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DESIGN, BUILD, OCCUPY, ADAPT: CRITICAL CONSIDERATIONS OF ARCHITECTURAL EDUCATION IN AN ETHOS OF UPHEAVAL

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ABSTRACT

Over the past century, as mobility increased and communication heightened, architectural education saw a shared vision gain uptake and adoption in many corners of the globe. Informed by an embrace of architecture as a regulated profession, schools pursued similar standards, structure, accreditation & assessment, albeit with local overlays and national policies dictating details and nuancing content. While numerous models developed in concert, all pursued the notion of education providing base competencies for the subsequent pursuit of professional registration/certification and associated modes of practice. In many ways curricula has been increasingly comparable between many international regions, which has resulted in benefits around legibility, reputation and value of architecture as both discipline and profession. Centered on the studio as a signature pedagogy, architectural education has tended, to date, to translate well across borders and boundaries. However, recent challenges such as climate change, health calamities, financial crises, and global conflict, to name but a few, have given cause to critically review architectural education, writ-large, in terms of content, delivery, value, efficacy and impact. The present project, driven by researchers in North America and the Middle East, examines and interrogates aspects of architectural education considering this ethos of upheaval. The work, which is exploratory in extent and preliminary in character, is intended as a provocation concerning the status quo. Included in the probe are factors that prove fundamental to our productively advancing the profession and practices of Architecture: namely technology, psychology, sociology, business, research, sustainability and ethics. Developing from an environmental scan, and drawing from extensive administrative experience (in numerous nations) of the two lead authors, the research then examines selected details for each of these factors - proposing new means and methods that promise to better prepare architecture students for a dramatically different world. Ancillary yet vital qualities, such as interdisciplinary engagement, leadership, intersectoral understanding, and holism, are investigated with respect to a curricular reset. The authors shape a novel model for higher education in architecture that resonates with emerging demands and equips students to survive and thrive given the changing global context and the transcendental 'new normal.'

1. INTRODUCTION – SURVEYING THE LANDSCAPE

> "Design is a multifaceted subject. It ranges from the smallest manufactured objects to the planning of cities, regions and entire countries. In today's world it is not only local but inevitably global." (Cairns, 2014)

For the past several decades, since the millennium, our world has been subjected to extraordinary changes, challenges and, with more frequency, catastrophes (see, for example, UN Environment & International Energy Agency, 2018, Irfan, 2019, Pak, 2019 & Imam, 2020). Following on the heels of an unprecedented period of international order, stability and peace, we have seen in recent times growing uncertainty, indeterminacy and chaos. Today many systems are under strain, many organizations are in upheaval, and many individuals are encountering stress (Sinclair, 2021). The pressures on long established means and ways prove intense and undue, with erosion and collapse more common and more tragic. From human-made structures, such as financial and political bodies, to natural systems, such as ecological and environmental spheres, we are witnessing incomprehensible upheaval. Impacts of broad and endemic instability, mutation and failure are grave (Sinclair, 2020). Implications, costs and effects of dramatic shifts, including societal disorder, pain and suffering prove exceptional. Clearly the consequences of inaction are frightening. That said and given the shear magnitude of many of shifts in context and circumstances, we struggle to find appropriate paths forward.

Historically the university has had fundamental, meaningful and critical roles to play in furthering civilization, in guiding development, and in improving quality of life. From educating citizens and discovering knowledge, to questioning directions and proffering moral guidance, higher education has played vital roles in our communities – advancing society while instilling confidence, building awareness, and injecting optimism into an often-uncertain milieu. Such key roles of the post-secondary sector have been under escalating attack, sometimes with dramatic outcomes, in part related to the broader and deeper assault of many of the systems that have defined modern life over the past century. While it is easy to slide into pessimistic posturing, and modes of helplessness, especially considering the scale and scope of the challenges in our contemporary lives, it is essential for us to confront the unknown and to endeavor to find routes to a brighter tomorrow. The present paper acknowledges this troubling ethos, yet contends that higher education, and in particular architectural education, have vital opportunities to contribute, individually and collaboratively, to solving some big problems and bringing order, balance and harmony into our communities, countries and civilization writ large.

