34th Australasian Association for Engineering Education Conference
3 - 6 December 2023 – Gold Coast, QLD

Lego Challenge: Build Something Invisible

Catherine Hills[a], Chris McAlister[b], and Alexander A Kist[a]

School of Engineering, University of Southern Queensland, Toowoomba, Queensland, Australia[a], School of Surveying and Built Environment, University of Southern Queensland, Springfield, Queensland, Australia[b]
Corresponding Facilitator's Email: Catherine.Hills@usq.edu.au

---

The engineering profession is often not well understood by school students, teachers and parents. This can impact the student's ability to make informed career choices. We would argue that for every obvious example of the things engineers may do – bridges, buildings, cars – there are a number of invisible examples – data communications, process design and automation for example.

OVERVIEW OF WORKSHOP

The aim of this workshop is to build on the CRA (Concrete, Representational, Abstract) instruction principles used by schoolteachers and consider ways we can use the ubiquitous Lego brick to demonstrate abstract or invisible concepts. The resulting ideas may be adapted to primary school or high school students as STEM outreach activities (educational interventions), creating lines of sight to careers that may not have been previously considered. Consideration will also be given to how these can be used in a tertiary context to introduce a concrete element to support understanding of abstract concepts.

ACTIVITIES

Part 1: (45 minutes) After learning of the presenters own practice in the form of a short activity, participants will collate a list of concepts that can be difficult to teach without understanding the science or abstract frameworks behind them ("The List"). Participants will then work in small groups to use Lego to demonstrate an abstract concept provided by us. Groups will share their practice and reflect on the utility of the Lego analogy.

Part 2: (45 minutes) Each group will tackle one idea from "The List" to consider how the use of Lego in the CRA process might be a useful tool for making the concept more accessible. Again, groups will share their practice, reflect on the utility of the Lego analogy, how applicable it is to the concept at hand, and how a link may be made to the abstract concept.

TARGET AUDIENCE

Anyone who is keen to play with Lego for an hour or two and learn some stuff at the same time.

OUTCOMES

Participants will develop a personal framework for applying the CRA instruction principles to STEM education.

KEYWORDS

Concrete Representational Abstract Instruction; Lego.

PRESENTERS' BACKGROUNDS

Catherine, Chris and Alexander never managed to grow out of Lego. Chris and Catherine are First Year Leads for their schools and regularly use Lego to facilitate STEM engagement activities as well as integrating it into first year courses and staff professional development sessions to demonstrate abstract concepts. They are the proud owners of many Lego tee shirts. Alexander is into serious Lego and has created a Lego elevator and a Lego gantry system, both interfaced to PLC controls for small scale lab and remote lab activities.