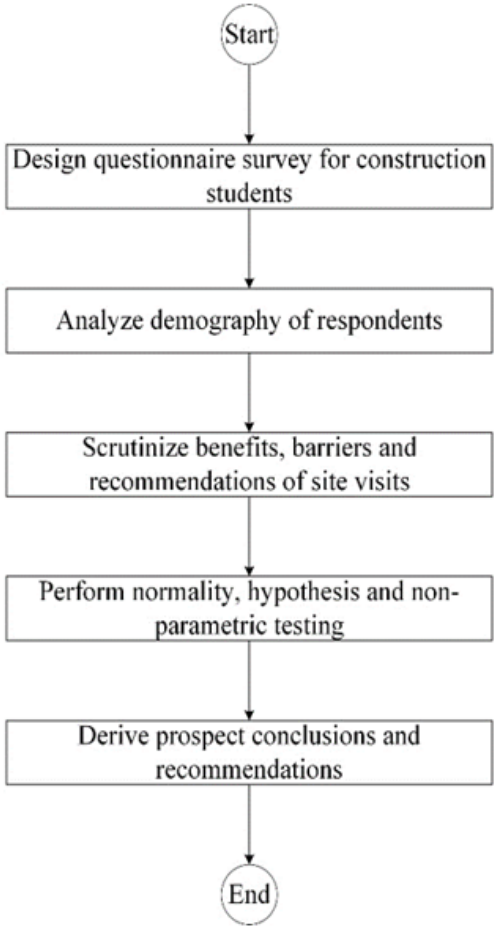

Figure 1: Framework of the developed methodology for studying the impact of site visits on construction students

Table 1: Sample distribution of students.

Academic Course	Male	Female	Year 4	Year 3	Site visit- Yes	Site visit- No
Fall 2023	10	17	24	3	18	9
Spring 2023	3	23	25	1	14	12
Total	13	40	49	4	32	21
	53		53		53	

Site Visit Description

The students are asked to conduct a site visit for a project in the construction phase. The students are asked to write up a report showing the benefits and comments for their site visit. The students are divided into groups of 3 or 4 students. They prepare their visit by their own contacts. Most of groups conducted their visit in the educational weekend, which can be a working day for construction project personnel.

Questionnaire Design

A questionnaire survey is designed to collect the students' perspectives regarding the conducted site visit. The questionnaire consists of four sections. They address students' general information, the visited project information, the benefits of conducted site visit, the barriers of conducted site visit, the student recommendations for future site visit and students' general evaluation for the conducted site visit. All the questions were from closed type. A web link was shared to students who conducted the site visit and total of fifty-three students participated in questionnaire reply. Appendix 1 shows the used questionnaire.

Analysis and Discussion

This section reports demographic analysis of respondents. It also delineates a detailed scrutinization of gathered responses.

Demographic Analysis

Figure 2 shows the respondents' demographic analysis. It can be observed that the majority of participants are from females (75.47%), four-year students (92.45%) and have a site visit before (60.38%). Despite the difference of motivations for female and male students to enroll the engineering programs in the Gulf area [43], it was recognized that the number of females who enrolled the construction management program has been increased [44]. Figure 3 demonstrates the surveyed projects for site visits. It can be viewed that most of the surveyed visited projects were from public owner type (68%), and the surveyed projects are from different purpose types.

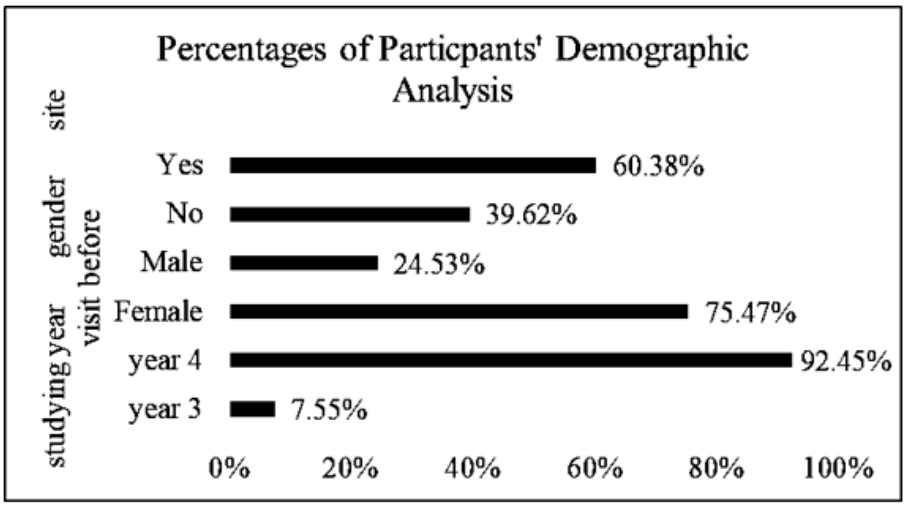

Figure 2: Participants' Demographic Analysis.

