PAPER

Spatial Translations: Sequencing Making and Technology in First-Year Design Pedagogy

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The transition from the secondary school world of standardized tests and objective evaluations to the subjective creativity and open-ended prompts of the university design studio is a notoriously difficult progression. Various models and pedagogies exist in navigating this shift, each with different levels of support in terms of meeting time, curricular support through skills built in concurrent classes, and level of emphasis on modeling versus drawing and the use of digital tools.

This paper presents a new first year pedagogy for undergraduate students at the University of Virginia that serves as a transition between a large format lecture course and the traditional design studio format (which usually consists of smaller class sizes and substantially longer meeting time). The course aims to prepare students for future studios through the development of conceptual and spatial thinking abilities, and to equip them with technical skills in drawing and modeling through a variety of 2D and 3D analog and digital methods. Students develop a single spatial project over the course of the semester through a series of short assignments or 'translations' that allow for experimentation, testing, adaptation, and iteration of both skills and ideas.

INTRODUCTION

The course is taught to University of Virginia undergraduates in the second semester of a four-year pre-professional architecture program (B.S.Arch. degree) as well as non-majors looking to transfer into the program. These students have had one semester of a large format lecture class introducing analog skills and concepts in 2D composition, sketching, and analog model making. Concurrent supporting disciplinary courses at this point of the curriculum consist of a pair of architectural history survey classes, meaning that the course described in this paper has the opportunity to introduce a substantial amount of conceptual development and technical skill building — including introducing digital workflows in drawing and modeling.

The course draws from historical conceptual and abstract exercises piloted by the Texas Rangers and incorporates contemporary digital drawing and modeling tools. The class is four credits and meets for six and a half hours per week, serving as a transition from the first semester three credit, four-hour course to the full six credit, eleven-hour studios in the second, third, and fourth years of the pre-professional program. The course is taught by three faculty leading studio sections of thirty-four students each, with every ten to eleven students additionally paired with a graduate or advanced undergraduate Student Instructor Assistant (SIA). A fourth faculty member works with the course curating, managing, and lecturing on theoretical and historical reading content for section discussions.

COURSE STRUCTURE

Due to the large student-faculty ratio and abbreviated meeting time compared to a typical design studio, the course is structured as a sequence of one- or two-week long projects titled 'translations,' each building upon previous assignments. Translations are usually paired with a reading and are introduced through a course wide introductory lecture. Classes are then spent as studio sessions with working time, pinups, discussions, and critiques, until the next translation is introduced. A 'Production Manual' book produced for the course serves to teach many of the technical skills, from hand drafting and modeling to various design software packages and documentation and presentation skills. This shifts toward a flipped classroom model in which technical skills are primarily learned outside of class, making course time available for conceptual development and critical discussion of student work.

TRANSLATIONS

The primary goals of the course are to build conceptual and spatial thinking abilities and to develop a fluid workflow of analog and digital skills in both 2D and 3D. Material investigations and exploration in relation to conceptual ideas are developed through each one- or two-week translation (Figure 1).

Each translation defines specific objectives and output, beginning with analog orthographic drawing and model making before progressing to digital tools, then working back and forth between analog and digital methods to build fluency. Conceptual and spatial considerations increase with complexity throughout the semester, beginning with orthographic drawing, 3D formal

