Designer2maker: a timeline for concept generation and translation

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> *The whole [design] process is said to involve considerable perspiration. Ultimately, however, the quality of the final product depends on the quality of the substantive knowledge at the designer's disposal and his or her ability to use it creatively. [But] the key to creative thinking is the ability to generate ideas" (Lang, 1987:57).*

The National Conference on the Beginning Design Student has historically congregated environmental designers from architecture and allied fields, implicitly endorsing the idea that design—its general purpose, the thinking behind design, the design process, its methods—is largely universal: that it straddles the disciplinary boundaries among the environmental and other applied design fields. However, we are warned that "the extent to which the various design fields share a common process is a matter for considerable debate… [but] that designers educated in each of these fields tend to take a different view of problems is less contentious" (Lawson, 2005:8). Assumptions about commonality do not preclude acknowledging the variability of the fields and as a result, the co-existence of both generic and discipline-specific skills in the design process, along with the requirement of a different balance of skills by each type of designer (Lawson). This is the case of the skill for design concept generation, development, and application, which in this paper is approached from the perspective of interior design.

External reviewers, guest critics, and advising practitioners often reference the ability to develop and apply appropriate design concepts as a marketable design skill, and they demand evidence of their application in interior design student projects. Concept generation/development is included within the scope of services offered by interior designers (Ballast, 2013); it is listed in the definition of interior design of several North American jurisdictions that regulate interior design practice, and is acknowledged as key content within the body of knowledge of the interior design profession along with the implementation of the design process of which it is an integral component (Guerin and Martin, 2006).

The design concept is widely understood as the overarching idea, formulated in the early stages of the creative process, which drives the function and form of a designed object. Though it is acknowledged that often multiple concepts contribute to a design (Rengel, 2007), a distinction is made between the programmatic concept—which encapsulates the solution to the functional problem, irrespective of its physical interpretation—and the design concept, which in interior design defines the approach to solving the design problem within the space allocated in a building (Ballast, 2013). The design concept thus summarizes the desired properties of the organization plan, spatial relationships, surfaces, lighting, materials and furnishings that satisfy the programmatic concept, and so critically impacts the numerous decisions that follow throughout the design process timeline.

Teaching the design concept skill to beginning design students, including its place in the design process continuum, is, therefore, a common objective for interior design education. However, this is often challenging. There is a general misconception, frequently embraced by beginning students, that the emergence of creative insight is a sudden, often uncontrollable and sometimes elusive result of a leap of

imagination (Cross, 1997). Students, therefore, may have misguided expectations that the design concept will result from a flash of inspiration which should arrive on cue, overlooking the Edisonian reminder that 'creativity is 99 percent transpiration and 1 percent inspiration.' Research by Cross and others describes the process of arriving at creative solutions as "not so much a 'creative leap' from problem to solution as the building of a 'bridge' between the problem space and the solution space by the identification of a key concept." This is also recognized by Schön and seen by many as "crucial to high-level performance in creative design" (Dorst and Cross, 2001:435).

From art to space

This paper discusses the art2space project used at the University of North Carolina at Greensboro as a multidimensional beginning interior design project that introduces students to the design process through the repetitive practice of cycles of analysis, synthesis, and creation. The project responds to the need to foster understanding of the chronological sequence whereby ideas become designed objects and addresses students' misconceptions about the creative process and its unfolding over time. Art2space has three major learning objectives: To introduce a systematic design process; to develop ideation and conceptualization skills, and to develop skills for transferring inspirational ideas and emotions into actionable design patterns.

Art2space is focused on ideation and concept development and application. It is based on a project originally developed by Akkurt in the early 2000s. The original project aimed to introduce ideation to beginning interior design students, emphasizing the systematic transfer of emotive qualities from art to designed interiors. It sought to enable the creation of atmospheric interiors through manipulation of space form, lighting, color, and surface properties on the Bauhausian premise that elements and principles of design are universally applicable to all the arts (Torres-Antonini and Akkurt, 2006). The current iteration addresses the scope and aims of an interior architecture program where a strong focus on making combines with a human-centered approach to the design of architectural interiors. It retains the overall arc leading form artwork to interior spaces as a vehicle for idea generation and interior design concept development and application, adding steps for exploring the design and execution of conceptually consistent 2- and 3-D products. Making is stressed to align with the focus and scope of interior architecture, and to encourage creativity in design by fostering the "haptic immersion where the hand explores, searches and touches independently" from the brain (Pallasmaa, 2009:072). The project concludes with the creation of a spatial experience—the students' first attempt at designing interiors—that connects the different products, reinterpreted as graphics and volumetric interior elements evocative of the original piece.