2. BACKGROUND

> "Education is about healing and wholeness. It is about empowerment, liberation, transcendence, about renewing the vitality of life. It is about finding and claiming ourselves and our place in the world." (Palmer, 1999)

While architectural education has a relatively brief history in universities (transitioning from craft & guild models to more formal schooling rather late in the game), the authors argue that the potential to make a demonstrably positive impact on current crises is both significant and urgent. Many of the hard and heavy problems at play in modern life, including

health, economies, climate and conflict, to note but a few, have strong connections to and relationships with the built environment. While the magnitude of any one crisis is daunting, the interplay and intersections of 'distinct' problems creates even greater crises that demand tremendous creativity and innovation to comprehend and solve. Architects are only now beginning to more fully grasp the agency and ability that they have to tackle some of the challenges on our doorstep, to operate across disciplinary borders, and to help reverse the downward slide on many fronts (Couzens, Sinclair & Klumper, 2022). Design education (especially considering the studio as signature pedagogy) stands as somewhat unique within the academy and is, arguably, well positioned to potently contribute to solving wicked, complicated and multi-faceted problems (Sinclair, 2015).

3. ACCREDITATION, STANDARDIZATION AND LOWEST COMMON DENOMINATORS

"Appropriate solutions to some of our most daunting problems will arise through the concerted efforts, open dialogue, and collective wisdom of the wide array of stakeholders, professionals, politicians, decision makers, and citizens (both engaged and disenfranchised) who have the will and wherewithal to make a difference and to make the world safer, healthier, and better. It seems vital for us to critically examine, and question, our belief systems and their connections to the ways we define, refine, and realize progress." (Sinclair, 2015)

As architectural education developed within universities, and societies advanced in terms of principles, policies and protections, the need increased for more uniform standards in curricula, inputs and outputs. The self-regulated professions, most notably, offered assurances of competency for the right to protect title and scope. To meet such claims around awareness, knowledge, skills and abilities, schools with architecture programs looked to the vehicle of accreditation as a means to ensure quality and foster consistency. In many countries rigorous accreditation regimes were developed and enacted to 'raise the bar.' For example, the Canadian Architectural Certification Board (CACB) and, in the United States, the National Architectural Accrediting Board (NAAB), were established to promote, delineate and enforce standards in the education of architects. In general, such moves and mechanisms have been incredibly positive, providing assurances to their respective societies that students graduating from 'accredited' programs are duly educated and properly prepared to enter the profession. In earlier manifestations the regimes and criteria were arguably more rigid and common – with one size fitting all – however, over time more flexibility and customization, in essence celebrating the uniqueness of schools, was enacted. Such higher levels of mutability and 'give & take' were aimed at acknowledging the character, culture and climate inherent to a given school in a distinct setting (e.g., geographically, demographically, philosophically, politically, financially, etc.). To meet the distinctiveness of a particular school, some balance was sought between disciplinary and general (e.g., liberal arts) content, between scientific and artistic dimensions, between theory and practice aspects, etc. While such approaches, attempting to meet societal needs while also seeking some equilibrium between the general and the specific, worked well in the education of many generations of architects, the authors of the present paper argue that today parts of the strategy may no longer prove appropriate nor viable. In particular, as is presented in the current research, we argue the basic skills and core knowledge must be reformed to meet, head on, the plethora of new forces, factors, crises and catastrophes in our orbit.