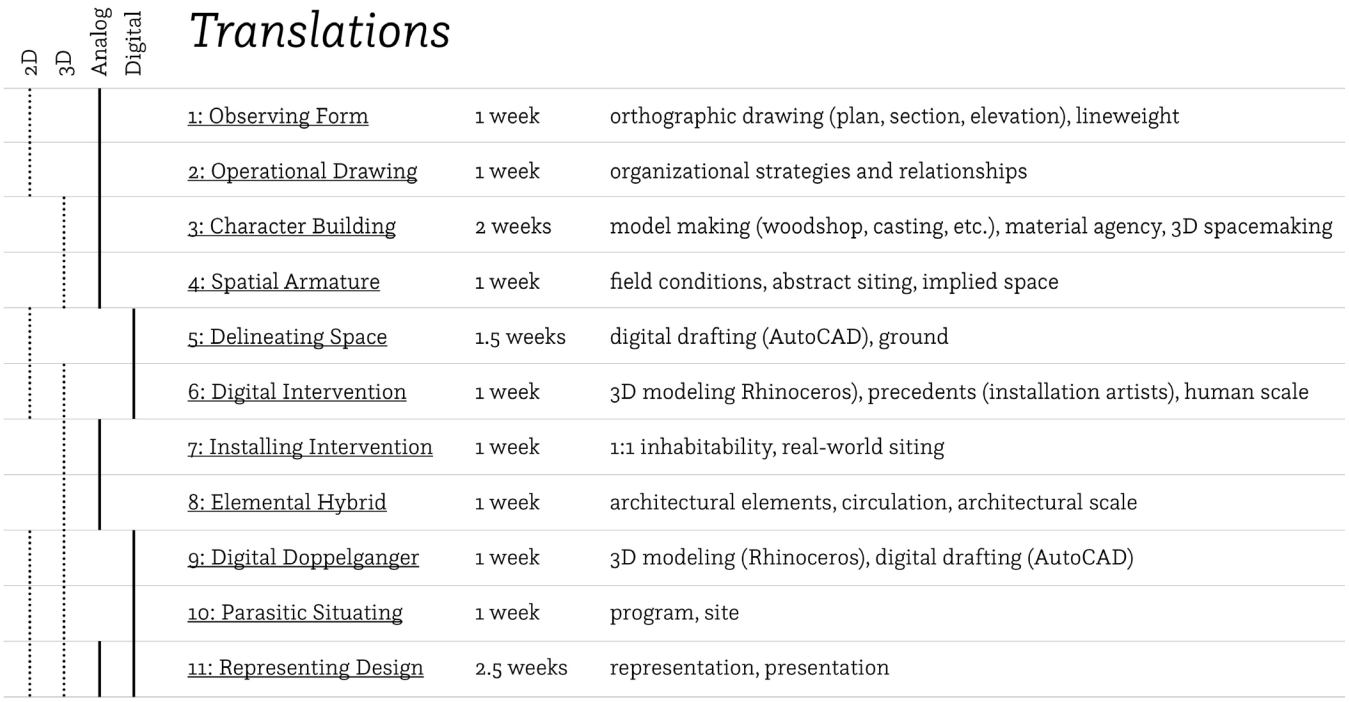

Figure 1. Sequence, duration, and focus of course 'translation' assignments. Image by author.

development, and materiality, before introducing human and architectural scale, site, and simple programmatic considerations.

As with many historically successful introductory design pedagogies, disassociation is a crucial tool. Students are encouraged to see form, space, and material in new ways, and to work through an iterative process to develop, analyze, adapt, and refine ideas as they transition between different modes of production and different modes of evaluating their work. As such, translations are intentionally distributed one at a time, so that students can be creative within a specific framework or set number of objectives, without worrying about what the next step in the process will be. This usually means that work produced one week will be revisited the next week through a new lens: a new mode of production, such as switching from modeling to drawing or from an analog to digital workflow, or a new scale, site, or programmatic consideration. By changing the spatial or programmatic objectives of each translation, students are encouraged to view and evaluate their work based on its unmined potentials, rather than to fall back on preconceived or normative assumptions of what constitutes architecture.

Translation 1: Observing Form

The first two translations are one week each and introduce orthographic projection — specifically plan, section, and elevation. This is accomplished through architectural hand drafting, with a focus on conventions of lineweight and building literacy through architectural drawing. Students are asked to find and describe a small object through a series of plan, section, and elevation drawings. Specifically, this object must be a "found object that was formerly part of a living organism" and "a piece of wood found in nature." The phrasing of the assignment aims to encourage creative thinking and questioning of familiar everyday objects. Drawings are constructed on a single large sheet of paper, using construction lines to develop relationships and transfer dimensions between drawings.

Translation 2: Operational Drawing

Translation two serves both as an opportunity to iterate on and further develop drawing skills, while introducing and applying conceptual organizational ideas. As with Translation one, students are asked to construct a series of drawings on a single large sheet, this time developing an intentional composition driven by a selected operational word — fragmenting,

Figure 2. Translation 3 ‘character’ models pinup and discussion. Image by author.

rotating, expanding, shearing, layering, intersecting, etc. Density, repetition, and layering of drawings to convey this formal organizational idea is foregrounded, as well as the use of techniques such as serial sections to fully describe a 3-dimensional object through 2-dimensional orthographic linework. At the conclusion of translation two, students have learned architectural drawing conventions through orthographic projection, and discussions in class have prepared them to precisely describe formal and spatial relationships through orthographic terminology — for example, "element A is nested within element B in plan, but in section, the two read as discrete parts."

