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**Digital Media as an Agent of the Global
Aesthetic: Challenges for Design
Education**

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Abstract

This paper argues that the rise of digital media¹ in design disciplines accentuates the tension between global and local cultural identities. Using a study conducted in graduate design education it describes how the technology is changing the methods and strategies used for designing the built environment and, more significantly, the effect this has on design thinking. In particular, it discusses the media's tendency to internalize the design process by maintaining an analogical disconnect between the symbolic constructs employed in design thinking and the ecological, cultural, and material factors that inform our experience of places.

The paper first situates digital media technology relative to the intentions of design pedagogy. It then describes the methodological framework developed for the study and reviews its implementation in graduate landscape architecture design studios. Finally, it contrasts the observed internalizing tendencies of digital media with the practices introduced by other design tools and methods.

The paper proposes that externalization in design thinking occurs when technological boundary conditions analogous to those found in the real world are introduced. These conditions, it is suggested, may be fundamental in helping designers move forward with propositions demonstratively appropriate to local environmental and cultural contexts.

Introduction

From the perspective of a design educators technology is most usefully defined as a practice. As Ursula Franklin observes, this recognizes the "deep cultural link" of technology and puts the onus on us "to understand better the human, social, and ecological impact of [...] the way things are done".² In her book *The Real World of Technology*, she argues that new technologies, and in particular electronic ones, modify social and political patterns by emphasizing prescriptive and asynchronous practices over holistic and synchronous ones. One consequence, she further proposes, is our increased isolation from the environmental, social, and experiential patterns that have traditionally shaped and defined local cultures.³

The present study sets out to observe the extent to which the use of digital media in the design process effectively contributes to this isolation. The paper first describes the methodology and results of this enquiry. It then reviews some of the shortcomings of digital media in regard to the purpose of environmental design and suggests that these are generated by the media's tendency to maintain students in an internalized mode of conceptualization.

A framework for recording the design process

To establish the particular digital media approach to design a framework for recording each student's design process was developed around the three categories of tasks, tools, and products. The intent of this framework was to help students articulate their design process by providing a frame of reference from which to recognize patterns within their own process and contrast these with those of their peers. It was also hoped that this recording framework would provide insights into the methods, strategies, and knowledge promoted by digital media and, ultimately, help assess these against the pedagogical objectives identified above.

The list of design tasks is based on Brian Lawson's revised categorization of design activities and skills.⁴ *Formulation* includes the skills associated with understanding and describing problems. *Ideation* ('moving' in Lawson's description) encompasses the skills required to make design propositions. *Representation* refers to the externalization of internal processes, both as an act of self-actuation or communication to others. *Selection* refers to the testing, sorting, and evaluation of design propositions. Finally, *evaluation* refers to the critical assessment of the design process itself and its success in conducting the four previous activities.

Tools were less specifically defined except for a requirement for mixed media, in particular the combination of digital and non-digital media, two and three-dimensional media, and static and time-based media. A list of the most common design tools was provided but students could modify it throughout the process. One example was the addition, in mid-project, of sound recording and processing tools, which had not been considered as relevant by the instructors. Products selection was left entirely to the discretion of students. The only imposed parameter was that the selected product (or products) had to be representative of the primary tasks accomplished at the time.

Self-recording of tasks, tools, and products was conducted weekly by students, using a template provided for that purpose (Figures 1 and 2). The sequence of tasks and the proportion of the week dedicated to them were recorded using color-coded segments. When two or more tasks were conducted simultaneously, students had the option to add parallel segments to the main baseline. Tools were identified below the tasks and accompanied by pictures of selected products. To complement the recording template, students were also asked, at the end of the project, to provide a second template with the product illustrations resized to graphically reflect the relative impact of their associated task on the overall design process. It was hoped that this would further help students reflect on their design process as a whole and serve to assess the actual contribution of each tool and media type.