The present paper argues against subscribing to lowest common denominators to shape and set accreditation criteria. While core knowledge can and should be determined and addressed

in architectural education, each school needs to ask tough questions, grounded locally, regionally and globally, concerning how they can best build and deliver a curriculum that prepares their students for practice in a rapidly shifting and taxing ethos. Spelling out some base demands, which tackle key problems, will afford insights into new directions for accreditation. The first and second authors of this paper, both seasoned scholars and experienced senior administrators, have worked with, written about and interrogated architectural accreditation systems in various jurisdictions. Assessment of current regimes for accreditation underscores many especially important criteria that should be retained and even strengthened, for example addressing life safety, comprehensive design, collaboration, and accessibility, and others. The paper endeavors to address and fill in some key deficiencies, or gaps, given society's rapid transformation of and emergent challenges at this point in time. The present research attempts to identify some central challenges facing us, and by extension residing within the domains of education, while also exploring potential means and methods with which to confront these ongoing and very troubling problems.

4. MOUNTING + GROWING CHALLENGES

"Architecture often ignores its role of making a place with purpose." (Cedric Price, 2003)

As previously underscored, the problems facing society today, and indeed civilization writ large, are countless, complex and concerning (Imam & Sinclair, 2018). In many ways the massive escalation of said issues, both in number and scale, prove incomprehensible. A century ago, problems were typically localized, simple to grasp, and manageable to tackle. However, today, for many reasons including, most notably, the explosion of information technologies, problems jump jurisdictions, are evasive to understand, and often impossible to deal with (at least through the deployment of conventional means, available tools and accessible knowledge). Crises are now inseparably intertwined, blurred & unbounded, difficult to categorize, and even harder to consider. Single disciplines can no longer understand, on their own, contemporary dilemmas. Rather, diverse disciplines must closely cooperate in analyzing circumstances, navigating through the quagmire of complications, seeking reasonable remedies, and charting paths forward. Conventional modes of operation can neither fully see nor fully solve unconventional crises (Sinclair, 2019).

To begin the process of questioning architectural education, pedagogy, curricula, and accreditation, the researchers identified, defined and delineated some more pressing facets of modern society that demand our attention. By considering the problems in play today, logically we are better able to reform and reset teaching and learning to better prepare students for practice in ever-changing and turbulent times (Sinclair, 2020). The following are some more perplexing, tricky and 'grand' challenges that warrant our focus as educators, practitioners and professionals. Unquestionably the boundaries among these challenges are blurry with overlaps manifold – while the researchers separate these for descriptive and manageability purposes, when addressed within the curriculum attention should be given to dynamic interactions and systems-thinking. While this call flies in the face of the Western mantra that highlights for "A place for everything and everything in its place.," it is nonetheless essential in fragmented times and too often dysfunctional realms.

• Climate: The implications of climate change, and global warming, are now well grasped by countries around the planet. The devastation and disasters once predicted are now playing out in real time before our eyes and in our communities. From wildfires

and droughts to hurricanes and floods (to barely scratch the surface), climate chaos is wrecking havoc on our lives and costing us greatly (financially, socially, psychologically, etc.), as citizens and societies. As we know, the design and building sectors are major contributors to such crises. As we also know, design and building sectors must be major players in remediation, resolution and regeneration. Students need to be intensely knowledgeable and skilled to contribute post-graduation. Sustainability, green, living and well buildings are no longer marginal or optional – they are mandatory and mainstream.

- Health: In the northern hemisphere we commonly spend upwards of 90% of our time indoors – in buildings. For many years, the architectural profession was not overtly aware of connections between the way we design and the implications to users of these designs. However, in recent years, for many reasons, acute awareness, and deep knowledge, has arrived that connect design to health, both individual health and community health. Tightly sealed buildings brought sick building syndrome into common parlance. Central air systems raised understanding of risks of airborne illness, such as Legionnaire's Disease. Automobile focused planning has engineered exercise from our lives, ushering in escalating obesity and other conditions. On a positive note, research has also contributed to heightening our understanding of the vital roles and positive impacts of daylight, greenery and views in our lives, and especially within buildings. Society is now more aware of the intense relationship of design and health, and as a result increasingly demands architects, and their designs, to foster wellness.