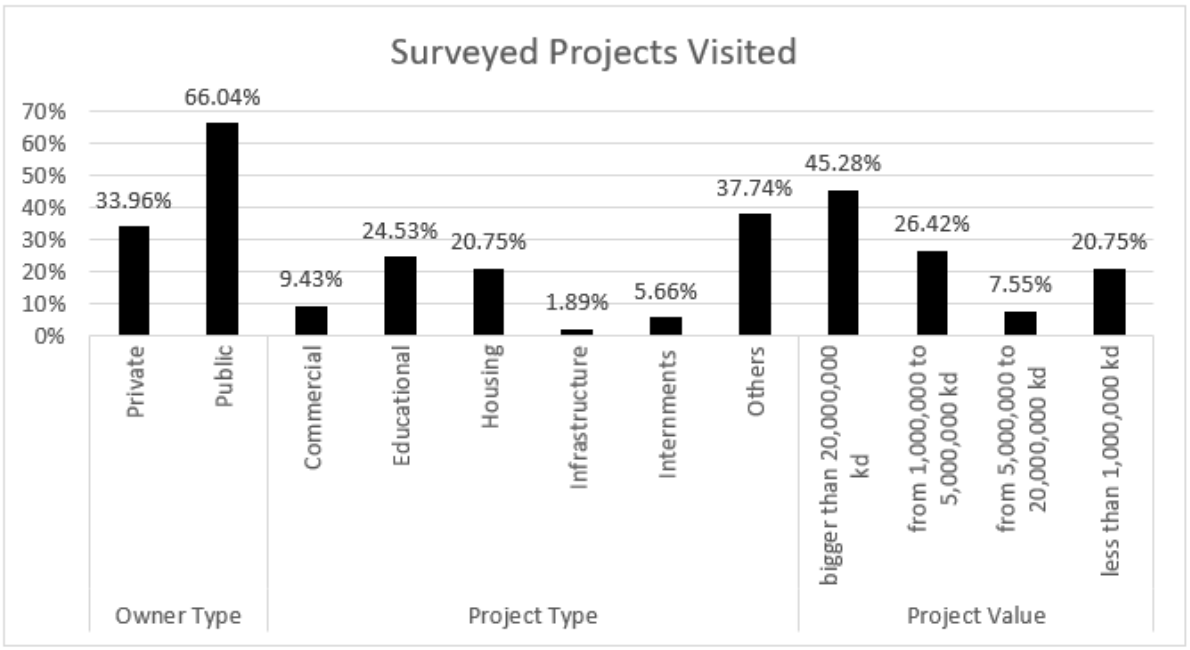

Figure 3: Surveyed Projects for the Site Visit.

Benefits of Site Visit

The respondents are asked to define their gains from the site visit. Nine predefined gains are listed for respondent to choose from. The respondent can choose more than gain. Figure 4 shows the percentage of the predefined set of gains as a percentage from all participants group. Many of the predefined listed gains are shared by more than 50% of all group. The highest gain that recorded by student is "understanding how the theoretical knowledge is fitted in site practice (70%)", followed by "to encourage the student to be a civil engineer (66%)". The gains in other categories recorded less percentages.