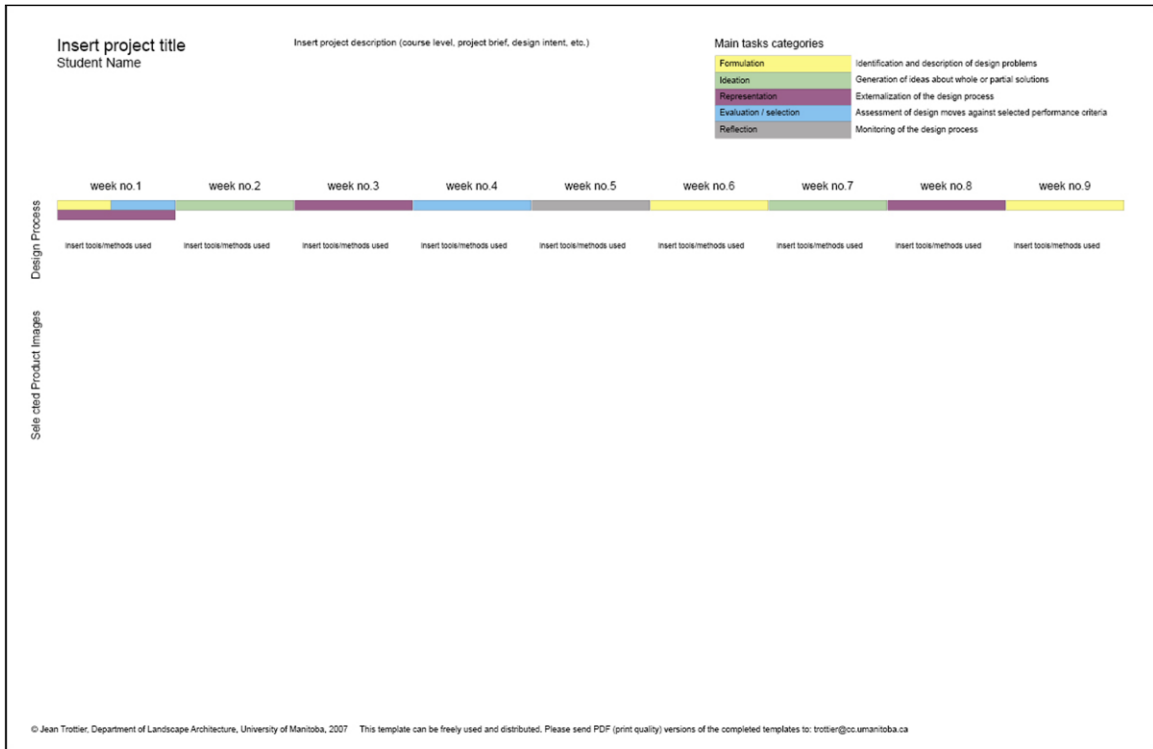


Figure 1. A template for self-recording of the design process

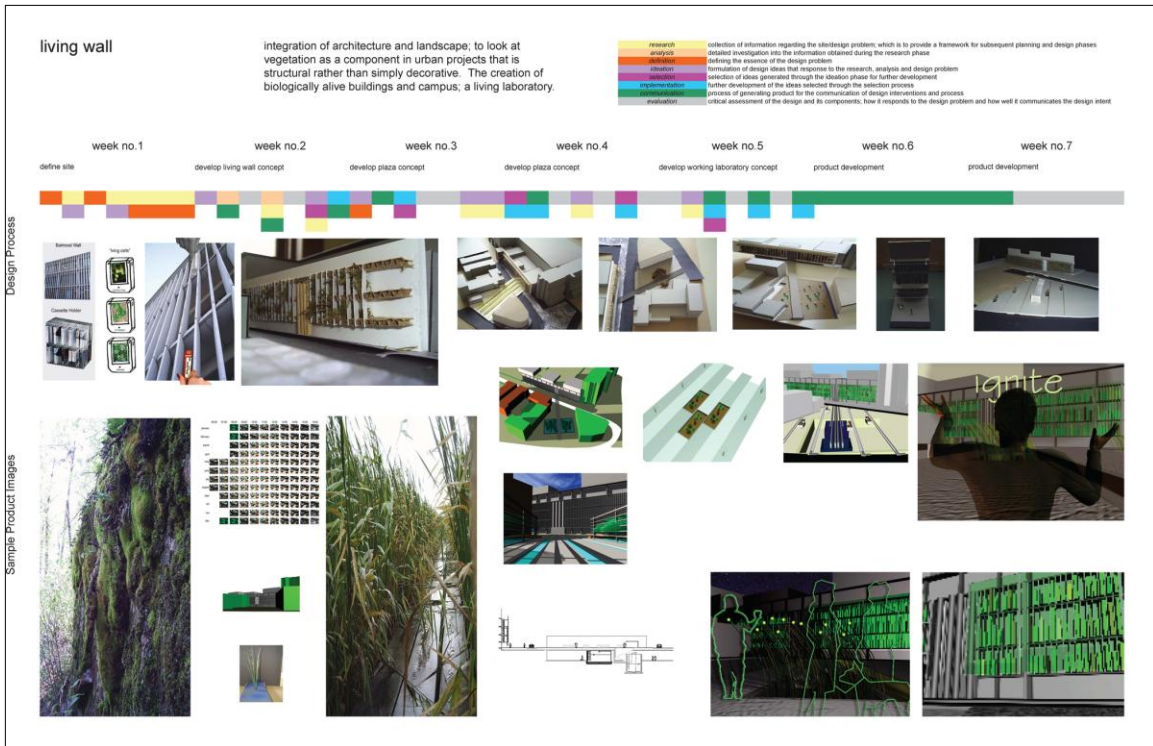


Figure 2. Example of a completed template

Observations

A comparison of the various completed templates first supports the view that the design process is iterative and specific to each individual. Some students approached the project holistically, with a significant return to formulation (research) and ideation tasks in mid project. Others formulated the intent of the project early on and then set out to conduct sub-design processes on discrete components, each with its own iterative sequence of design tasks.

Second, while the visual weighting of products does not indicate any bias towards digital or non-digital media (neither media could be said to have had more impact on the design process) it appears that students reflect on the strategic value of each tool for the various design tasks and choose to use digital media for ideation and representation tasks but non-digital media for formulation. Almost none of the students elected to use digital media before week three of the project even when digital surveys and a virtual 3D model of the site were available. This would indicate that digital media, at least under its current incarnation, does not have the operative breath to independently support a fully iterative, conversant, and reflective design process and that interfacing digital and non-digital media will remain a key pedagogical challenge.

Third, only 30% of students employed three-dimensional modeling media in any significant way. This parallels trends in professional practice and seems to illustrate the remaining difficulty of achieving fluency in modeling and visualization software. Two-dimensional CAD was used by about half the students at some stage in the project but, by and large, the preferred digital media remained associated with photo-processing and graphic design software.

Finally, given that the study was conducted in design studios where experimentation is encouraged it was expected that the ideation and selection tasks would occupy the largest share of a project's duration (respectively about 50% and 30% of that duration). More surprising was the extent to which students ended up conducting much of the evaluation tasks simultaneously to the representational ones. Given the observed bias towards graphic design software the implication is that many students end up testing their spatial propositions using two-dimensional representational tools.

