

## Practical Construction Experience for BSc Construction Engineering Management students

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*This case study describes how a lecturer organised practical construction experience in partnership with industry for 35 1st year BSc Construction Engineering Management students.*

### Reasons for engagement

The Civil and Building Engineering department organises an outdoor management course for 3rd year students and the feedback from the students was that they wished they had this type of experience in their first year. Julian was aware of the Constructionarium, a hands-on construction experience, which combines the academic perspective with those of the design professional and practical site delivery. Constructionarium is held as a 6 day working field course where participants construct scaled down versions of bridges, buildings, dams and civil engineering projects. Students are assessed on the final day in terms of budgetary control, methodology and timely completion. Julian wanted the students to have experience working on a live construction site and the students wanted to 'build something.' Constructionarium usually has a civil engineering focus and is aimed at 2nd or 3rd year students but Julian wanted a change in emphasis from a civil engineering perspective to a construction management perspective aimed at 1st year students. Planning, costing, risk assessment and safety are involved with the experience and Julian was also keen to focus on developing

the management and teamworking skills of the students.

Julian attended an event at University College London organised by Constructionarium where people from industry and academics shared their experiences and he said that he was looking for an industry sponsor to enable his 1st year Construction Engineering Management students to participate in Constructionarium. Paddy O'Rourke from Laing O'Rourke said that he would be willing to discuss sponsoring the experience for the students.

### The engagement

Julian wanted to make it a productive learning experience, he wrote a module specification and wanted to properly prepare the students for the 6 day field course. As it happened Laing O'Rourke were building new halls of residence at Loughborough University campus and Julian thought that this could be a platform on which to launch Constructionarium. Julian wanted Laing O'Rourke to give 35 students regular access to the site with a view to observing tradesman working on site. Often it can be difficult to gain access to a live construction site and if a visit is arranged sometimes it can be

during the lunch break when there is little or no activity. Julian wanted the students to experience a live site and would have also liked to have an area of the site cordoned off to allow the students to use the hand tools. To make the group more manageable the students were split in to 2 groups, whereby when one group were on the site the other group would undertake surveying practice on campus.

Mark and Adrian (an experienced Project Manager and a Senior Engineer) from Laing O'Rourke worked with Julian on the project. They had 8 weeks to prepare and had to fit it in around their other projects. They decided to have 3 intensive study days (on Wednesdays) where the students would prepare for their 1 week experience. The first day involved health and safety and the students gaining their CSCS (Construction Skills Certification Scheme) cards. The second day involved ethos of thought related to accidents and being 'incident, injury free' and group dynamics. A Human Resources Manager from Laing O'Rourke delivered a 'mind games and memory' session which the students enjoyed. The students were presented with the outcomes of Belbin and had to split themselves in to 2 teams for the site but they couldn't do this and became frustrated. Julian had to split the group in two. Student managers would assess their team (10% of their mark) and the Laing O'Rourke Project Managers assessed the 2 student managers. All the students were peer assessed. The third day involved the project briefing. The students were introduced to the projects. Julian, Mark and Adrian were one tier of management, below them were the two student project managers (Sam and Matt). Julian, Mark and Adrian floated between the two groups. There was a remote site induction with paper plans and health and safety talks where Laing O'Rourke reinforced their health and safety policy. Students received their project pack and had to create a project programme, costs,

risk assessment and method statement. One group worked on the Ravenspurn Oil Platform and the other group the Bridge in Durham (scale replica of bridge designed by Ove Arup). The students completed work output was given to Laing's who were impressed with it.

Julian thought it was important for the students to gain some experience using small tools before going on the 1 week programme. Hilti demonstrated the tools and provided the students with hands on practice using them. The students travelled to the National Construction College at Bircham Newton, Norfolk and received their site induction from ConstructionSkills. A typical working day would be 7am breakfast, 7.30/7.45 on site. Toolbox talk at start of the day where everyone is made aware of specific issues and hazards. There was strong sun for the first few days so no shorts were allowed (t-shirts were ok) and sun protection applied. Lunch usually around 12 to 1 and finish 5/5.30. Students had to prepare a report for 8pm and each group had 45 minutes with the management team where they had to give a health and safety report for the day, progress report for the day and a profit/loss statement. Presentations in the evening were challenging for the students because of the questions asked by the Project Managers.

Progress was compared with a Gantt/bar chart which was prepared prior to going to the site. Laing O'Rourke were tough on the students. Costing – group provided with budget costs at the start. If the group wanted to use equipment they would have to go the stores and book out the equipments e.g. a wheel barrow would cost £1,000 an hour to hire - students initially did not return equipment and would be billed for hire even when not in use. This was a good learning experience!

There were numerous problems encountered by the students. In constructing the bridge the concrete was lean (dry) and tough

to work with which made it very labour intensive. The students had built dams using sandbags but one of them gave way and the lagoon had filled up again. The site was dusty but then it rained which made it muddy. There was a carpenter, machine driver and a general foreman on the team. At the start of the week they were a little too keen to help the students, they had a paternal attitude and as tradesmen showed the students what to do. The projects are challenging and there is not a lot of time for students to think about how to solve problems. It was make or break on the final day de-brief in the afternoon.

### Issues

Two key issues encountered were:

- Obtaining sponsors
- Gaining access to the construction site on Loughborough University campus

The Project Manager was not keen on having the students regularly visiting the site. In the end both groups of students had 2 visits to the site to observe. Due to supervision, risk and distraction issues the Project Manager did not want the students working on site.

### Benefits

It was a very rewarding experience, everybody took part and the group dynamics were interesting to observe.

Benefits included:

- Management and teamworking skills developed by the students;
- Practical experience and confidence gained working on a real construction site;
- Experience using hand tools.

### Context

Julian Mackenzie is the Deputy Programme Director and Admissions Tutor for the Construction Engineering Management degree programme in the Department of Civil and Building Engineering at Loughborough University.

Laing O'Rourke plc is the largest privately owned construction firm in the UK. They have offices in the UK, Germany, India, Australia and United Arab Emirates and over 31,000 employees worldwide. Led by Chairman and Chief Executive, Ray O'Rourke, the business has grown rapidly since the acquisition of Laing by R.O'Rourke and Son Ltd in 2001.

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