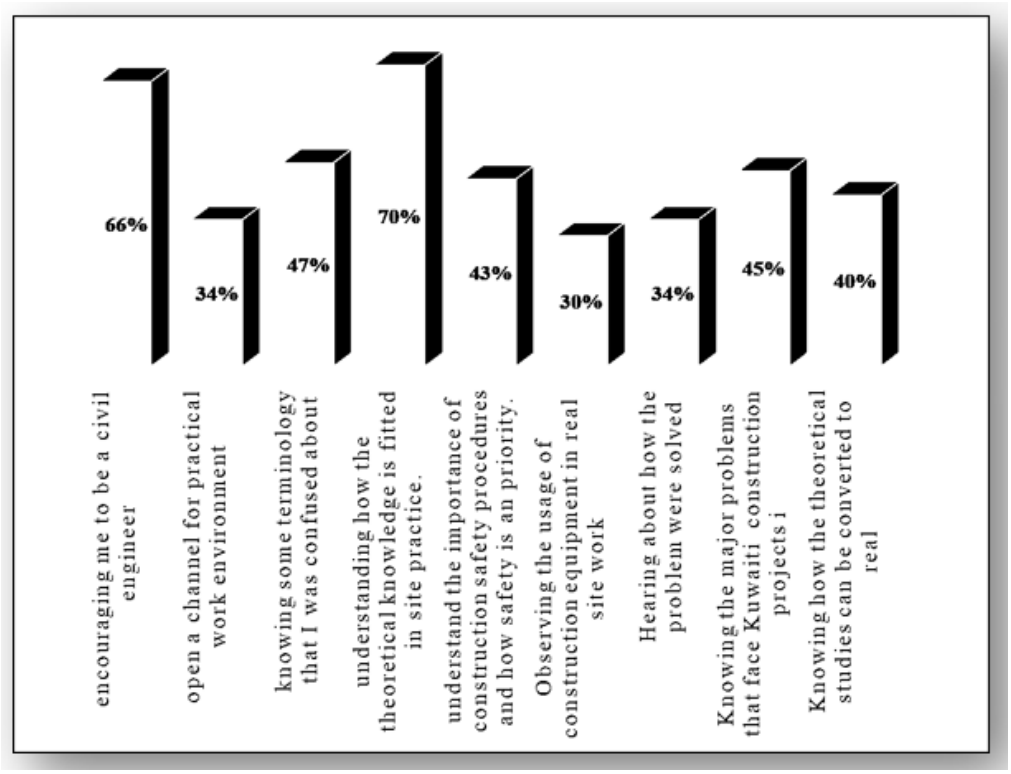

Figure 4: Percentage of Site Visit Gains as per Respondents Group.

Barriers to conduct the site visit

The respondents are asked to define their faced barriers to conduct the site visit. Eight predefined barriers are listed for respondent to choose from. The respondent can choose more than barrier. Table 2 shows the number of students cited per each barrier. As seen from Table 2, the highest ranked order from students' perspectives was the site visit preparation is too much preparation (40%). This is because it was the students' obligation to prepare the site visit and choose the project. Even though the students had a letter from the university to the project personnel to ease their visit, they did not have much communication with the industry, and they encountered dissatisfaction from many different projects. Also, the students complained that site visits consumed too long time and the project is distant from university location.

Table 2: Site Visit Barriers from Students' Perspectives.

Site Visit Barriers	No of students cited (2022)	No of students cited (2023)	No of students cited	% of Total group
Needs too much preparation	12	9	21	40%
Takes too long time	8	12	20	38%
Far away from university location	6	5	11	21%
The site personnel use unknown or familiar words	1 2		3 6%	

Unavailability of proper site to visit	7	7	14	26%
Weather conditions	3	6	9	17%
Site personnel were not welcoming There was nothing to show in site	1	5	6	11%

Recommendations for Efficient Site Visit

The respondents are asked to suggest their recommendation to increase benefits from their study. Six predefined recommendations are listed for respondents to choose from. The respondent can choose more than one recommendation. Table 3 shows the number of students cited per each recommendation. As seen from Table 3, 58% of the group suggested organizing site visits by university not by themselves. The main barrier that students mentioned in Table 2 was that they had organized the site visit by themselves, and they faced difficulty in the site sorting. They chose that the site visit recommended to be organized by the university.

Table 3: Students' Recommendation to More Efficient Site Visit. Students' General Evaluation

Recommendation for more efficient site visit	No of students cited (2022)	No of students cited (2023)	No of students cited	% of Total group
To be organized by the university	19	12	31	58%
To be accompanied by a faculty staff member	1	4	5	9%
Too many students in one trip is better than a limited number	1	5	6	11%
Applying virtual site visit - if applicable	1	0	1	2%
Applying site visits regularly - once a year	1	3	4	8%
Choose a limited number of projects and direct students to visit	2	0	2	4%

Students finally were asked to evaluate their site visit with two general questions; the first one asked them to evaluate their visit based on a five-point rating system. The average was 4.05 which means that they felt that the site visit was valuable. The other question was a general statement to evaluate their site visit and if the site visit can be replaced by another study activity such as an assignment or homework. Almost all the group numbers (52 /53) acknowledged that the site visit is helpful and cannot be replaced by another educational activity.