This last observation generated much discussion between studio participants and suggested that ultimately the most significant impact of digital media on the design process may not be in the manner in which it changes the methods and strategies employed to accomplish design tasks but rather in the kind of knowledge it brings (or not) to design thinking. Given the impetus to make digital media a predominant tool in design education we may well ponder for a moment the specific nature of that knowledge.

The ideation / evaluation conundrum

The collapsing of evaluative and representative design tasks observed in design studios may well constitute but a symptom of a deeper shift in pedagogical paradigms that only

happens to find itself aligned with – and augmented by – the new technological possibilities. Nowadays, it is not rare to see collages, video filming, and other generative tools used in formulating the purpose (or program) of a project. Yet, because these tools are primarily generative rather than demonstrative students have a tendency to define problem statements on the basis of their personal, subjective response. The design process then serves to first clarify the formal and experiential possibilities of that subjective response and then, and only then, to find ways to accommodate the programmatic, social, or ecological requirements. Under these conditions the final specification of formal properties often proves quite frustrating.

In my experience, most students that find themselves in that dilemma attempt to make formal propositions during the final representation tasks of their design process. In this instance, collages, photo-imaging, and other presentation techniques are used as evaluative tools *precisely* because they cannot clarify the formal implications of their design intent. The result is that the evaluative tasks of the design process have been skipped entirely: we have no way of knowing the specific dimensional, formal, textural, or color attributes of the proposal or whether these attributes are appropriate to the project at hand.

