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The power of the pen(cil): Enduring validity in technology-dominated design education

Abstract
The recent marginalization of long-established manual graphic traditions by technological alternatives has precipitated wide-ranging consequences for design education in diverse contexts and specializations. In this paper, I analyze this progression as situated within the discipline of landscape architecture, advocating for a curricular reformation to reprioritize manual graphics as a pivotal element in design education. From my vantage point at the intersection of professional practice, pedagogy and research, I summarize this development within the specific arena of landscape architecture education. Prominent issues of concern and implications are identified, followed by articulation of remedial strategies appropriate to current circumstances.

Keywords
Sketching; Drawing; Creativity; Design education; Design technology; Landscape architecture; Manual graphics

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DISCUSSION FRAMEWORK AND MY RESEARCH STANCE

The unprecedented, rapid technological revolution underway in our world has reimagined almost every facet of our lives in a relatively brief timespan. With few aspects of human existence remaining untouched by automation, computerization or mechanization, it is critical to undertake an impartial evaluation of the implications of this momentous development, recognizing the possibility that technology's consequences may not be exclusively benevolent (Bowker 2019). While our overall lives are undoubtedly facilitated (though not always *enhanced* or *enriched*) by technology's various manifestations, the same does not hold true for all spheres of our existence. Indeed, it can be argued that certain concepts should remain unviolated by technology to forestall detrimental consequences. One such concept is design, a discipline historically reliant on human creativity, ingenuity and wisdom to discover enduring solutions for a spectrum of assorted challenges. Indeed, it is the human touch which produces the beauty, uniqueness, emotiveness and lack of sterility that makes design noble and sublime, whether of an object, concept or process (Bernsen 1983; de Botton 2006). This paper evaluates technology's influence on a specific design discipline – landscape architecture – and specifically on its pedagogy, advocating for a more guarded assessment of technology's repercussions, which may not always be benign.

For landscape architecture, this technological pervasiveness is of extraordinarily monumental import, upending centuries of established tradition and challenging foundational underpinnings. Vital to a landscape architect's work is the capability to graphically express concepts, illustrate processes, visualize solutions, and materialize abstracts notions (Byrd and Nelson 1985). Ultimately, the facility to realize tangible imagery on paper (and subsequently, on the site) is the essential service that landscape architects offer their clients, who, often lacking a design background, may struggle to comprehend spatial and aesthetic proposals in the abstract. Generating an accurate visual representation, an *idea-sketch* (Verstijnen et al. 1998), is the initial step in discovering a viable solution, and also the most powerful (Dee 2016). The ability to speedily distill complex ideations into concise, comprehensible visuals underlies the iconic portrayal of the designer and is immortalized as the clichéd 'napkin sketch'.

It is this indispensable capacity which has been significantly compromised by this technological inclination, and which prompts the investigations outlined in this paper. I contend that utilizing computers for formerly-manual practices adversely impacts landscape architecture design education, and requires examination of its repercussions on the knowledge transmitted to aspiring professionals. Of the several resultant consequences meriting analysis, I will focus on design intent communication, i.e., comprehending, synthesizing and expressing concepts simply, clearly and concisely.

As a former practitioner, current researcher-educator and proponent of art education, this issue is integral to my core identity. It elicits an emphatic personal opinion and consequently motivates my advocacy. My observations and arguments are situated within the intersection of

academic and applied realms of design, and informed by personal proficiency in both manual and computer graphics usage. Additionally, the chronology (1987 to the present) bears particular relevance as it was within this period that centuries-old traditions were incrementally supplanted by computerization, which emerged as a marginal novelty but eventually metamorphosed into the unrivalled, sole industry standard. [i]

Initiated with education in architecture and landscape architecture, my journey encompasses fourteen years of practice and thirteen years of university-level teaching. The patterns witnessed across the industry correspondingly manifest in this trajectory as well. My education was characterized exclusively by manual graphics; professional practice by computer use; and teaching by a transition from predominant hand drawing (in 2006) to ubiquitous computer use (in 2019). This protracted yet intimate familiarity allows a profound appreciation of each medium's strength, applicability and optimal role in education. My teaching enables a prolonged observation of the steadily-increasing mechanization of landscape architecture education and its attendant consequences, intended and unintended. What I present here are formulations by distinct but overlapping identities, grounded in three decades of observation and analysis.

