UC SANTA BARBARA
THE Current

February 5, 2025
Johannes Steffens

Lego bricks teach replication skills in a fun way

Picture students divided into groups in a classroom, each group intently focused on a pile of Lego bricks. But in this particular image, it's not children at an elementary school doing the building — it's a group of graduate students from UC Santa Barbara's Bren School of Environmental Science & Management at UC Santa Barbara. Their task? To build a fantasy creation of their choice and describe it in writing so it can be replicated. After a few minutes, the groups disassemble their creations, rotate positions and attempt to recreate each other's constructions based on the written instructions. If they're successful, the same creations will emerge. But if not — and indeed, they often do not — therein lies the lesson.

This variation on the age-old game of telephone — can a message be communicated through a chain of people intact? — is actually a serious exercise in understanding the challenges and requirements of making research replicable. Based on The Lego® Metadata for Reproducibility game pack, it is part of a new annual training offered to Bren students by Julien Brun, the earth and environmental sciences research facilitator in UCSB Library's Research Data Services (RDS) department. The training includes instruction in open science principles and research data management practices, helping students to meet their capstone projects' requirements of scientific reproducibility and data preservation.

Students working through the Lego exercise often discover the need for some type of coordinate system to describe the position and orientation of the pieces. (If a

brick is “to the left” of another brick, from whose perspective?) And they quickly come to appreciate the value of having a shared, standardized terminology for describing the many and subtly different types of bricks. Even with those realizations, though, it can still be challenging for a group of people viewing something together to recognize everything that needs to be communicated to future readers, and to anticipate what may be prone to misinterpretation.

“Communicating one’s method takes effort, but it is an investment with a great return on productivity by enabling the students to reuse their own work,” said Brun. “It is also a cornerstone of modern science practice as increasingly interdisciplinary science means that data and methods can be reused by researchers and communities never originally intended or envisioned.

“The analogies between the Lego exercise and science quickly become evident.”

The widely adopted principles of open science demand transparency across the scientific method—citation, sources, methods, code, research materials, design, analysis, outputs. This transparency often takes the form of documentation that accompanies publications, data and code, stored in publicly accessible repositories. A key challenge is translating intrinsic, implicit knowledge—often developed and shared within projects, labs, and scientific communities—into explicit, accessible documentation.

Working with schools, colleges and departments across campus, RDS helps students, faculty and researchers alike use technologies that facilitate the recording and communication of methodology, from metadata standards and controlled vocabularies, to formal research protocols and computational notebook platforms.

“All these technologies aim to reduce the burden of describing methodology, reduce ambiguity, facilitate communication, and ultimately improve the reusability of past work and the reproducibility of results,” Brun said. “If you can do it for Legos, you can do it for science.”

Media Contact
Shelly Leachman
Editorial Director
(805) 893-2191

sleachman@ucsb.edu

About UC Santa Barbara

The University of California, Santa Barbara is a leading research institution that also provides a comprehensive liberal arts learning experience. Our academic community of faculty, students, and staff is characterized by a culture of interdisciplinary collaboration that is responsive to the needs of our multicultural and global society. All of this takes place within a living and learning environment like no other, as we draw inspiration from the beauty and resources of our extraordinary location at the edge of the Pacific Ocean.