

## Playing A Simulation Game for Construction Management Education

Soft skills, such as teamwork, ethics, and scheduling are exceptionally difficult to teach. Nevertheless, these skills are required to be taught, and students must show that learning of many of these soft skills have occurred. In addition, employers are looking for students who are familiar with the concept of lean construction. This is why Dr. Zhang decided to try a simulation game with his Construction Management students, with the help of Ashleigh McManus, an undergrad assistant to Dr. Zhang. The game is called Villego, and its focus is to teach Lean Construction (LC). LC is a method to reduce waste; waste in time, waste in materials, and in effect, increase profit margins and construction site safety. LC does this by ensuring the minimum number of contractors are on the job site at a time and that they bring only what materials they need to complete the job while they are there. The game relies heavily on teamwork and scheduling and shows students the difference between lean construction and traditional construction methods.

The students had one overall goal: to build a house out of building blocks. At first, the task may have seemed deceptively simple. The house is small, the students have elevation blueprints, and they are all broken up into two large teams. The teams compete against each other, initially using traditional construction management practices, and later, by using the principles of lean construction. Each team had a time limit to plan and to make work schedules, and then to finish the build. The teams had to follow very strict safety rules as well, making the simulation a great multi-faceted teaching tool. Despite all the planning, neither team was able to finish the building block house in the allotted time. The teams came together to discuss what happened, what went wrong, and what could be improved. Profit/Loss was also calculated, using other tracked metrics, such as safety violations, build errors, and building waste. Using traditional methods, no team turned a profit.

The results of the first round prompted the teaching and implementation of lean construction in round two. The students returned to their groups, and the construction managers were swapped. During the planning and scheduling phase, each group now approached the build in a piece-by-piece approach. Each player would only take exactly what materials they needed to the build site, and each individual piece was placed on schedule. The elevation blueprints were also improved, tailored for a piece-by piece approach. The teams showed large improvements using the new methods, and each team was able to complete their building block houses on time. Each team turned a profit by reducing the build time, reducing material waste, and improving safety.

The simulation was a huge success. The data is still being gathered on student responses to learning, but the game was well received by the students and participation was high. Learning outcomes like teamwork, which is difficult to teach and elusive to measure, were certainly employed during the simulation. This is the first time Villego was used by students at UW, and it shows that simulations such as Villego could be very powerful learning tools, and that future use could also be applied successfully and studied.