Hypothesis testing

The study test two hypothesis that: there is significant statistically difference between the point of view of male and female engineering students toward the importance of site visits in construction education. The alternative hypothesis was: that the female group will act more positively with site visits than the male group as the male group has more chance to visit sites in summer or any vacation time. The other hypothesis is that those who did not visit the site before will act more positively with a new site visit. As the number of each group is not identical, the hypothesis will be evaluated from three questionnaire questions: the average number of site visit gains per student, the number of barriers faced per student, and the general evaluation rank out of 5 per each student either male or female. Table 4 reports the comparison criteria results.

The male group acted positively with the site visit more than the female group. This does not establish the proposed hypothesis. This might be because of two reasons: the majority of the male group did practice site visit before and they felt that the exposure to site visit was more valuable. The other reason may be because of the idea that the female engineers work in offices more than construction sites, so they felt less positively about site visit than the male group.

Table 4: Comparison Between Male and Female Participants' Groups.

Evaluation criteria	Male	Female
Average number of gains from site visit per student	4.615	3.9
Average number of barriers from site visit per each student	1.923	1.7
General evaluation out of 5	4.69	4.025

To evaluate the perspective difference between students who conducted a site visit before and those who did not, the same three criteria are used. Table 5 shows the difference between the two groups (who visited sites before and who did not). There is no doubt that the students who did not conduct a site visit before gain benefits more than those who visited before. This analysis approves the hypothesis.

Table 5: Comparison Between Who Visited Sites Before with Not Visited Before.

Evaluation criteria	"Yes" Visited	"No" Visited
Average number of gains from site visit per student	3.969	4.125
Average number of barriers from site visit per student	1.917	1.372
General evaluation out of 5	3.875	4.25

Responses' Statistical Analysis

This study applies the Kolmogorov-Smirnov test to assess the normality of students' responses about gains, barriers, and recommendations in the years 2022 and 2023. The examined null hypothesis (H_0) denotes that the garnered students' responses follow the normal distribution. Table 6 elucidates the results of the Kolmogorov-Smirnov test for the students' responses. As can be seen, the P-values are greater than the confidence level of 5%. This demonstrates that the null hypothesis is rejected in favor of the alternative hypothesis (H_1), and hence Wilcoxon, Binomial sign and Mann-Whitney U tests non-parametric tests are applied herein in this study. In this regard, these tests scrutinize the null hypothesis (H_0) that demonstrates that there are no statistically significant differences between the student's responses in 2022 and 2023. Table 7 spots light on the Wilcoxon, Binomial sign and Mann-Whitney U tests. It can be inferred that the P-values between the students' responses in 2022 and 2023 are more than the confidence level (5%) across all the assessment criteria. Thus, there are no statistically significant differences between the students' responses and they agree on the garnered gains, encountered barriers, and proposed recommendations.

Table 6: P-values of the site visits assessment criteria using Kolmogorov-Smirnov test.

DATA	P (value)	DATA	P (value)
Gains (2022)	0.128609	Gains (2023)	0.10082
Barriers (2022)	0.225881	Barriers (2023)	0.211647
Recommendations (2022)	0.384672	Recommendations (2023)	0.345904

Table 7: Statistical comparison between the responses of students in the years of 2022 and 2023.

Assessment criteria	Wilcoxon test	Binomial sign test	Mann-Whitney U test
Gains (2022) and Gains (2023)	4.76×10^{-1} (H_1)	2.45×10^{-1} (H_1)	8.33×10^{-1} (H_1)
Barriers (2022) and Barriers (2023)	5.08×10^{-1} (H_1)	2.19×10^{-1} (H_1)	6.88×10^{-1} (H_1)
Recommendations (2022) and Recommendations (2023)	4.22×10^{-1} (H_1)	6.53×10^{-1} (H_1)	8.06×10^{-1} (H_1)

Design of checklist

a site visit checklist was designed based on the questionnaire results and was designed to ensure that the site visit is well-prepared and acquires the most benefits of the site visit. Designing a checklist is a process to make sure a required function is confirmed, for example, Chang et al. [45] used a checklist to self-evaluate engineers' site visits. The designed checklist is divided into three sections: before conducting the site visit, during the site visit, and post conducting the site visit. The first section includes questions to make sure that all the required steps preparation is done. The second section is to make sure all the required information from the site visit is collected. The third section was designed to make sure that the required information was put in a technical form and evaluate the site visit consequences. Appendix 2 shows the used checklist. To verify the checklist, another sample of eleven students who conducted the site visit were asked to evaluate the checklist items and ensure the efficiency of using the proposed checklist.