Translation 3: Character Building

The third translation spans two weeks of physical model making. Students are provided with two types of character traits: 'physicalities' and 'personalities.' They are asked to develop a series of 'character' models that embody a selected personality and physicality, for example: fuzzy and disagreeable, lanky and selfish, slender and curious, or wrinkly and sheepish. The pairings are selected by students from words that can be understood in multiple ways. Creative interpretation is encouraged and is backed up by a clear articulation of how these characteristics are understood and conveyed by the designer.

Iterative development through sketch models is encouraged. Students ultimately produce three 'final' models measuring 3"x4"x5" in three distinct primary material palettes: one of wood, one of a cast material, and one of a material selected by each student individually (Figure 2). If students are unsure how to begin, they are encouraged to experiment with the assigned materials and to consider how their operational word from translation two might inform how their model comes together. To support the development of model making skills, this translation includes training in the UVA School of Architecture FabLab woodshop on various saws, drills, sanders, and hand woodworking tools.

Translation 4: Spatial Armature

Translation four builds directly on Translation three. Students spend a week building an armature model in which one of their prior character models is situated or sited. The armature model measures 6"x8"x10" and must envelop or partially intersect the selected character model. Material is limited to white chipboard to shift focus to the spaces produced with a limited palette. Ideas of site are introduced, with an emphasis on interpreting the character model as a field condition, in which volumes, surfaces, and spaces at the model periphery can be projected and manifest into the space beyond. Understanding these edges of implied space is linked conceptually to the deployment of construction lines in earlier drawings.

Translation 5: Delineating Space

Translation five reinterprets this physical model through drawing, bringing prior analog drawing skills into digital workflows through the use of AutoCAD. AutoCAD is intentionally taught before Rhinoceros and is limited to 2-dimensional drafting. Students are taught how to construct drawings digitally just as they did by hand, before 3-dimensional digital modeling is introduced in the second half of the semester.

Students digitally construct plan and section drawings of their physical model, allowing the exploration and description of interior and exterior spaces. Students are also asked to design a ground line in their sectional drawings, continuing to develop ideas of site by imagining their models positioned relative to a solid and likely carved ground condition.

The conclusion of translation five marks the midpoint of the semester. The sequence from analog drawing to analog model making to digital drawing is designed to first introduce literacy in drawing conventions and a vocabulary with which to accurately describe design ideas through plan and section, both verbally and through sketches. The development of formal and spatial ideas is allowed to develop intuitively through physical model making, with the deployment of different materials and model making techniques providing additional opportunities for creative invention. Describing physical models through orthographic drawing allows for the precise description of and reflection on the designed spatial relationships (Figure 3).

Translation 6: Digital Intervention

Following the University academic calendar spring recess, translations six and seven span two weeks and are conducted with students working in small teams of three to four individuals. Translation six begins with the study of a series of spatial installation artists such as Theaster Gates, Andy Goldsworthy, Yayoi Kusama, Rachel Whiteread, Amanda Williams, and Fred Sandback. Students also identify a site in or around the UVA School of Architecture at Campbell Hall. Working together, they develop a series of digital iterations for small spatial installations modeled in Rhinoceros.

Translation 7: Installing Intervention

In Translation seven, student teams physically construct their spatial material interventions at full scale in physical space, using a minimal material palette such as string, tape, or cardboard. This sequence introduces human scale in a real-world site. Students are asked to observe and document their work through photography throughout the day, and to display a text formatted as a gallery tag describing the conceptual, experiential, and material ideas in the work.

Figure 3. Midterm pinup displaying models from translation four and drawings from translation five. Image by author.

Translation 8: Elemental Hybrid

Translation eight brings ideas of human scale and inhabitability observed in the real world back to model scale. Students deploy their prior skills in physical modeling to design a hybrid architectural element — such as a window-stair, balcony-ramp, or door-hearth — introducing considerations of program or function relative to the scale of the human body. Designs are made to fill a volume measuring 16'x20'x24' and are modeled at an architectural scale of 1/2"=1'-0".

As in translation three, material provides an additional framework for design. Students are asked to use materials from two of three categories in the construction of their model: frame (square or rectangular basswood sticks), plane (white chipboard or basswood sheet), and volume (rockite, plaster, or solid wood). This additional consideration allows prior formal and spatial ideas to be redeployed and interpreted within a new programmatic and scalar context.