- Economy: The financial impacts of the building and real estate sectors, within our societies, are massive and even immeasurable. Buildings, and the large spectrum of companies (development, design, construction, manufacturing, management, etc.) that feed into the building industry, play primary roles within local, national and international economies. Related to other facets, including climate and health, growing attention is focused on our responsibilities to manage resources in diverse ways, including recycling, adaptation, and obligations within circular economic systems. By training, architects have historically had limited exposure to theories and practices concerning macro and micro-economics. However, architects inevitably, through their design work, have major influences on finances and economics. Students need to understand how money flows, how resources are deployed, the ways in which materials move, and the roles and responsibilities of architects within these extraordinarily complex relationships, dynamics and structures.

- Inequity: Architecture and development, as pertains the building sectors of society, have arguably been connected to power and privilege. Architects meaningfully participate in a relatively small fraction of the built environment, for example in North America it is widely accepted that Architects design less that 10% of constructed buildings. Many critics have expressed frustration that greed and preservation of the status quo have fueled much of the enterprise. Recent moves and movements to address other than the so-called 'one-percent' have seen the spotlight, in essence underscoring the need for environments to be fairer and more inclusive, versus catering to narrow segments of society. Over recent decades attention has been directed to the widening wealth gap between the global north and south. While this gap continues to grow, recently focus has been on income and wealth inequities within developed nations and even within cities & communities. Architects, historically and conventionally, have exercised limited voice in such discussions and debates. However, there

are signs of a shift, whereby the profession and practitioners are talking about such imbalances and seeking ways to positively contribute to a more just society. Students absolutely need to be informed and engaged in conversations, research and projects aimed at bringing more equity to the built environments. Architects have remarkable opportunities to exert influence – dialogue needs to transpire around means and methods to reach good ends.

- Conflict: Locally, regionally, nationally and internationally conflict brings disruption, despair and in many cases death, to good men, women and children. Much of the West has been relatively isolated from such turmoil -- however in recent years, and especially with the rise of domestic disarray and disagreement, even areas accustomed to calm have been confronted by chaos. Within the architecture profession there has been scant attention paid to such concerns around conflict, simply because out-of-sight translated into out-of-mind. That said, it is no longer an option to be ignorant, apathetic or uncaring. Today the situation is morphing with many societal problems, and especially pertaining to conflict (regardless of root causes – whether political, legal, religious, ethnic, etc.,), looming large in our lives. Whether next door or around the world, architects and the profession need to be informed and need to develop stances, especially on humanitarian grounds. This does not imply that regulatory or advocacy organizations, and even individual firms & corporations, should be intrinsically political, but rather that they need to be aware, sensitive and open to action. To such ends, the education and preparation of students should include curricular content that builds knowledge of such affairs, and equips students to become informed, inspired and responsible practitioners.

To sum up …

The challenges facing modern society, and impacting our everyday lives, are many, complex, and, largely, unavoidable. While traditionally the limits of the architecture profession were clear and bounded, we no longer have the luxury of avoiding engagement, claiming ignorance or limiting our view. In fact, the opposite scenarios are urgent, whereby architects, and architecture students, are willing to get involved, are informed of the facts (and able to separate wheat from chaff) and are operating with eyes wide open. Specialization does not release professions from bigger societal obligations, limit their ability to positively effect change, or excuse them from rising to meet moral imperatives.