Checklist Validation

To validate the checklist, the checklist is surveyed through students in civil engineering at the university in the semester 2023-2024 spring course. They are asked to evaluate the criteria as a success tool as a civil site visit requirement. Eleven respondents were collected. Table 8 shows that the criteria were verified and the respondents weighted average for the proposed checklist questions are more than 2.5 which is the least value to accept a criterion as mentioned by Benjamin and Cornell [46]. As shown from Table 8, most of the proposed questions contained in the proposed checklist are verified. The transportation procedure has the least weighted average, that is may be because of the students uses their own cars, which is usual in The Gulf area state.

Table 8: Checklist Verification.

code	Criteria	Relevant as a Criteria		Criteria Average Weight
		yes	no	
1	Before conducting the site visit			
1-1	Communication and contacts			
1-1-	Choosing site visit group members	100%	0%	4.90
1-1-	Contact the faculty staff member (organized by faculty	100%	0%	4.80
1-1-	Contact the person in charge of the project site visit	91%	9%	4.70
1-2	Project choice			
1-2-	Project information gathering	91%	9%	3.67
1-2-	Searching for road and transportation	82%	18%	3.09
1-3	Project visit set up (time,…)			
1-3-	Time	91%	9%	4.33
1-3-	Transportation facility	64%	36%	2.50
1-4	Prepare required facilities.			
1-4-	Camera	91%	9%	4.25
1-4-	smart phone	91%	9%	4.00
1-4-	notebook	91%	9%	4.30
2	During the site visit			
2-1	Meeting venue			
2-1-	Meeting the right person	100%	0%	4.89
2-1-	Meeting in a suitable site location (meeting room,	82%	18%	4.67
2-1-	Taking a site tour	91%	9%	4.63
2-1-	Wearing safety clothes and	91%	9%	4.56
2-1-	Time of conducting (hours), weather, site visit location	100%	0%	4.67
2-2	Collect essential data			
2-2-	Project general information (title, duration, cost, contract	100%	0%	4.70
2-2-	Project stakeholders and leaders	91%	9%	3.90
2-2-	Site organization	100%	0%	4.63
2-2-	Project components and description	100%	0%	4.50
2-2-	Collect the required project available data (drawings,	100%	0%	4.90
2-2-	Project schedule	91%	9%	4.38
2-2-	Project safety precautions and instructions	82%	18%	4.38
2-2-	Project time status	91%	9%	3.89
2-2-	Project major problems and how to solve	100%	0%	4.83
3	Post site vis			
3-1	Report writing.			
3-2	Comments on site visit function			
3-2-	Data gathering	100%	0%	4.67
3-2-	Easy of conducting	100%	0%	4.71
3-2-	Hostage and friendship of site personnel	82%	18%	4.83
2-4	Comment on the linkage between site visits and academic lessons			
2-5	Identify benefits, barriers, and recommendations.	100%	0%	4.29

Conclusions

No doubt that connecting site construction industry is very crucial for civil engineering students. Many benefits that can be resulted from site visit for civil engineering students. Many site visits were conducted as part of construction management education course in the university in Fall and spring 2022-2023. The students were required to prepare, organize, and conduct a site visit and writing up a site visit report as a result of their visit. A questionnaire was designed to assess student perspectives regarding their conducted site visits. fifty-three students participated in this questionnaire. The questionnaire analysis revealed that all the participated students believe that the site visit was helpful and important for them. The questionnaire involved asking students to identify the gains, barriers of conducting a construction site visit and their recommendations for an efficient construction site visit for civil engineering students. Examples of the gains they acquired encompassed: engorging me to be a civil engineer, knowing some

terminology that I was confused about, understanding how the theoretical knowledge is fitted in site practice and understand the importance of construction safety procedures and how safety is a priority. They identified that they faced some of barriers during their site visit such as: its needs for too much preparation, the site personnel use unknown or familiar words and weather conditions. They recommend the university to organize student site visit companying with staff member and include the site visit in more than one course. The students are divided into two groups of respondents; male and female group of respondents to evaluate a hypothesis that the male group were more encouraging knowing site works. Three elements were analyzed to compare between the two groups. The analysis proves that male students' group was more positively act with the site visit. To sum up, for evaluation the idea that men would be more supportive of understanding how the site operates, the students were divided into two groups of respondents: male and female. Three factors were compared between the two groups using the analysis. In addition, the collected data showed that the group of male students reacted to the site tour more favorably. The study showed that conducting site visit for civil engineering students is a successful tool fir acquire knowledge regarding construction site works and provide students with a deeper understanding of theoretical concepts. The study results may be used as basis to design a qualified site visit for civil engineering students by overcoming the barriers and taking into consideration students' recommendations for more efficient site visit.