The effectiveness of digital media in producing seductive visual experiences tends to mask this self-referential condition and validates students that wish to remain in an internalized ideation mode. To say it differently: it appears that while digital media effectively supports the reflective aspect of the design process it fails in maintaining an effective dialectical conversation between the designer and the external world:

"In pre-electronic studio activity, the imagination would conceptualize from a wide array of influences, historical, technical, and phenomenal. Influences that were, in other words, external, diverse, physical. Designing with electronic media involves a complete inversion – it is an internalized, constrained, and virtual experience in which the creative relationship to the tools and information held within the machine seems to be more stimulating and to hold more promise than the experience of place, or the lessons of history".⁵

I content that this conundrum will not be eased until the tools used for *both* ideation and evaluation and ideation tasks contain within themselves boundary conditions for the types of conceptual operations that can be pursued. To clarify these boundary conditions we can begin by contrasting digital media with other tools and methods that have traditionally informed the design process.

Hand drawing: kinesthesia

Consider two approaches to designing a path. The first, using a pencil, draws a continuous sinuous curve on a sheet of paper. The other, using a computer screen and mouse, "draws" the same curve by pulling down a menu to set arc parameters and then clicking on three locations to establish the beginning, end, and radius of that curve. In the first instance, an experiential analog is maintained between the design process and the spatial experience, as the adjusting tension in the wrist and the angle of the hand provide the designer with an unconscious appreciation of what one would experience running along the path. In the second instance, the "right" degree of curvature is established almost exclusively on its visual properties and the designer must consciously reconnect that visual experience with embedded memories of past bodily sensations.

Full-size mock-up: scale

In *What is Design?* Jacques Grillo defines scale as "[the] feeling of a design fitting its space and surroundings" adding that this fit only makes sense relative to the human body, which provides "a constant and immediate system of reference [for establishing] the bond between the scope of man's creative power and the world around him".⁶ The immersive attributes of the digital experience, where one zooms in and out of virtual constructs without a fixed referent, erodes the ability to establish dimensions that are appropriate to the anthropomorphic characteristics and behavioral limitations of users. In this regard, digital collages or fly-through animations are poor substitute for full-scale drawings or mock-ups. In one design-build studio a Japanese gate was first designed to full scale, on a blackboard, and then further refined in a full-size mock-up prior to construction. This not only ensured that all dimensions were conceived relative to the human body but also that the level of detailing of the various parts of the structure were appropriate to both the perceptual and mechanical abilities of the users.

Design/build: material behavior

The same design/build studio served to identify another type of knowledge that is not readily provided by digital media. A library entrance canopy was first entirely conceived in 3D-CAD. The patterns for some of the most complex parts, such as the curved joists and the sheet metal soffits, were then printed to full scale and used to cut out the final pieces. One limitation with this approach became apparent during on-site construction as the canopy refused to conform to the designers' intent even though all dimensions and curvatures had been precisely established in 3D. The problem, of course, is that while each component of a 3D model - in this instance the joists that compose the intricate canopy - is a perfect duplicate of the original digital construct, each of the piece of lumber used for construction possesses a distinct character shaped by the particular density and orientation of its grain. This deficiency in analogical correspondence between the real material and the "abstracted" construct used in the design process implied that the students never internalized the proper mechanical behavior of their structure and failed to identify the requirement for additional blocking components to ensure the even, regular alignment of joists required to achieve the intended character.

The sandbox: physical forces

Design studio projects are commonly set up as a process of formal clarification of an *a priori* concept. Under these conditions, it is not uncommon for students to strategically engage their design process within the parameters initially suggested by the concept itself and to focus on reinforcing their original image of the final product. Design propositions then typically focus on the possibilities suggested by the visual experience to the detriment of those associated with other formal generators.