Translation 9: Digital Doppelganger

In translation nine, students iterate upon their previous design by working through 3D modeling digitally in Rhinoceros. Students are taught to use their 3D models as a tool for creating plans and sections that are further developed using learned methods in AutoCAD.

Translation 10: Parasitic Situating

The last four weeks of the semester are spent developing the final two translations, which task students with applying all the skills and concepts developed throughout the semester to design and represent an architectural intervention. Translation ten introduces the program and site for this final design project. Like in translations six and seven, the project is sited within UVA's Campbell Hall. Students each select a site that transitions between two or more distinct spaces within or around the building. A simple program is provided, consisting of a space for work or rest (for an individual) and a space for gathering or meeting (for a small group of three to four people). Additionally, these spaces should provide two or more distinct views into surrounding spaces (interior or exterior), and two or more ways to enter or exit.

The prior work from translations eight and nine is adapted directly into the first iteration of this project, and is developed through now familiar methods of digital 3D modeling and plan and section drawing.

Figure 4. Final review. Image by author.

Translation 11: Representing Design

The final weeks of the semester are spent developing a set of representations of the design work, in preparation for presentation formats in future design studios. Students produce a plan and two section drawings, an axonometric drawing, a physical model, and two perspectives developed primarily through model photography. The work is formally presented to peers and guest critics in a final review format, where students are asked to provide a concise written and verbal synthesis of how their ideas developed throughout the semester, leading to the design of their final work (Figure 4).

CONTEXTUAL RELATIONSHIPS AND SITE

Contextual relationships and understandings of site are introduced throughout the semester. This occurs first through the siting or embedding of a prior model within a new one, changing the way the work is viewed from as an object to as a landscape. When this combined model is drawn, students are asked to articulate the ground line in their sections such that the project can be understood as being embedded within the earth. In lieu of traditional site analysis, students are asked to build familiarity with site at a smaller scale, with the architecture building in which they are studying serving as the site for two projects — first, the physical spatial installation, and then the final project designing a series of parasitic spaces within the building. This allows students to build familiarity with scale and drawing legibility by observing the building around them, and to begin to interrogate this building or site through design interventions that thoughtfully respond to or take a position in relation to their context.

NARRATIVE DEVELOPMENT

The translations are broken down into one- or two-week assignments to allow students to focus on a specific task for a designated amount of time, and to ease them into more open-ended projects with longer time frames that await them in future studios. The translations are also designed to build upon one another, either directly week-to-week or recalling and building upon knowledge from prior weeks. They are collectively conceived as a single spatial project to be developed by each student over the course of the semester. This structuring encourages students to be both intellectually agile in how ideas are transformed and iterated upon, and thoughtful in how a single conceptual narrative is formed over the course of the semester. At critical points throughout the semester, students are asked to write about and/or present their work, conveying the development of a project through a clear narrative. The narrative is delivered through written words and verbal presentation, but

also through the communicative capacity of architectural representation — namely drawings and models. Students work to develop the ability to articulate their ideas precisely and concisely, building valuable communicative skills for future studio courses and future employment.

PRODUCTION MANUAL

At the beginning of the semester, students are provided with digital access to the 'Production Manual' for use throughout the course and beyond (Figure 5). This 107-page guide produced for the course aims to teach fundamental skills including hand drafting and model making, digital drawing and modeling through AutoCAD and Rhinoceros, and documentation through photography and photoshop. The Production Manual has also been provided to first year graduate students and third year undergraduate students, and has served as an effective tool in building and reinforcing efficient workflows in the architecture studio, according to informal feedback from these students and observed progress in subsequent studios.

The Production Manual will be developed and expanded in the future as an Open Educational Resource (OER), in collaboration with faculty Lauren McQuistion. Please contact the author for access to the most recent version of this learning and teaching resource.

CONCLUSION

Holistically, the pedagogy aims to prepare students for a fully-fledged traditional architecture studio the following semester in which they can focus on the design of a building with specific site and program considerations. Students are equipped with the ability to move fluidly between drawing and modeling both digitally and by hand, allowing each individual to work in ways that are most productive to them, while still being able to produce a range of representation that may be requested for future projects. The course suggests possibilities for a different format of architectural education, addressing some of the challenges of studio courses with shorter meeting times and larger cohorts.

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Figure 5. Production Manual example spreads. Image by author.

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ENDNOTES

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