LANDSCAPE ARCHITECTURE: IDENTITY AND EVOLUTION

The profession of landscape architecture (along with architecture and urban design) is an intricate, multidimensional built discipline with distinguished constituent phases requiring discrete and specialized skills. Specific interpretations of the profession vary widely, a logical consequence of its expansive range of applications, scales, services and contexts. It is a comparatively young discipline, with its values, philosophies and parameters still being negotiated, refined and formalized (Kullmann 2016; Langley et al. 2018). In fact, its identity and social perception have continuously morphed over time, acquiring distinct identities for different audiences in different places. Today, it encompasses an expansive range of multiscale environmental engagements, from implementing solutions at intimate scales (designs for residential gardens) to large-scale administrative supervision (management of national parks). Recently, with growing concern about humanity's catastrophic depredation of the planet, it has acquired yet another, urgent dimension through its ecologically-responsible restorative contributions to heal nature and humans (Kammerbauer 2019; Sullivan 2019; Weller 2014).

Notwithstanding its ever-evolving identity, at its core it has always been a problem-solving discipline, proposing solutions for environmental concerns of individuals, groups or communities. In this regard, it echoes the undertakings of its sister professions, architecture and urban design, which differ only in the context and materials of their applications. This fact has retained its validity even as these professions have undergone a recent metamorphic reconfiguration, becoming increasingly reliant on (and defined by) technology and integrating computers in almost every stage of their practice.

For a craft characterized for centuries (millennia, in the case of architecture) by human handiwork and ingenuity, this shift is historically unparalleled for its wide-ranging impacts. The conventional paradigm required each sequence of practice — initial conceptualization, refinement and drawing production, final construction — to be accomplished manually. Each stage of the pre-construction process relied on artistic refinement and dexterity — sketching for initial exploration; drawing and drafting for translating schematic proposals into legible, coherent documents; lettering for effectively communicating information; and rendering to vividly convey the designer's vision in presentation drawings. The degree of expertise, talent or proficiency manifested in the handiwork determined the quality of the final product in each circumstance, and each phase was distinguished not merely by functionality but aesthetic quality as well.

Clear communication was (and remains) vital for the process to unfold as foreseen and for the proposal to be constructed within specified logistical expectations. A complicated and protracted process with numerous stakeholders relied upon accurate and efficient communication (visual and verbal) for the various groups to interpret and execute the product exactly as foreseen by the designer and client (Self 2019). While generated primarily as communication, visual graphics also came to be appreciated for aesthetic quality. This expectation was not a concession to a superfluous attribute, but reinforced the principal objective of effective, lucid communication. Refined aesthetic quality — precise linework, consistent lettering, graphic hierarchy, accuracy, cleanliness — while enhancing aesthetic appeal, also facilitated better comprehension. Of all requisite skills, the ability to express visual information was the most vital, as effective communication was the keystone of successful execution.

The pantheon of analog graphic communication included assorted hierarchies, value systems and technical parameters, customized to the various categories of data to be transmitted (Ching and Juroszek 1998). From fanciful, tentative imaginations of germinating ideas to refined, measured construction drawings, the continuum included various permutations of imprecision and precision. While all initiatives were valuable, arguably the most essential was sketching, a technique which transfigured abstract notions into viewable, comprehensible and measurable images. With its simplicity, immediacy, and potential to "stimulate contingency and openness" (Dee 2008: 62), this minimalistic imaging was a remarkably efficient and valuable design instrument. Sketches distilled the pure essence of ideas for speedy yet methodical assessment, and required minimal supplies. Indeed, an ordinary pencil could grant the designer an astonishing and limitless versatility, in highly individualized styles ranging from the whimsical to the meticulous, as attested over the years by numerous authors (Ching 2003; Jenny 2012; Rauch 1978; Wang 1977).

NEW PARADIGMS AND REPERCUSSIONS

The tradition outlined above continued largely unbroken for centuries, and although it was not static, the advancements and incremental enhancements to tools, implements and materials did not restructure the overall process significantly. As recently as the 1980s, innovation meant cosmetic improvements to existing practices (mechanical ink pens, synthetic letter transfers, etc.) which left the essential procedural integrity intact.

