

## **CURRICULUM DESIGN FOR TEACHING INNOVATIVE STRUCTURAL SYSTEMS; A NOVEL APPROACH**

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### **ABSTRACT**

Architectural/engineering students, usually, show a greater interest in topics which are demonstrated physically rather than those that are explained using the so called ‘chalk and talk’ methods, that is, by oral presentations and blackboard/whiteboard/OHP. Also, students are motivated by hands-on experience and by linking concepts and physical models to real engineering problems [1].

To improve the students’ practical considerations of designing an innovative structural system and developing different skills such as interpreting other people’s ideas, teamwork, communication and time management, the Author has been developing and implementing an educational scheme entitled Design, Assemble and Dismantle (DAD) Project at the University of Surrey, UK, since 2014 (Fig. 1 left). Groups of students design a structure and prepare the documents (drawings, method statement, risk assessments, etc) and swap their design with another group to assemble and dismantle the structure in a limited time. Also, each group should make a short video (i.e 120 seconds) about their experience in the DAD Project. Students from different universities in Brazil, Iran and Mexico have also taken part in the Project and exchanged their designs with Surrey students, see Fig. 1 right. These international collaborations introduce more challenges such as managing language, cultural and time differences – just like the real-life challenges that face international construction companies [2-3]. Ongoing student evaluations show that 92% of students have been enjoying the project, 89% felt highly engaged and 93% were interested to participate in similar projects [1]. These are some key elements for teaching excellence.

During the COVID-19 pandemic, a new small-scale teaching kit was designed and sourced from Brazil (Fig. 2 left) and sent to each Surrey student home address in the UK and abroad in January 2021 to facilitate the design and exchange of ideas. This was crucial to motivate the students' group work while they could not physically meet each other and the students complimented 'the mola kits are excellent.'



Fig. 1. Left: A group of students after the assembly of their structure at the University of Surrey, UK, in 2016. Right: A group of students from the Ferdowsi University of Mashhad in Iran during the assembly of a structure designed by a group of Surrey students in 2018.

Moreover, student-staff collaboration has been fundamental in the development of the DAD Project, including a full-scale tensile membrane teaching kit designed by an undergraduate student under the supervision of the Author at the University of Surrey which was manufactured in 2021, see Fig. 2 right. This structure is going to be used by the DAD Project participants in the 2021-22 academic year and similar kits are going to be manufactured in Mexico and Iran.



Fig. 2. Left: A new small-scale Mola teaching kit designed for the DAD Project during the COVID-19 Pandemic. Right: Full-scale tensile membrane teaching kit designed and manufactured at the University of Surrey, 2021.

To further develop the DAD Project, the Author has been redesigning the curriculum in collaboration with the Surrey Institute of Education. This includes a series of workshops with student/staff participants from Brazil,

Iran, Mexico, Spain and the UK to discuss different aspects of the new curriculum such as the aims, learning outcomes, student skills to develop, feedback (both, formative and summative) and assessment. The new curriculum is going to be implemented at the University of Surrey in Semester 2 of 2021-22 academic year and the student experience will be assessed as part of an ongoing research project.

## REFERENCES

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