Design is 'a highly complex and sophisticated' though learnable skill, but "one which can be analysed, taken apart, developed and practised" (Lawson, 2005:15). Yet beginning students struggle to understand the design process. Throughout their education, they have been mostly exposed to the scientific approach to problem-solving. Whereas traditional models of the design process "often suggest that designing should proceed in a sequence of stages... [and] that the overall problem should be decomposed into sub-problems, and then sub-solutions found and combined into an overall solution" (Cross, 1997), such fragmentary approach is at odds with the reality of design practice, where creative designing oscillates between consideration of partial and integrative solutions (Cross:317). In fact, creative design is a wicked problem demanding the synchronous definition of the design problem and its possible solutions, "with constant iteration of analysis, synthesis and evaluation processes" between these two realms (Dorst and Cross, 2001:434). Or, as described by Schön, a "reflective conversation with the situation" that involves series of iterations where problems are continuously reframed, moves decided and reflected upon; where the implications of each new idea are reflected and acted on until a satisfactory solution is found (Schön, 1983).

However, introducing this non-linear approach which demands to be comfortable with uncertainty and risk-taking is particularly problematic for millennials and GENZs who, according to a study by the International Interior Design Association, "aren't good with the 'gray area.' They grew up [relying on] a clear path to success–and expect the same on the job" (International Interior Design Association and Milliken, 2017). To facilitate learning for these beginning designers, it is necessary to still convey that the design process "consists of a sequence of distinct and identifiable activities which occur in some predictable… logical order" (Lawson, 2005:33), and as suggested by Lang, involve the two basic thought processes that characterize design: divergence and convergence (Lang, 1987). The art2space project responds by introducing the design process as a clearly structured progression with embedded iterative cycles of divergent and convergent production—"the generation of a variety of ideas or potential solutions or parts thereof" vs. "the act of synthesis [or] producing a single idea out of many parts" (Lang:57) The cycles are embedded into five distinct exercises of increasing complexity, building up to a comprehensive learning experience. In each exercise, art2space proposes a sequence of activities that combine analog and digital technologies for visual representation and fabrication along a sequential timeline as seen in figure 1.

The timeline starts with an analysis phase—represented by exercises ONE and TWO—in the first three weeks of the 16-week semester. It is followed by three ensuing cycles of synthesis, application, and making—exercises THREE, FOUR, and FIVE—each of approximately four weeks duration. It culminates in their final integration and presentation by the end of the semester.
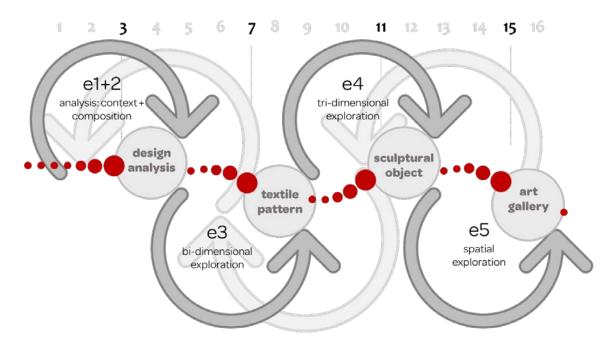

Figure 1. designer2maker timeline

Exercise ONE. Consists of the study of an assigned abstract painting: researching the artwork and artist's background/ideological context and assessing the artwork's concept and perceived meaning/emotional content, to garner insight for formulating possible design concepts. The exercise taps on the observation that most beginning design students seek referential images as a point of departure for design, and often struggle to derive appropriate and applicable design cues from them.

Exercise TWO. Centers on the study of the painting's design composition—organizational pattern, design principles; study of its color palette, texture, and suggested illumination and materiality. The project uses mostly non-figurative art to allow focusing on design composition and avoid any distractions which might be posed by the explicit or immediate reading of the painting. The exercise demands that students pay careful attention to the relationships between distinct design elements and their potential contribution to the whole. As illustrated in figure 2, students are asked to make several pages of tracings of the painting to extract observed lines, shapes, and implied forms; and identify proportions, organizational pattern, symmetry or balance, and other design principles. Students are also asked to study the use of color in the painting by sectioning a color copy into different areas according to hue, and with these, creating a color separation chart that demonstrates the proportional contribution of each, and then analyzing the palette. Finally, students use different media to create corresponding color swatches, to refine their understanding of color mixing.
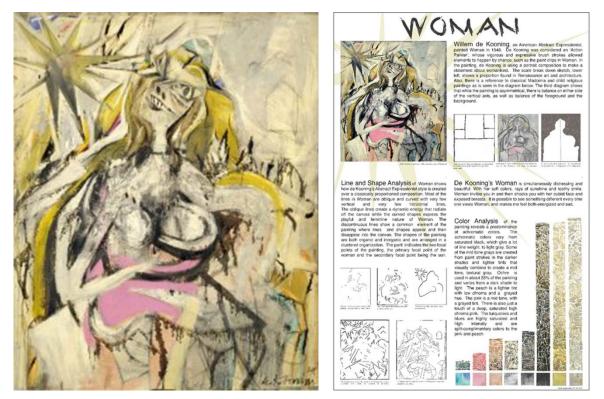

