



A Collaborative Learning Method for Construction Project Delivery Methods

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Abstract

Developing the understanding of construction project delivery methods is one of the major objectives of Construction Management course. This course has been offered by the author for the last three academic years at the University of Texas at San Antonio. The course is lecture-based. The lecture-based course usually leans towards being instructor centered. Recognizing this fact, the author has developed different strategies every semester to keep the lecture more interactive and student-centered. The strategies included from group studies to company interviews and presentations. According to the author's personal experience, traditional homework assignments are not as effective as team-based assignments in a lecture-based management course. Embedding people's skills requires team-based collaborative exercises. In order to enhance students' learning, rather than having traditional homework assignments, different quiz assignments have been designed for the course. The last semester, the author has decided to explore in addition to the lecture, if collaborative working exercises can be effective in learning. The construction project delivery methods topic is used for the collaborative working exercise. First, the delivery methods are presented in a traditional lecture. The Engineering News Record (ENR) Top Lists of Design-Build, Construction Management at Risk, and Construction Management for Fee type of delivery methods are made available to students. Later, they are asked to make a group of five people and investigate those companies' websites in a detailed manner. They are supposed to find out the reasons why these companies became the leaders in respective project delivery methods. They are asked to come up with their own construction company and develop an argument for the audience explaining how their company became one of the leaders in respective project delivery methods. They are also asked to explain their approach (involvement) from initiation to completion of projects by being specific and giving examples of projects from different industry segments. During presentations, the instructor guides them on presentation skills as well. The team based, collaborative working approach creates interaction among students, enhances communication. They enjoy creating together. The results of the evaluation are expected that in addition to traditional lecture, the team based work study approach enhances the understanding of the project delivery methods; students get the chance to work in a team environment, learn by collaborating, and develop leadership skills.

Introduction

Construction Management – I covers broad range of topics such as the architecture-engineering-construction (AEC) industry, project participants, project delivery methods, project chronology and specific phases of a construction project (preconstruction, construction, closeout, post-construction). Many of the technical issues are covered in specific courses such as Estimating- I, Estimating – II, Construction Management – II and MEP in Construction. Besides technical skills, the necessity of integrating interpersonal skills has been mentioned by many scholars.^{1,2,3,4} Construction Management - I is a lecture-based course. The lecture-based course is instructor centered. In order to integrate interpersonal skills the author has developed different strategies every semester to keep the lecture more interactive and student-centered. The strategies included from group studies to company interviews and presentations.

According to the author's personal experience, traditional homework assignments are not as effective as team-based assignments in a lecture-based management course. Embedding people's skills requires team-based collaborative exercises. In order to enhance students' learning, rather than having traditional homework assignments, different quiz assignments have been designed for the course. The last semester, the author has decided to explore in addition to the lecture, if collaborative working exercises can be effective in learning. Developing the understanding of construction project delivery methods is one of the major objectives of Construction Management - I course. The paper includes an interactive teaching method applied to that topic. The construction project delivery methods are very lecturer-centered topic. Despite the nature of the topic the attempt for an application of an interactive teaching method is the original aspect of the study.

Literature Review

Construction professionals are surrounded by different personalities while performing their jobs. Various project participants such as owners, architects, engineers, subcontractors and laborers all have different perspective and motivations. The construction industry needs competitive leaders. Today's complex projects and increased number of stakeholders make the project environment more challenging to lead. Possessing people skills is crucial in order to be successful in construction business. Leadership is even more important in today's challenging construction project environment. Most curricula in the nations' construction programs include necessary technical courses as core courses. Many scholarly work in construction science imply that construction is mostly seen as a technical field but the issue of leadership and interpersonal skills have not been pronounced as they should be.^{2,3,4}

Having good communication skills is another expectation from construction professionals. These skills constitute the majority of interpersonal skills. Communication comes in two forms: Verbal and non-verbal. In many cases, construction professionals accomplish work tasks by verbal communication. Besides verbal communication, non-verbal communication also plays an important role. The professor of psychology Albert Mehrabian established the rule of 7% - 38% - 55%⁵. According to this rule, a face to face communication is composed of 7% words, 38% vocal tone, and 55% body language. Construction business cannot be excluded from this rule⁶.

Construction professionals need to lead many different groups to accomplish project activities, conduct meetings, and make presentations to win projects. An example is included in the study of Loosemore and Patrick (2002)⁷. Working with diverse migrant workforce is one of the major problems that needs to be addressed in improving the productivity in Singaporean construction industry. Dainty et al. (2006) mentioned that different motivations of different project stakeholders can always cause problems and promotes conflict⁶. Communication skills can be crucial in times where you need to resolve problems among stakeholders.

Communication skills are important not only in project execution phase but also in winning projects and procurement phases. Construction professionals make presentations to get new projects. They usually compete with prequalified contractors and the presentation itself can play a major role in winning new contracts. During presentations, the idea is that the project team establishes chemistry with owners' team. In other words, not only project team members' experience and capabilities but also their people skills are evaluated by owners. Team members' body language reflects both their respective role (superintendent, project manager, project engineer, project executive, etc.) and their personality.