Frustrated with this "concept first" approach Natalija Subotincic developed an empirical methodology that requires students to engage structural imperatives directly in the formulation, ideation, and evaluation tasks of their design process. Students begin by constructing a sandbox within which they conduct a sequence of experiments. Because of the constant limiting conditions set by the sand the exploration of form-making propositions happens simultaneously with their evaluation: each failure provides insights

into appropriate formal responses. Representation through photographs and drawing is conducted in parallel to reinforce the learning process through reflection. This mini-laboratory

"serves as an analog for the physical dimensions of design. It allows 'physical ideas' to emerge simultaneously with the conceptual elements and thinking that must occur in bringing form and relationships into being. Issues such as materiality, structure, detail, color and light do not have to wait in the development of a design as they are part of the students' imagination and thought from the very beginning".⁷

Enactment: ecological processes

Every designer eventually faces the task of laying a grouping of trees, columns, buildings, or objects in a naturalistic or organic pattern. Much time is usually spent moving elements here and there until the overall configuration feels "right". This approach is not only inefficient but, as for the path example above, implies a rightness established purely on the basis on a visual experience that may have little to do with the intended experiential one.

An alternative approach is to integrate in the design process the forces that generate organic patterns in the first place. Thus, a plan of a proposed design is brought outside on a windy day. Pine seeds are then thrown and left to fall on the sheet of paper, taking, literally, the planting layout out of the hands of the designer. This is, of course, but a simplistic example; closer in substance to the strategies employed by all-over painters than to real replication ecological processes. But it illustrates how relatively simple design strategies can nevertheless sustain ideation and evaluation tasks in conditions analogous to complex dynamic systems.

Conclusion

In a polemical essay on technology Neil Postman proposes that when new technologies compete with old ones social and cultural institutions are altered and, along with them, our own worldviews. "New technologies", he says, "alter the structure of our interests; the things we *think* about. They alter the character of our symbols; the things we think *with*. And they alter the nature of community: the arena in which thought develops [his emphasis]".⁸ With this in mind, the study presented here is an attempt to clarify how digital media alters the traditional foundations of design practices.

The effort to identify when and how students from a computer-savvy generation choose to resort to digital media brought forward two main observations. First, given the option, students will prefer to move strategically between digital and non-digital media. This puts the onus on instructors to clarify the benefits and limitations of each tool and to teach towards the effective combination of these tools throughout the design process rather than attempt to deploy the same digital tool over all design tasks. Second, while all tools can be made to mask inconsistencies in reasoning and arguments digital media seems particularly adept at it. This is most evident in the way that the media's ability to make things look good is exploited to hide the fact that design propositions remain untested or have yet to be externalized from self-referential ideation activities.

Given this second observation we should heed Postman's admonition and concern ourselves less with what digital media can do than with what it makes us think about and, in particular, with the tendency of digital media to maintain students in an internalized mode of thinking. The inability of the technological tool to provide knowledge of external, real-life conditions is not specific to digital media but it is compounded by the fact that digital media works, in part, through a simulacrum of realness that makes students less likely to develop an awareness of the unresolved or problematic aspect of their design propositions.

We have explored five other design tools or methods that encourage externalization in design thinking by introducing limiting boundary conditions analogous to those found in the real world. These boundary conditions, by collapsing ideation and evaluation into one simultaneous set of tasks – unconsciously as in the hand-drawn path example or consciously as in the design / build one – seem to allow students to move forward with their design process by focusing on propositions demonstratively appropriate to the problem at hand. This, in and of itself, may constitute the single most important area of future critical enquiry regarding digital media.

¹ The term *digital media* is used here to reflect the technical convergence of CAD, visual simulation, video, web, and graphic software in the design disciplines.

² Franklin, Ursula M. *The Real World of Technology*. Concord, Ont.: Anansi, 1992.

³ Ibid.

⁴ Lawson, Bryan. *How Designers Think: The Design Process Demystified*. 4 ed. London: Architectural Press; Elsevier, 2006.

⁵ Balfour, Alan. "Architecture and Electronic Media." *Journal of Architectural Education* (2001): 268-71.

⁶ Grillo, Paul Jacques. *What Is Design?* Chicago: P. Theobald, 1960.

⁷ Subotincic, Natalija. "Turning Our Attention from Product to Process: A Design Studio Methodology Which Does Not Begin with 'Concept'." *88th ACSA Annual Meeting: Heteropolis: Immigration, Ethnicity, and the American City*. Association of Collegiate Schools of Architecture. Los Angeles: ACSA, 2000. 183-87.

⁸ Postman, Neil. *Technopoly: The Surrender of Culture to Technology*. 1st ed. New York: Knopf, 1992.