5. PEDAGOGY'S COLLISION WITH CHANGE

"A connected curriculum would encourage the integration, application and discovery of knowledge within and outside the architecture discipline, while effectively making the connections between architectural knowledge and the changing needs of the profession, clients, communities and society as a whole." (Boyer, 1996)

Philosophies concerning education, and the structure and delivery of teaching (i.e., pedagogy) need to be tightly and meaningful connected to the spirit of the times. To execute education that is out of touch with contemporary issues, which proffers obsolete knowledge, or that focuses on outdated skills, places the architecture profession on the losing side of equations for progress (Sinclair + Furlan, 2022). Architecture, as a discipline and a profession, is well positioned to embrace, advocate for and introduce real, positive and demonstrable change. However, for such transformative impact to materialize it is necessary to reform the ways we prepare students to practice in an arguably volatile and, at times, desperate world. For sure the authors in no way propose a far-reaching denial of the past, or a broad discounting of previous means. To the contrary, many aspects of past

and present architectural education are both relevant and potent – for example, the studio's emphasis on iteration, open-mindedness and tacit knowing – and deserve our attention and incorporation (i.e., into reformed modes of operating). That said, there are aspects of the ways in which we have taught that need scrutinizing, reforming or abandoning. In this way the authors encourage an extremely critical assessment of needs and a subsequent determination of theories, tools and techniques that could be developed and deployed moving forward. We need to ensure our curricula, and our students, are future-fit, resilience and adaptable. We need to teach students to be cognizant that there are many things they do not (and perhaps cannot) know, but also how to cope with unavoidable uncertainty and unpredictability.

Just as there is a plethora of challenges facing society, and higher education, so to is there a wealth of possible means to respond. The present research underscores numerous aspects of higher education that may prove especially germane at the present juncture. These aspects are not isolated and distinct, but rather are highly interconnected. A key aspect of our suggested reset of architecture education is to approach curricula, and teaching & learning, in a manner that embraces systems-thinking and that instills in students a profound awareness of the inter-relationships of forces and factors, means and methods, theories and practices at play and to our avail as problem-solvers in and creators of the built environment. Numerous of the points rendered below have been illuminated by the first author in previous papers (see, for example, Sinclair, 2019), underscoring glaring deficiencies (e.g., business, psychology, research) in the present diet of courses + studios offered in many schools of architecture. The following are a selected array of issues to consider as pedagogical reform is envisioned and enacted.

• Technology: Technology has developed in extraordinary ways, including the arrival of advanced computer, information and communication systems that have irreversibly altered our lives, our cities and our civilization. For architects, such technology has remarkably transformed the nature of practice. Beyond the physical and conceptual confines of the design office, emergent technologies are shaping construction systems, prefabrication + making, robotics + manufacturing, and even monitoring/modifying of building environments and performance. Educating students to master, optimize, criticize and contextualize such technology is paramount.

• Psychology: Architecture is not a fine art but a social art. In constructing a building there needs to be attention paid not only to the container, but vitally to the contained. Users need to be defined, understood and accommodated in our design processes and products. To this end it is vital for designers to understand how built environments shape who we are and how we feel as users of spaces and places. Environmental psychology needs to be a required part of the curriculum in all schools of architecture. There is ample research explaining the relationships (both positive and negative) of people and place – it is fundamental to cover this territory in the education of architects.

• Sociology: While architects, as noted under the category 'psychology,' need to understand how design effects people, they also need to be knowledgeable around how groups of people, including communities, behave and react, and what they expect and deserve. There are many fields that address such complexities, including cultural anthropology and urban sociology. As have been noted elsewhere in the paper, there is a pressing need to understand design and construction in a broader fashion than attention to site and building may suggest. In fact, many aspects of group behavior, such as NIMBYism (Not In My Back Yard), directly impact the paths and outcomes of discrete projects. Architects are increasingly called upon to respond to community needs,

fears, aspirations and the like. The education of architects should, in sensible ways, incorporate such learning within accredited programs, including opportunities to observe/participate in political exercises (e.g., development approvals, land-use approvals, court cases, etc.).

