

Expanding Evidence-based Pedagogy WITH DESIGN HEURISTICS

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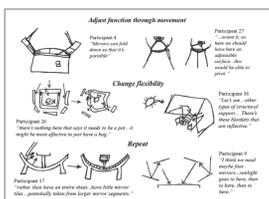
Design Heuristics are “cognitive prompts” that encourage exploration of a variety of solutions during ideation. A cognitive heuristic is a simple “rule of thumb” used to stimulate a judgment or decision. Cognitive heuristics are not guaranteed to lead to a determinate solution, as in the case of an algorithm; rather, they describe specific “best guesses” at potential solutions. Heuristics are intended to help designers move through a “space” of possible solutions, guiding designers to generate non-obvious ideas that are also different from one other.

OUR GOALS

1. Raise awareness of the importance of educating students to generate creative concepts
2. Train instructors on how to teach Design Heuristics within existing engineering classes
3. Assess learning outcomes from Design Heuristics pedagogy from diverse instructors, courses and universities
4. Incorporate the lessons learned to develop an effective, easy-to-adopt pedagogy for educating students about how to generate creative ideas

DESIGN HEURISTICS WERE DERIVED FROM:

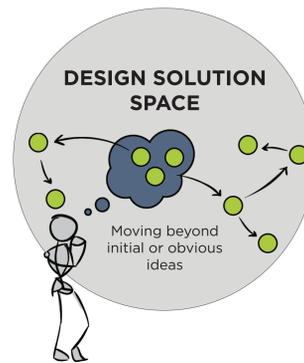
behavioral studies of student and expert conceptual designs



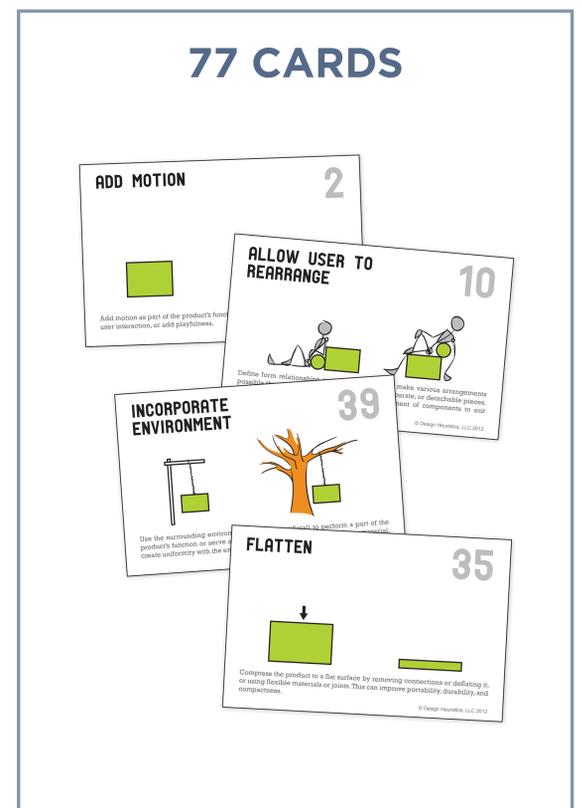
analyses of award-winning concepts that transformed existing products



a case study of a long-term project by a professional designer



Design Heuristics push you to more fully explore the potential solution space.



INITIAL THREE LESSONS

IDEA INITIATION



Engineering students frequently struggle to generate solutions without basing their ideas on existing solutions. In this lesson, students practice creating new designs using different Design Heuristic cards with a novel design task. This concept generation lesson emphasizes the ability to continue generating new and different ideas, and allows students to see how possible it is to generate a lot of ideas for any design task.

IDEA DEVELOPMENT & TRANSFORMATION



In this lesson, students are asked to apply Design Heuristics to transform or iterate on their existing ideas. Design Heuristics can be applied at many points within the design process (e.g., after initial ideation, idea selection, prototyping) to allow students to practice with design iteration. This lesson emphasizes that even a single idea can be the source of many interesting novel ideas through transformations suggested by the Design Heuristics.

SUBCOMPONENT DESIGN



In this lesson, students design products using incremental changes to improve components. They decompose existing products using functional decomposition (or start with the design problem and decompose the functions using morphological analysis), redesign components using Design Heuristics, and finally suggest new versions of the product based on combinations of the redesigned components.

INDIVIDUAL AND TEAMING EXERCISES

Many engineering activities require teamwork, especially as the complexity of the design task increases. Each lesson includes options for individual and team activities to support the creation and development of design ideas with Design Heuristics.

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