Figure 2. Willem de Kooning Woman, 1948. © 2018 Hirshhorn Museum and Sculpture Garden, and combined exercises ONE and TWO board; includes a selection of process elements to present the analysis of the assigned painting. Board by Christina Brown, 2017.

Exercise THREE. Comprises the manipulation and recombination of the design principles and elements derived from the original painting to create a bi-dimensional pattern. To achieve this, students distort, hybridize and combine the lines and shapes previously discovered into original 2-D compositions, to which they apply the colors resulting from their prior analysis. Select compositions are further refined and converted to a repeatable pattern tile, for which they must consider repetition options, the adjustments needed to ensure exact pattern matching, and the resulting larger pattern effects in relation to the qualities of the painting. At this point in the exercise, students move from analog to digital tools to generate a printable pattern, which calls for the transfer of the pattern and the digital recreation of the color palette into drawing format. Several repeats of the resulting pattern are printed on canvas, which the students stretch and attach on frames they make in the woodshop. The

expected outcome is an original, repeatable textile pattern for interior applications that evokes the design, color, textural qualities, and intentions of the painting; results are presented on a board which describes the process and outcomes of this exercise, as shown in figure 3.
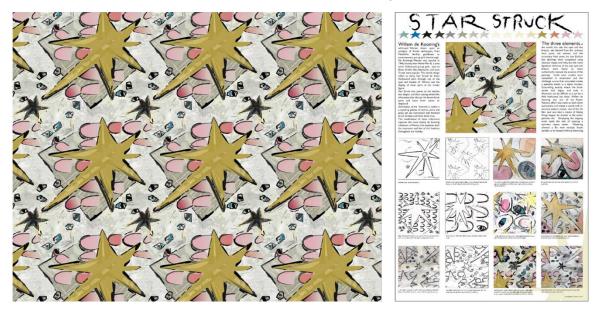

Figure 3. Textile pattern generated by repeated pattern tiles inspired on Willem de Kooning's Woman (1948), and Exercise THREE board showing the finished tile and its development process. Board by Christina Brown, 2017.

Exercise FOUR. Entails using the previous bi-dimensional explorations as a point of departure for developing a sculptural object referenced from the original painting. This requires that students make the leap from graphic to volumetric design and consider how graphic elements might become tridimensional beyond mere extrusion of flat shapes, as well as how to capture the materiality suggested by the original painting, and which materials and construction methods might best serve their design intentions. Thus, students move from drawn 3-D compositions to white-paper study models, allowing them to concentrate on volumetric composition. From this study a viable model is further developed into a small sculpture made with conceptually consistent materials; a second, larger iteration captures the refinements suggested from their exploration of material properties, interaction, and attachment. In each case, students rely as needed on a range of tools and methods, from hand craftsmanship to digital fabrication. Results are presented on a board as shown in figure 4, which illustrates the final product and the process leading to its creation.
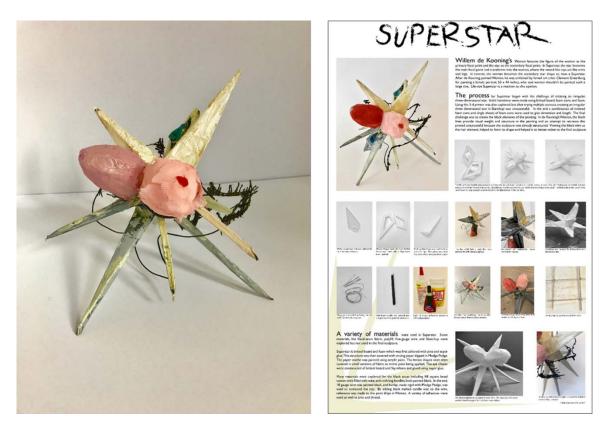
Figure 4. Exercise FOUR board showing the sculptural object and its development process. Board by Christina Brown, 2017.