- Business: An examination of most schools' curricula will quickly highlight an absence of formal business training. However, the primary aspiration of most students in such programs is the pursuit professional practice and the establishment of a private firm. Given that business acumen is fundamental to opening and running a company, and to sustaining it to get projects in and out the door, this deficiency in the education of architects is somewhat unfathomable. In many schools the exposure to business comes only through limited professional practice courses (often single 3-credit hour) within a student's program of study. In many studios projects are not assessed regarding construction cost or financial viability. Pro Forma are largely avoided as key to understanding projects from a development vantage point. And yet, if attending to money and business practices are viewed as optional or even in bad taste, there are inevitable and negative consequences downstream. Students need to be versed in business principles and comfortable manoeuvring in business milieu – their success, efficacy and impact as practitioners is directly hinged on such intelligence.

- Research: Today clients and governments, and even the public, are increasingly expecting evidence to inform decision making. Evidenced based design is a concept that has seen strong uptake, whereby processes are influenced meaningfully by knowledge. Previous examples of links between design and health outcomes serve to illuminate the value of research to architectural production. In many architecture schools formal research training holds limited cache. Students commonly see the extent of 'research' defined by internet search engines, and the most evident manifestation of 'research' as precedent studies. Few students are exposed, yet alone educated, concerning research methods, or distinguishing qualitative versus quantitative, or grasping principles of validation, generalization or dissemination. Rare are cases of students mining through research journals, in architecture and critically beyond, to build arguments supporting their project design directions. In light of the previously noted 'grand' challenges facing our globe and ourselves, the education of architects needs to develop research skills, knowledge and acumen.

- Sustainability: Fortunately, many schools have embarked on paths that meaningfully introduce principles and practices for environmental sustainability, green buildings, and the like. However, this content is commonly packaged into a discrete and bounded (often 3-credit hour) stand-alone course. The authors argue this is both insufficient and inappropriate. The locus of sustainability knowledge, and skills development, needs to be in the studio with projects as case studies. While students may gain awareness of rating systems and performance metrics around green building, they need to be facile with the fundamentals and principles underpinning such assessment programs. Understanding the core drivers of systems that celebrate and manifest concepts of living or well buildings is essential in the education of architects. Students should move beyond the goal of 'doing no harm' to embrace objectives around restoration, regeneration and demonstrable respect of environments.

- Ethics: Finally, we all need to work diligently and tirelessly to instill in our students, and by extension to architects, a vibrant and consequential moral compass. The first author has researched and widely written

(see, for example, Sinclair, 2019 "The Devil's Crop") on the need for students to interrogate and determine concepts of right, wrong and appropriate. Manifold aspects of society, and its systems, are under assault – with many questioning the facts and truths that guide our steps and inform our decisions. Rather than simply accepting popular opinion, or progressing with less than adequate evidence, architects and students of architecture, need to be well versed and well equipped to determine the facts and to render ethical decisions based on solid grounding and strong foundations. While this is hard sledding, it is perhaps the most critical of all suggestions brought forward in the present paper.

To summarise …

The previously mentioned list of issues to insert and intertwine in architecture curricula is neither complete nor defining. Rather, it is an attempt by the authors, based on research & experience, to identify potential subjects and to illuminate acupuncture points that can, if exercised, stimulate the broader system into more potency, higher efficacy, greater relevance and deeper impact. As noted, each school needs to find a curriculum that works in context, that celebrates personality, and that respects accreditation demands. The authors believe this can and must happen, but that our current global circumstances warrant a major reset – to our minds following the guidance and provocations laid out in the present paper. Again, we underscore many of the objectives and criteria in present accreditation regimes are sound, but argue they are insufficient as presently cast.