The proliferation of computers, however, reshaped not only superficialities but the underlying core of design implementation. As technology has advanced from replacing instruments to subsuming entire processes, it is now the computer which is the primary work generator, with human contributions restricted to guidance and instruction. While the computer actually draws, edits and prints, the human hand (with the help of an intermediary instrument such as a mouse) merely supplies inputs and issues commands. The cumulative impact of this development is not entirely negative. It has simplified, facilitated, enhanced and expedited professional practice, and realized a degree of efficiency previously unimaginable. In doing so, it has improved production and improved communication among the various stakeholders for fluid, seamless implementation. It has been invaluable for improving efficiency and performance, and consequently, profitability.

But how has it affected other aspects of landscape architecture? Have its consequences been equally benevolent in all dimensions? While facilitating the achievement of certain objectives, could this mechanical dependence hinder the achievement of others?

These questions are especially pertinent in academia, where the evolution underway in the professional sphere has, unsurprisingly, precipitated a parallel trend. Institutions granting landscape architecture degrees exist to not only provide an education, but also to adequately prepare students to enter the profession upon graduation. Eligibility for prospective employment is an important consideration for students, which makes it incumbent upon institutions to ensure their curricula satisfy the expectations of professional competency standards. Consequently, there has been an increased incorporation of computer usage in landscape architecture curricula. They have become the preferred (if not required) means of production, and distinct subjects of courses (computer-aided drafting, rendering, 3D modeling, animation, etc.). The time, space and resources previously dedicated to manual graphics have now been assigned to technology-based courses.[ii]

EDUCATIONAL FRAMEWORK PRE-COMPUTERIZATION

A summarized review of the dismantled educational paradigm will help us better estimate the value of that which has been lost. The simplicity of the former system, with manual drawing as the sole medium of graphic communication through the program, offered dual advantages, one explicit and one implicit.

Continuous reinforcement of one medium (through instruction, criticism and guidance from mentors) over several years (typically 4 or 5) enabled the acquisition of improved knowledge, dexterity and sophistication. Achieving proficiency in manual graphics, like other learned skills, requires cumulative training over an extended period, with structured exposure to increasingly complex and challenging techniques and concepts. This arrangement afforded the student a prolonged period of practice and sustained iteration, which resulted in improved ability, proficiency and confidence. This structural simplicity provided a linear, streamlined educational process which enabled an efficient channeling of the student's energy, time and attention. Proficiency was developed gradually in various representational techniques, with increasingly complex concepts being introduced in concert with advancement in the program. This arrangement provided a suitable structure for acquiring essential observational and documenting skills. As a consistent, unifying link through various classes and subjects, manual graphics acted as a sturdy endoskeleton for an accretive, compounding learning structure.

A more substantial educational advantage was graphic communication's role as a conduit for design education, the core of the discipline. Manual graphics became a medium to first comprehend, and then reinforce, design principles by facilitating observation, synthesis and representation of ideas. Drawing compels the artist to truly see, and perceive entities, characteristics and relationships inaccessible to a cursory glance. Advancement through the curriculum, which led to addressing increasingly complex theoretical ideation, was accompanied correspondingly sophisticated graphic abilities to express this evolved thinking. This paradigm parallels the repetitive, iterative model for learning acquired skills, like speaking a new language or playing an instrument.

ADVERSE CONSEQUENCES ON PEDAGOGICAL PROCESSES

The unrestrained and enthusiastic embrace of computers, though well-intentioned, has precipitated potentially serious long-term repercussions. When viewed through a critical academic lens, I consider the following the most prominent for their influences on teaching and learning. Configuring a forward-thinking, comprehensive and complete education program would require redressal of these foundational shortcomings prior to the articulation of programmatic particulars.

Compromised design learning

The most problematic issue is the inability of computer programs to teach design and creativity, which derive exclusively from human genius and instinct. Technology provides a partial substitute for manual graphics as it only compensates for its functional aspect, which is what it was intended to do. While it has significantly simplified drafting and made possible revolutionary 3-D modeling and photorealistic rendering techniques (Kullmann 2014), these capabilities relate to later production stages which succeed the conclusion of the creative process. In the early

phases of ideation which rely on experimentation, innovation, non-conformity and unrestrained exploration, technology (so far) provides no equivalent for a hand-drawn sketch's infinitely potent efficacy.