Teaching Methodology

The project delivery methods are first covered in a traditional lecture. In addition to theoretical knowledge, students are also introduced to the Top Companies' Lists of Design-Build, Construction Management at Risk, and Construction Management for Fee type of delivery methods published by the Engineering News Record (ENR) Magazine^{8,9}. It becomes easier to deliver the content when actual data is incorporated from the industry because students are more interested with theoretical content when it is provided with real life data.

The students are asked to make a group of four people. They are requested to explore the websites of construction companies that are listed in ENR's top lists. This way, they become familiar with leading companies which developed expertise in specific delivery methods. They are supposed to observe the reasons why these companies are the leaders in respective project delivery methods. Also, they become familiar with the types of projects being delivered with those delivery methods.

After the research, the part of the homework, students are asked to present their own construction company and develop an argument for the audience explaining how their company became one of the leaders in respective project delivery methods. They are also asked to explain their approach (involvement) from initiation to completion of projects by being specific and giving examples of projects from different industry segments. During presentations, the instructor guides them on presentation skills as well.

Findings and Analysis

In order to have an idea about the students' opinion on the learning experience, a survey which is composed of open-ended questions is given at the end of the presentations. The author plans for

detailed evaluation with statistical analysis after repeating the study for several semesters. This way, more data will be collected and comparative statistical analysis will be made.

The following questions are asked to get the students' opinion:

- 1) How have you benefited from the group study?
- 2) How can you compare your knowledge after theoretical instruction vs. teamwork exercise?
- 3) What are the lessons learned in a group study?
- 4) What do you think of team members and how would you select them in the future?
- 5) Do you think you need to improve your presentation skills? Are they important from the marketing standpoint?

Total 25 out of 28 students answered the evaluation questions. All answers were positive for Question#1. One of the students has noted that it was constructive for him to practice in a group. Also, noted that collaborating, dividing the work load and scheduling were all skills that they have used. It also helped him to learn more about the real companies. Another student has mentioned that everyone in the group knew something that he/she did not know. Another comment was that the exercise process made him/her understand what they learned in class. Another answer was that the group study has shown him real life examples of the different project delivery methods. This helps them connect what they learn in class and how it is used in the industry. By being involved in teamwork they can learn more in less time another student reported.

Question#2 was also answered by 25 students. Other than one student they all confirmed that their knowledge has improved further after the teamwork assignment. One student said: "I understood the topic conceptually before; however I have now been exposed to new ideas involving these firm types." Another student mentioned that the presentations helped to have a better understanding of project delivery methods. Also, another student said that by researching various companies he developed better understanding of project delivery methods than the lectures alone would have.

Question#3 was answered by 22 students. Three students reported unfavorable experiences due to poor performance of other group members. The majority of the students agreed that their learning experience enriched because of the collaborative work. One student reported that the teamwork and group discussion bring on different aspects of the topics. Also, they can bring up information you might never think about. Another student reported that she learned to listen to others' ideas and working in a good group helps to generate ideas as many people come with various perspectives. One of the students reported that their group observed that they were not as prepared when compared with others. Also, one student mentioned that the group method brings more minds together, all adding input from various background, all are valid and open the minds of other members.

Question#4 was answered by 20 students. Overall, all students had positive feelings about their group members.

Question#5 was answered by all students that participating the survey. They all agreed that this study gave them the opportunity to compare their presentation skills with other groups. They all think that they need to improve their presentation skills and believe that such skills are critically important from the marketing standpoint.

The given answers to evaluation questions give clear indication that the students benefited from this interactive collaborative study.

Conclusions

The presented study constitutes an example of interactive teaching and learning. The study comprises an exercise helping to develop collaborative working, communication and presentation skills. Development of these skills contributes to the development of interpersonal skills. The findings of the study indicate that students benefited from the active learning experience. Students develop more interest when data from the construction industry are integrated to the content. They reported that the study help them to learn about real companies.

Capability of working in a team environment is an expected quality from construction professionals. This study is a good example of a collaborative learning in which the students had the chance to interact, communicate, listen and present as a team. The majority of the students reported that they had a great learning experience. Despite the benefits of working as a team, the students also reported the downside of working together. Equally dedicated members need to be selected while working together for a short amount of time. One of the students was even unable to work in a group environment. Poor performance of some members becomes a problem. Also, all members should be equally well organized.

The importance of presentation skills has been mentioned during the lectures. Thanks to this exercise student had the chance to make a presentation and compare their performance with others. The project delivery methods topic was an appropriate topic to make a sale presentation. All students reported that they fully understand the importance of making presentation in construction business.

The team-based, collaborative working approach creates interaction among students, enhances communication. They enjoy creating together. It is expected that in addition to traditional lecture, the team based work study approach enhances the understanding of the project delivery methods; students get the chance to work in a team environment, learn by collaborating, and develop leadership skills.

The author is further planning to integrate interactive methods into the lecture as a teaching method. In order to make sure that the students benefit from this approach more feedback is needed from students. The analysis of the survey (student feedback) has been made with limited amount of data. The number of participants to the survey is not enough to make universal recommendations. In addition, since the approach is applied for the first time the questions asked

for the evaluation are open-ended and they are aimed to understand the students' opinion only. Therefore, the study will be repeated in coming semesters and comparative analysis will be possible among different groups of students from different semesters with questions that can be measured with statistical methods. This way, reliability of the results is expected to be based on a statistical analysis.

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