6. SO WHAT? IDEATIONS AROUND A CONCEPTUAL FRAME

"While we endeavor to provide spaces and places that are functional, durable and dependable, the real magic of design and planning lies in those aspects that move us well beyond. Strong design and planning accept the pragmatic as a given while aggressively pursuing the inclusion of the poetic. It is in this intricate balance of pragmatic and poetic that the spiritual is most likely to manifest. With basic needs realized, users of our spaces and places can then have the opportunity to experience beauty, encounter solitude, attain flow and achieve meaning in ways that enhance emotions, accentuate perception and heighten pleasure." (Sinclair, 2019)

In consideration of the challenges facing society, that architectural education must respond to and is embedded within, and the tools and techniques at our avail to cope therein, the authors explored the overarching parameters that are necessary to achieve traction toward progress. Historically, while architecture itself is a far-reaching discipline, incorporating by necessity dimensions of art and science, it has tended to operate within a rather limited bubble. Conventionally conducting & coordinating the sub-fields of engineering, and with oversight on construction matters, the architect has resided in the relative separation and security of the building industry. However, the drastic changes in society, including the call for greater equity diversity, and inclusion, have ushered in more sensitivities concerning user needs, community expectations, environmental responsibilities, and so forth. Further, recent calamities such as the global pandemic, sick building syndrome, endemic obesity, and other physiologically + psychologically impactful conditions have brought to light the roles of architecture & design in either improving or degrading our wellness. Research abounds pointing to the built environment as a fundamental determinant of public health. Additionally, architecture has more often than not been a display of power and an instrument of privilege, serving intentionally or inadvertently to separate and segregate various sectors of the population. Such prominent factors, introducing striking change into the market, give architects cause to pause.

It also calls on educators and researchers to reconsider approaches, and aspirations, around the teaching of students and the pursuit of new knowledge. To such ends, the authors have developed a model, or conceptual frame, comprising the key tactics needed as novel curricula is developed, teaching is adjusted, and research is conducted. The model was developed to provoke thinking that departs from the status quo – in essence a challenge to a business as normal approach to current education.   The following four elements comprise our model for a pedagogical reboot.

• Interdisciplinary: Novel problems demand innovative approaches, and central to this pursuit is to expand the view and widen the catchment beyond the arguably narrow confines of Architecture. As this paper has underscored, the built environment is shaped by and in turn shapes many forces (including people). Buildings influence health, the economy, the environment, our feelings, and so forth. Architectural education, however encompassing it may claim to be from a 'subject' or topic perspective, needs the input of other disciplines. Our students need to be taught by, and interact with, others beyond our discipline – for example, medical doctors, social workers, cultural anthropologists, etc. Interfacing with those outside our field and learning to see through the eyes of the other, is essential in an increasingly complex society.

• Leadership: It is necessary to develop awareness and knowledge in underserved and unserved areas of the curriculum, as the paper clearly delineates. However, understanding alone proves insufficient. Students need to have the skills to mobilize knowledge to effective ends. In this regard we identify the critical need to develop strong leadership qualities within a student's time in an accredited school of architecture. Leadership equips students to move an idea from concept through construction or mobilizing a principle into an action. In many ways to achieve traction, pedagogically, schools need to transcend book learning to immerse students in experiences which test their ability to lead. One way to meet this objective is to have students actually solve problems in the 'real world' (in-situ) versus addressing them hypothetically in the classroom (in-vitro). Experiential Learning presents a powerful vehicle to have students move theory to practice, ideas into reality, and words into deeds.

• Intersectoral: Today it is insufficient to attempt to operate, as an architect, in isolation from the messiness of the market. Likewise, as we educate students to become architects, we need to ensure that integration replaces isolation. While specialization remains important to building discipline-specific knowledge and skills, this specialization must be grasped and operationalized within a great sphere of other specializations, other disciplines, other professions, other fields, other players, and the industry writ-large. As students work through an accredited program there needs to be opportunities to discover, firsthand, how others contribute to imagining, conceiving, constructing, occupying and managing the built environment. Of course, included in any equations for the crafting of build environments are the broader array of environmental design professionals, the many authorities holding jurisdiction, the building contractors, the product manufacturers, and many citizen groups. Students need to learn not only about the existence and responsibilities of these sectors, but critically how to engage with them, to work together, and to solve problems as a team. From awareness of life cycle assessment to knowing how to maneuver within supply chains, today's students need new ways of working that were simply irrelevant or unknown in earlier times.

