

## REFLECTION ON THE RESEARCH CONDUCTED UNDER THE LAIDLAW SCHOLARS PROGRAM

Having been intrigued by refugee shelters for many years, even prior to studying architecture, the opportunity presented by the Laidlaw program to conduct research on a topic of interest seized my attention since hearing of it. Initially intending on applying in my first year, my limited architectural studies pushed back my application to second year until I was able to better formulate a research proposal and identify a supervisor to guide my research.

Enter year two after being accepted into the program, the months that followed included conducting preliminary research on biomimicry and refugee shelters, navigating how best to explain my research to those with and without an architectural background, and finally, enrolling in a summer Design Build course to get hands-on experience with designing and constructing a simple structure.

During the six-week research period, the process consisted of weekly meetings with my supervisor, Professor Brady Peters, whose knowledge and experience with similar topics strengthened my research arguments and allowed for overlaps between architecture, construction, technology, and sustainability. Part of his guidance additionally introduced me to computational and prototyping tools at the faculty to better comprehend the approaches available to test and fabricate models, including laser cutting, 3D printing, CNC mill machines, and the KUKA robot arm. Here, I would like to thank John Nguyen for offering a detailed and comprehensive tour of the facilities available at Daniels and for answering my questions.

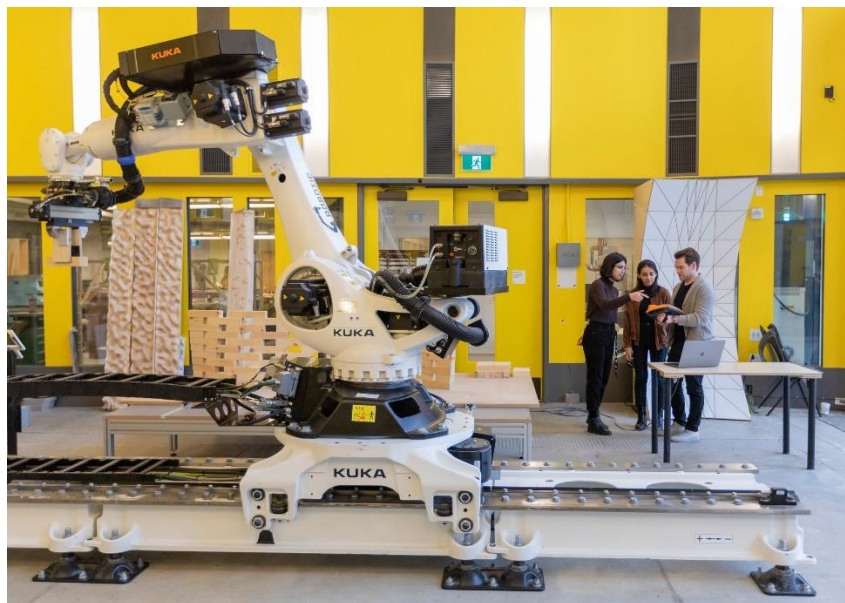


Figure 1: The KUKA Robot Arm at the architecture faculty's Digital Fabrication Lab

Following a brief investigation into the topics I was researching, I determined early on the scope of the project more complex and multi-faceted for a written report to suffice. Hence, my intention from the beginning was for the report to act as an informative source or first-step for those seeking to investigate and design refugee shelters, whether from the dimension of biomimicry or not. Having overcome many obstacles to obtain detailed information on the different shelter types, the inclusion of numerous drawings, the division of the report into two parts, and the reading list at the end were made to better aid researchers and designers by cutting the time and energy they would needlessly spend. Though not part of the program's deliverables, the drawings I made served as important investigation and representational tools. Part of architectural education consists of precedent analysis which often entails a rich exploration of a project through research and architectural drawings, such as plans, sections, and elevations, to thoroughly understand its complex workings and parts. Different from viewing images, that can be altered and limited in their scope, drawings translate layered and complex ideas from a few strokes.

During this process, the intensive Design Build course I completed, whose benefit I initially doubted, aided my understanding of different shelter components, such as the truss and galvanized parts of the transitional shelter. After constructing shading structures and an outdoor stage with a group of students, I had a better understanding of the structural considerations that affect performance, cost, and lifespan. From material specifications to techniques for drilling and joining components, the knowledge gained from the experience is reflected in the drawings, particularly those detailing materials and features.

Being investigation tools, the drawings played an essential role in critically assessing differences between the shelter types and evaluating different considerations such as ventilation, structure, cost, insulation, and process. As a result, a better understanding of their limitations and areas of development led to a more accurate study and application of biomimicry. Demonstrated in the framework provided, a design challenge or an existing limitation in a refugee shelter is considered the starting point where all subsequent biomimicry-related steps follow.

The process of establishing a framework and validating biomimicry as a method to develop refugee shelters was a greater challenge than expected. While researching for additional information, I came across the Dunning-Kruger Effect. At the end of the research period, I was able to easily devise a plan and outline for the report, however, once beginning to write, I faced complex questions that required seeking out new sources and information. Though I would not claim that reaching the “Slope of Enlightenment” classifies me as a “Guru” on the subject matter, the experience certainly solidified my arguments and provided my research greater depth.

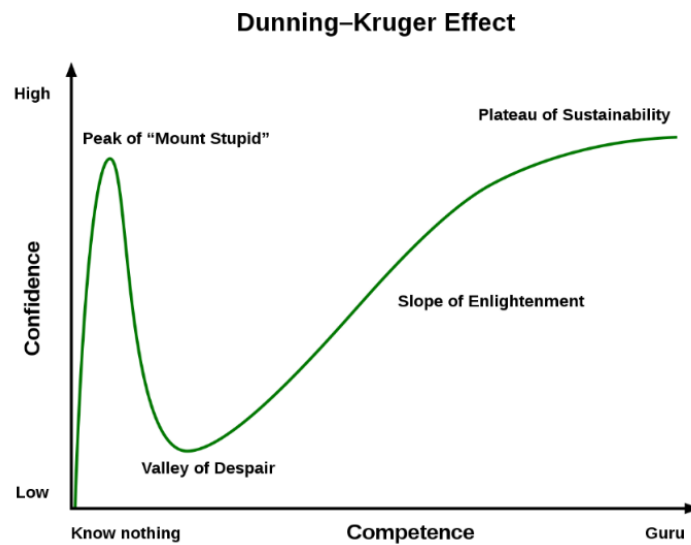


Figure 2: The Dunning-Kruger Effect devised by psychologists David Dunning and Justin Kruger.

Against this, the process from proposal to paper reveals to be far from linear and certainly not straightforward. In fact, the only constants are the final deliverables for the program; even the proposal is not static and can change after one becomes more familiar with the topic. Subsequently, acknowledging early on that some amount from the six-week period will likely be dedicated to investigating additional avenues and inquiries can help in maintaining one’s expectations and offer flexibility for change if the need arises.

All in all, from the leadership and communication skills gained by reaching out to organizations like ShelterBox Canada, for additional information on their tents, to explaining my research to the CEO of the Laidlaw Foundation, Susanna Kempe, I was constantly challenged by navigating new environments outside my comfort zone. Much more, my tumultuous yet exceptionally rewarding research journey, in addition to resulting in a special report, contributed significantly to my growth as a student, researcher, leader, and architect.