Data Availability Statement

All data that support the findings of this study are available from the corresponding author upon reasonable request.

Appendix

A. Student General Information

1. You are a student in ------- year

o year 3

o year 4

2. Your Gender

o Female

o Male

3. Is this your first site visit?

o Yes

o No

B. General information for the surveyed project

4. Owner Type

o Public

o Private

5. Project Type

o Building

o Civil - Infrastructure (Dams, roads, bridges,)

6. If the project is from building type, answer the following. If the project is from a civil type, skip this question.

o One Building

o Multi-buildings

o High-rise Building

7. Project Purpose

o Educational

o Commercial

o Internments

o Housing

o Infrastructure

- Others

8. Project Budget in KD (KD = 3.25 $)

- less than 1,000,000 kd
- from 1,000,000 to 5,000,000 kd
- from 5,000,000 to 20,000,000 kd
- bigger than 20,000,000 kd

C. Benefits of the site visit

9. This visit helped me in.....(you can tick more choice)

- engorging me to be a civil engineer
- open a channel for the practical work environment
- knowing some terminology that I was confused about
- Understanding how the theoretical knowledge is fitted in site practice.
- Understand the importance of construction safety procedures and how safety is a priority.
- Observing the usage of construction equipment in real-site work
- Hearing about how the problem is solved.
- Knowing the major problems that face construction projects
- Knowing how theoretical studies can be converted into real ones.

10. In general, the site visit was

- helpful and important
- waste of time

D. Barriers of the site visit

11. Identify the barriers to correctly applying the site visit. (you can tick more one choice)

- Needs too much preparation
- Takes too long time
- Far away from university location
- The site personnel use unknown or familiar words
- Unavailability of the proper site to visit
- Weather conditions
- Site personnel were not welcoming
- There was nothing to show in site

E. Your recommendations for a better site visit

12. What are your recommendations for a better site visit (you can choose more than one option)

- To be organized by university
- To be accompanied by a faculty staff member
- Too many students in one trip are better than a limited number
- Applying virtual site visit - if applicable
- Applying for site visits regularly - once a year
- Choose a limited number of projects and direct students to visit

F. General site visit evaluation

13. To what extent, did you evaluate this site visit (up to 5 points- 5 is best)

14. In general, this site visit was

- o Helpful and important
- o Can be replaced by another activity such as assignment, homework,
- o waste of time

Appendix 1: The Used Form of Questionnaire.

Civil Engineering Students Site Visit Checklist Criteria

		Checklist	
code	Criteria	yes	no
1	Before conducting the site visit		
1-1	Communication and contacts		
1-1-1	Choosing site visit group members		
1-1-2	Contact the faculty staff member who will be in charge of the site visit i. e. (organized by faculty member)		
1-1-3	Contact the person in charge of the project site visit		
1-2	Project choice		
1-2-1	Project information gathering		
1-2-2	Searching for road and transportation		
1-3	Project visit set up (time,...)		
1-3-1	Time		
1-3-2	Transportation facility		
1-4	Prepare required facilities.		
1-4-1	Camera		
1-4-2	smart phone		
1-4-3	notebook		
2	During the site visit		
2-1	Meeting venue		
2-1-1	Meeting the right person		
2-1-2	Meeting in a suitable site location (meeting room, office,..)		
2-1-3	Taking a site tour		
2-1-4	Wearing safety clothes and		
2-1-5	Time of conducting (hours), weather, site visit location		
2-2	Collect essential data		
2-2-1	Project general information (title, duration, cost, contract type,...)		
2-2-2	Project stakeholders and leaders		
2-2-3	Site organization		
2-2-4	Project components and description		
2-2-5	Collect the required project available data (drawings, sketches, photos,...)		
2-2-6	Project schedule		
2-2-7	Project safety precautions and instructions		
2-2-8	Project time status		
2-2-9	Project major problems and how to solve		
3	Post site visit		
3-1	Report writing.		
3-2	Comments on site visit function		
3-2-1	Data gathering		
3-2-2	Easy of conducting		
3-2-3	Hostage and friendship of site personnel		
2-4	Comment on the linkage between site visits and academic lessons		
2-5	Identify benefits, barriers, and recommendations.		

Appendix 2: Proposed checklist.

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