• Holism: Last, but by no means least, is the critical need to teach students to think about systems, connectivity, relations, and inter-

dependencies, in rich, potent and effective ways. Rather than delving only into details and specifics of design processes and products, equal if not greater focus must be on systems-thinking and holism. Many of our modern problems are the result of reductive thinking – of obsessing on the minutia of a given circumstance as opposed to grasping context, understanding history/ genesis, and seeing how puzzle pieces fit together. The adage that one 'cannot see the forest for the trees' is entirely relevant to our argument. Students need to see the bigger picture and to grasp correlation and cause-and-effect well beyond the confines of a narrow design decision or building project. This includes environmental dimensions of projects (e.g., watershed impacts) but also implicates social, financial, political, cultural and spiritual realms as well. Students must be able to holistically appreciate novel problems if they aim to arrive at appropriate, innovative and impactful solutions.

Figure 1. Rethinking Design Pedagogy in a Milieu of Dramatic Change

Enacting the Frame

Architectural education moving forward, regardless of the different curricular directions per 'accredited' school, should critically consider these four aspects of pedagogy: namely, interdisciplinary, leadership, intersectoral, and holism. The authors contend that embracing & enacting these overarching tactics will better equip the teachers and the curriculum to prepare graduates for maneuvering in environments of professional practice (both process and product-wise) that are remarkably complicated, often volatile, and undoubtedly in flux. Taking an integrative strategy whereby 'seeing, thinking & acting' are expanded and intensified seems vital in our current times. This frame also contributes to the urgent need to develop clear and cogent worldviews' and 'self-views' in our students – that is, having them confidently grasp their world and understand their place and potential therein.
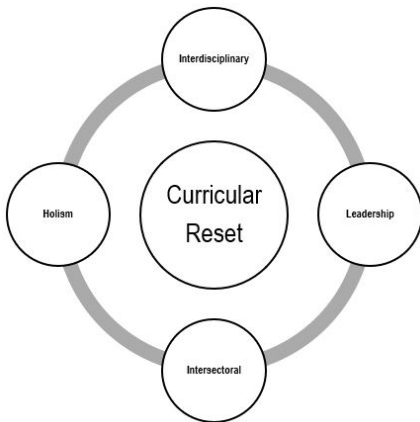
6. CONCLUSIONS

"Through a growing capacity to tolerate uncertainty, vagueness, lack of definition and precisions, momentary illogic and open-endedness, one gradually learns the skill of cooperating with one's work, and allowing the work to make its suggestions and take its own unexpected turns and moves." (Pallasmaa, 2009)

So much of our world seems confusing and discouraging – perhaps depressingly understood as plunged into darkness, chaos and uncertainty. That said, the authors believe there is outstanding opportunities for architects, for the profession, for the schools and their students, to contribute to strategies, systems and solutions for a brighter future. In large part we contend that to meet such ends the education of architects needs a drastic reboot. Often systems are difficult to reform or transform, and especially when the associated

bureaucracies are heavy and cumbersome. Inertia is difficult to deal with in many cases. We argue that a curricular reset is perhaps the most viable place to begin the shift – from product oriented to process driven, from single buildings to systemic attention, from a concern with the container to an obsession with the contained, from priorities of aesthetics + form to equity, social value + sustainability, from operating in isolation to being an essential contributor in a dynamic web of agents and actors, etc. The present paper should be understood as intended – as speculation, observation, provocation and proposition, versus as definitive stances on indeterminate, fluid and unprecedented circumstances. We are all struggling, as architects, educators and students, to make sense of an increasingly senseless milieu and to find ways to inject reason, creativity, strategies and solutions to right some ships and proffer some hope.

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