TFU Design Blueprint: Sustainable Architecture

Part 1: Overview

Context

This lesson is designed for introductory level college students who are interested in learning about sustainability in architecture. This lesson fits into a larger course around sustainable design principles in architecture which would be a valuable experience for students with an interest in careers in sustainability, ecology, design, or architecture. This lesson is designed to be completed entirely at a distance through asynchronous activities.

Generative Topic: Understanding Energy and Building Design

This topic is central to the domain of architecture because designing efficient buildings is a primary concern of architecture. Building design in itself is a key area of exploration, but as we become more aware of how human activity impacts our environment, it becomes critical to understand how the design of a building is related to that building's energy footprint.

Energy and building design is the instructor's area of research interest. The instructor has participated in several panels on the subject and is also a member of a committee involved in green design at a local conservatory.

The topic of energy and building design connects to several other areas both within the architecture discipline and the environmental science discipline. Designing buildings to use energy efficiently can lead to explorations in alternative energy. It can also lead to effective management of runoff water and how a building's design can impact the local watershed and the effects of those impacts downstream. Considering building and space design from an environmental perspective can help students think about the impact of their design from a systems perspective.

Part 2: Design Components

Understanding Goals
- Understand how environment can influence building design
- Understand tradeoffs of limiting negative environmental impacts during building design
- Understand how building design can improve health and wellbeing
- Understand the effects of construction choices on the environment

These goals support the overall goal of helping students understand environmentally friendly building design and how the definition of an environmentally friendly building changes depending on the region and culture of the location where a building is being constructed.

Understanding Performances

Messing Around

Students will work within discussion groups to explore the Living Building Challenge certification standards and review net-zero energy building case studies. Present a summary of your findings in the whole-class discussion space.

Deliverable: Small group collaborative document to share in discussion post

Tools to support Messing Around:
- Building Green "What is LBC?": https://www.buildinggreen.com/living-building-challenge
- Living Building Challenge Standards: https://living-future.org/wp-content/uploads/2019/08/LBC-4_0_v13.pdf (may need to enter email to download)
- Living Futures Resources: https://living-future.org/lbc-3_1/resources/
- Living Building Challenge Case Studies: https://living-future.org/lbc-3_1/case-studies/
- Net-Zero Energy Resources: https://www.wbdg.org/resources/net-zero-energy-buildings
- Collaborative document editing such as Google Docs
- Discussion board

Guided Inquiry

Students should select a space that they frequently occupy and assess the design of the space. They should spend significant time in that space and observe what goes on in the space. Use the standards of the Living Building Challenge to present an assessment of the space. Take images if you can do so while respecting the privacy of individuals occupying the space.

Students should also share details about the space to help others understand what it is (ex. A library, coffee shop, gym, student lounge, dorm room, classroom, etc.). Questions to guide their inquiry include:
- What is the intention of this space? Does it align with how the space is actually used?
- How many people occupy the space? What are they doing? Is this normal activity for the space, or does the activity fluctuate depending on the day/time?
- What kind of energy is being used in the space? Think about climate control, power outlets, lighting, sound, appliances, etc.
- What is the space lacking? What does it need to better fit the intentions of the space/how the space is actually used?
- Brainstorm some ideas to improve the space's energy efficiency. What are the tradeoffs to implementing these ideas?

Deliverable: Discussion post/reflection

Tools to Support Guided Inquiry

- Living Building Challenge Standards:
  https://living-future.org/wp-content/uploads/2019/08/LBC-4_0_v13.pdf
- Cell phone camera/digital camera
- Note taking tool
- Discussion Board

Culminating Performance

Students will design a net-zero energy space according to the Living Building Challenge standards. Students will select from the list below or choose a space of their own to design.
- Dorm/Hotel Room
- Kitchen
- Movie Theater
- Study Lounge

Students should use a digital design program of their choice to design a floorplan for a space that meets standards of the Living Building Challenge. Students should document their design process, including identifying the regional and cultural aspects that influence the design as well as justifications for decisions regarding material choices similar to how authors document their designs in the Dezeen website (example: https://www.dezeen.com/2018/10/16/water-institute-gulf-headquarters-mississippi-river-baton-rouge-perkins-will/). Students should present their design and a summary of their design choices with tradeoffs. Students should select at least 3-5 standards to design.

Deliverable: Presentation with images, text/audio in the form of narrated slide show or a written article similar to the format of Dezeen submissions.

Tools to Support Culminating Assessment:
- Living Building Challenge Standards:
  https://living-future.org/wp-content/uploads/2019/08/LBC-4_0_v13.pdf
  Example format from Dezeen:
  https://www.dezeen.com/2018/10/16/water-institute-gulf-headquarters-mississippi-river-baton-rouge-perkins-will/
- Presentation tool such as PowerPoint or Google Slides
- Design tool such as Adobe Photoshop or Sketch
- Note taking tool for design process documentation
- Microphone or audio recording tool to create presentation

Part 3: Plan for Ongoing Assessment

Students will receive feedback from the instructor or TA on their collaborative documents during the "Messing Around" phase. This feedback will be designed to push students' thinking further into more reflective insights about the case studies they explored. Students will also receive feedback from their peers during the whole-class discussion sharing of

those collaborative documents. Students will be encouraged to look for themes and common insights among the groups. After this discussion activity wraps up, the instructor will provide a summary in the form of an announcement email that identifies particularly high quality insights and also fills in the gaps of what was overlooked.

During the guided inquiry phase, students will be assessed based on how they interpreted the Living Building Challenge framework in the space they chose to observe. They will again receive feedback from peers in the discussion. The instructor or TA will comment on students' posts to encourage deeper thinking or correct misapplications of the framework so the entire class can learn from each other's successes and areas for improvement.

The culminating performance will be assessed based on students' rationale for their design choices and how those rationales stand up against the Living Building Challenge standards. Students will also be assessed based on their identification of realistic tradeoffs for their design choices.

Part 4: Reflection

One of the things I found most interesting about applying this framework was identifying the understanding goals. In my training and most of the professional development we undergo as instructional designers at the university level, we are told to never use the term "understanding" in objectives because it's not a measurable outcome. In fact, by the measures our courses are judged by, learning designs that incorporate vague or broad terms like "understand" or "appreciate" won't even pass muster! It was refreshing to see evidence-based alternatives to SMART goals because I think it's important to recognize, as Perkins and Unger address in their article, that not all types of learning necessarily require such intensive approaches. While my colleagues cringe at objectives that use terms like "understand" or "appreciate," I have been letting them slide as long as faculty are providing detailed criteria for success in other formats such as what is laid out in this TFU design process.

If I had more time to really work this up into something that would be included in a course, I would include templates for floorplans so students would have equal footing in terms of completing the design project for the culminating performance. Additionally, I think it would be worthwhile to consider the final performance as a "retrofit" design project where students take an existing space and try to re-design it to meet specific building standards in the Living Building Challenge. Finding 3-4 spaces or having students choose their own existing space might make this a more feasible leap for introductory-level architects as opposed to starting a design from scratch. I also think this would require at least two weeks for students to grasp the concepts they need during the messing around and guided inquiry phases in order to successfully complete the culminating performance. As an instructional designer, I would encourage an instructor to introduce that project in the beginning so that students know what they are working toward as they are completing the first two phases which could make the completion of that project a little less intense.