Inhibited creative exploration

Computer programs do not facilitate learning in a manner comparable to manual graphics, nor were they designed to. They are unable to stimulate or encourage spontaneity, and the precision and technical information they require is not only irrelevant in early phases, but an impediment to creative thought. By compelling the user to work within constraints, they inhibit the imagination and subliminally promote practicality, which is absolutely undesirable in the early stages of exploration. The energy, speed and immediacy of an exploratory scribble cannot be equaled by an alternative requiring specific data inputs, detailed knowledge, precision and intermediary machines.

Impeded pedagogical development

The advantages of technology — speed, efficiency, accuracy, simplicity — do not retain value in the educational context, becoming secondary (or even irrelevant) to the process of effective learning. Indeed, I contend that it is the opposites of these attributes which truly support substantive, comprehensive and meaningful learning. Intellectual growth is a protracted process which unfolds gradually, encountering and negotiating detours, dead-ends, errors and complexity to acquire an enduring understanding of a subject. From this perspective, the above attributes cease to be assets at all, and function more as obstacles by offering 'easy' alternatives, and thereby discouraging the undertaking of the correct but more arduous process. Thus technology's non-intellectual, sanitized, linear methodology becomes an irresistible (but flawed) alternative to the correct but harder choice.

Divided focuses

Unlike the former paradigm, current models which (commendably) seek to sponsor knowledge in both manual and computer graphics nevertheless are handicapped by a practical consequence. Because visual communication, digital or analog, requires time to mature, a bifurcated model is unable to foster expertise in either, as neither skill can be allocated sufficient time to be nurtured to the degree necessary. While the information is dutifully provided, it is unable to be absorbed, processed and applied to a satisfactory degree, either for manual or computer graphics. Equipped with only to a perfunctory introduction, students are unable to garner expertise or confidence to the degree necessary for fruitful application of the knowledge acquired.

Misplaced value emphasis

The reduced emphasis on manual graphics (manifested as fewer dedicated courses, and the promotion of technology as a comparable alternative) has unintentionally caused its

devaluation by implying that it is irrelevant, outdated, or optional. Juxtaposed against a newer, modern competitor (or rather, pretender to the throne), its perception as slow, inefficient, superseded or obsolete precludes its embrace by students. Current generations, with lives populated by and fully dependent on gadgetry, are unlikely to discern value in a medium so evidently defined by its antiquated alienness. As novices, the students are also uninformed of the potential benefit of this skill in their future, which further contributes to the absence of interest.

REMEDIAL STRATEGIES FOR RECALIBRATION

Accretive adaptations by academia to retain currency within the ever-changing professional sphere have resulted in disjointed, imbalanced relationships between manual graphics and technology. Devising curricula which successfully address dual (and perhaps dueling) priorities – teaching applied skills *and* design philosophy – demands the reevaluation of ideological identity and implementation of corrective strategies. First, it is essential to contextualize course content, implementation and organization in accord with prevailing circumstances. Second, it is vital to remain cognizant of the fact that the industry expectations may occasionally conflict with greater pedagogical objectives. Third, modern and traditional, pre-technological methods must not be viewed as antithetical, mutually-exclusive opposites, but rather harmonious and complementary ingredients inhabiting a shared continuum of holistic education. Ultimately neither is irrelevant nor ideal, and in contemporary scenarios, optimal performance is contingent upon harnessing their combined potential. A truly comprehensive and effective curriculum, I believe, must promote both mediums to utilize their relative merits and values without compromising the identity of either.

Reform curricular underpinnings

Manual graphics must be made an integral component of the curriculum as there are several justifications for this prioritization. It must be assigned a position of centrality to acknowledge its position as a foundational tool of design education. It is also logical to do so as a matter of expediency, as it offers dual advantages (while computer graphics only one). Additionally, proficiency in manual graphics can also improve performance in computer work. Furthermore, educational programs are the only instructional venue for manual graphics as there exist few opportunities outside of such institutions. Most computer programs, on the other hand, can be self-taught due to their highly technical, logical and automated nature. They also lack the intangible technical and aesthetic nuances which are only revealed through personalized mentoring. Instead, competency is easily gained by using online resources, accessing global mutually-assisting populations and inexhaustible FAQ repositories.