Exercise FIVE. The last exercise moves student explorations from form to space by requiring the design of a gallery space exhibiting the original painting and the student's sculpture—now considered life-size—as well as other works by the same artist, and incorporating the designed textile as carpet, wallcovering or upholstery. Functional requirements are limited to allow emphasis on spatial experience, circulation flow, focal points, and vertical integration. Students are asked to question which elements and properties from the painting should be reflected in the design of the gallery, and how they may be translated into architectural features. The design is explored through monochrome scale models; with a finalized version including scaled=down versions of paintings, the sculpture, and the textile pattern. Presentation boards contain floor plans, sections, and model photos as shown in figure 5.

Figure 5. Exercise FIVE board showing the gallery design and architectural details, and close-up views of the model. Model and boards by Christina Brown, 2017.

From designer to maker, and back

Final project deliverables collect the outcomes from all preceding exercises, evidencing sustained practice of the design process and the students' ability to analyze, conceptualize, and apply creative ideas consistently to 2-D, 3-D and spatial designs as seen in figures 6 and 7. Along its arc, the project introduced students to a range of skills, technologies, and tools: sketching, digital drawing, rendering,

and board composition; professional lighting and photography, photo editing, canvas printing, scale model making, laser cutting, 3-D modeling; and material cutting, carving and assembly using woodshop equipment.
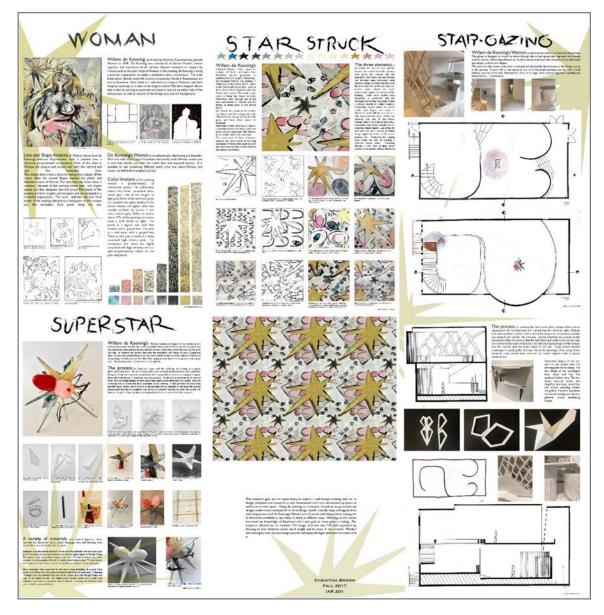

Figure 6. Comprehensive integration of deliverables from exercises 1-5. Boards by Christina Brown, 2017.

Notwithstanding the richness of the experience over three consecutive years in this format—or perhaps precisely for this reason—time, its unfolding over the design process and time management in general, remains an issue for most students. A series of nested loops are built into the project timeline to allow the repeated practice of the process, yet this has its own drawbacks. As noted by Lang, designers are misled in trying to reach optimal solutions, which always prove elusive. In this attempt, designers, and beginning design students in particular, "almost always feel that if they only had more time to spend on designing they would come up with better results" (Lang, 1987:59).

Figure 7. Comprehensive integration of deliverables from exercises 1-5. Clockwise from top left, Lizandro Marcial-Armas, 2017; Amber McCullough, 2016; Kimberly Bracht, 2016; Bryan Woolard; 2017.

The multiple iterations embedded in this project—the repetition of the process for creating each product, and the need to loop back to the sources to ensure coherence while also trying to meet the exercises' timeline—creates a condition that some students find uncomfortable. Beginning design student faculty might agree that "the current over-stimulated youth tends to take repetition as a mere pain. Even a slowed-down pace of events... is experienced as physically intolerable by many of today's students conditioned by the accelerated stimulation of action-cinema" (Pallasmaa, 2009:082). However, students may become the wiser if they realize that, as Pallasmaa suggests regarding hand making—but also applicable to the practice of any skill, such as design process or ideation—endless practice and repetition that borderlines on boredom are what "ignites imagination and initiates independent and self-motivated [creation]" (Pallasmaa:082).

So, there is hope. Some students acknowledged the lessons learned, echoing research findings that "the more time a [design study] subject spent in defining and understanding the problem, and

consequently using their own frame of reference in forming conceptual structures, the better able he/she was to achieve a creative result" (Dorst and Cross, 2001:431). As put by one student,

> *"Over the course of the semester, I learned the importance of the design process, specifically ideation… one of the most important parts of the comprehensive semester project was the research that was conducted in the beginning. Exploring the artwork gave us ample information to draw from throughout the semester in which each assigned project was built on the previous one… Overall, completing this project allowed me to see growth in my studio work compared to last semester. I spent more time focusing on conceptualization instead of simply creating. I think that was vital to my improvement."* (Amber McCullough, 2016)

This might be the most valuable lesson to be had from this project, and an incentive for its continued refinement and examination.

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