Reimagine contextualized identity

Specific parameters of manual graphics instruction must be reassessed in response to prevailing professional practices and expectations. The promotion of the most relevant skill sets is naturally optimal for the student, and these will change constantly. Those with enduring

relevance and validity due to stronger linkages with design (sketching, rendering, perspective drawing) should be retained and incorporated into other courses to the greatest degree possible. Activities such as drafting and lettering are practically obsolete in professional practice and can be minimized, if necessary, although their inclusion would not in any way be detrimental. These courses must be structured progressively, so students can develop communication skills in concert with their expanding design knowledge.

Modulate psychological perception

The role (and perceived importance) of manual graphics must be emphasized by increased offerings of dedicated courses and enhanced expectations of application *vis-à-vis* technology. It is critical to recognize the subliminal messages conveyed to students who lack an informed perspective of the discipline. A technology-heavy curriculum risks devaluing design by inadvertently overstating the importance of technology in design. Reducing its weight in relation to manual graphics would help communicate its true value as a secondary, production tool with limited ability to enhance design thinking. The relative contributions and utility of the two mediums in design versus production should be appropriately demarcated and clarified.

Mitigate perceptual barriers

Perhaps the most challenging will be to acknowledge and eliminate the psychological barriers confronting current generations in adopting non-technological mediums. The widespread integration, from a very early age, of gadgets and technology in their lives has resulted in a detachment from the simple, manual activities which were formerly commonplace. For many, abandoning technology can lead to stress and anxiety, a phenomenon I frequently observe in the classroom where simple tasks such as drawing a few lines can induce considerable nervousness. The direct ownership of the act and absence of an intermediary machine imbues a personal investment in even basic undertakings. Similarly, the intimately personal connection with the result leads them to discern a great individual investment in the end product, and any criticism of risks being perceived as a personal attack. It is imperative for the curriculum to ensure that manual graphics does not become a source of anxiety, but rather a manageable and enjoyable activity. This can be achieved by designing an extended introductory phase with simple, low-stakes exploratory exercises, intended more to build comfort and confidence than to teach.

CONCLUDING THOUGHTS

The crux of this discussion references a broader philosophical dialogue about the authentic place of technology in contemporary society. It is remarkably facile (and understandably so), when regarding our world, lives and values today, to embrace the progressive technological saturation as inherently benign, benevolent or beneficial. Further, although it may appear that we have inhabited a technological world for a substantial period, in actuality it is an extremely brief moment, as evident when juxtaposed against traditions with pedigrees dating back centuries and millennia. It would be prudent to adopt a more disinterested and guarded (even a little

skeptical) stance towards technology's role, place, value and contribution within discrete arenas. Its potential to do good is inseparably bonded to its ability to precipitate harm, unintended or otherwise. Technology's seductive lure, with its vivid, glitzy convenience may conceal inadequacies which could undermine integral human, social and cultural values.

It is also worth recalling that much technological innovation saturating our lives is intended to reduce human effort, either mental or physical. Many machines and software programs were developed to simplify work (or liberate humans from certain duties altogether) and therefore are simply modernized adaptations of previous practices – essentially, old wine in new bottles. For instance, several highly-advanced and truly extraordinary visual graphic techniques are rooted in analog processes (Kullmann 2014). Consequently, knowledge of the '*old way of doing*' could potentially aid in the improved understanding and utilization of advanced technology, as well as reinforce the awareness of larger ideological objectives. This of course would not hold true for entirely new inventions without historical precedent or parallel, but for activities with established traditions, it is undoubtedly a significant consideration. Being conversant with not only the technicalities of achieving an objective, but also the historical and philosophical framework can only increase knowledge, and consequently, enhance work quality. Ultimately, the survival and perpetuation of preexisting traditions, even if mechanized, does indicate an enduring inherent relevance. Although much transformed, they are evidently not obsolete just yet.

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[i] It should be noted that several firms continue to function using traditional drawing methods. However, they tend to be small in size and scope, and thus their impact on the overall trends is negligible.

[ii] In fact, during this time, several academic institutions throughout the nation have abbreviated their programs from five years to four.