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Post-COVID Rooftop Activation: An Educational Paradigm for Urban Design Schools in Egypt

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Abstract

The rooftop is a vivid spatial culture in Egyptian cities and an integral part of the urban fabric, yet it has not been integrated within the urban design educational aspect. This paper aims to highlight the importance of facilitating rooftop activation in architecture and urbanism studios, stressing the vital role of rooftops as a spatial prophylactic design in the post-pandemic city. The paper embraces an exploratory approach through which the reader gains a theoretical insight into the nature of urban design education in Egyptian schools. It adopts Nikos Salingaros' concept of living patterns, i.e. creating socio-geometric design patterns to establish a healthy environment. The findings propose a novel design theory, prophylaxis, which can be facilitated in design studios to address post-pandemic cities. Additionally, they reveal the expected role of architects and urbanists in tackling inequalities in designing spaces.

Keywords: Rooftop; Prophylaxis; Education; Urban Design; Pandemic; Living Patterns; Healthy Cities.

1. The Current Pandemic World: Is this the New Normal?

The 'new normal' became a dominant intellectual terminology among architects and urban planners since the outbreak of COVID-19. Global cities are no longer perceived as physical entities, rather as processes in continuous social transformations accommodating the emerging digital functional features, e.g. remote learning and remote working. Architecture Professor Ashraf Salama puts forward this transformation in a positive manner believing that such redefinition of human interactions invites global societies to think beyond the stable state (Emerald Publishing, 2020). Furthermore, Salama refers to Donald Schön's 1972 book, *Beyond the Stable State*, in which he argues that the current world system is a molding reservoir of interactions, religions, organizations, and values. It is a vivid representation of the present system in dire need to adapt to novel changes and global alterations instead of operating within the same normal structure.

The size, scope, and speed of the pandemic drafted several debates and questions regarding the civic usage of public spaces in the future. Despite the cloudy predictions as a result of the immediacy of the moment, the pandemic has inevitably redirected our focus towards redesigning our cities concerning sanitary conditions, as has always been the case since the late 19th century (Sennett, 2018). It was in this very particular point of departure that furnished socio-political dimensions of public space especially in the era of its temporary disappearance. Smith (1996) refers to this phenomenon as anti-urbanism, arguing: "...the last three decades have seen a shift from fear to romanticism and a progression of urban imagery from wilderness to frontier". The spread of COVID-19 revealed the spatial extension of commercialization and privatization of publicness. According to Van Eck, Van Melik & Schapendonk (2020), obligating sanitization of public space is often considered as a form of authoritative enforcement of rules over the users of public space negating all features of democratic culture and political practice. Michael Sorkin's edited collection, *Variations on a Theme Park*, visualized a modern form of late 20th-century urbanism where global capitalism transformed citizens into consumerists (Sorkin, 1992). Varnelis & Friedberg (2008) extended such argument to include the phenomenon of spatial virtualization – a dominant feature of the current pandemic era – claiming: "...individuals [are] becoming less and less citizens and more and more consumers".

The pandemic has revealed how uneven public space is distributed throughout megacities. Taking a closer look at Cairo, the share of green space per person does not exceed 2 square meters (Zaky, 2020), which is around 7% of the adequate area. On a macro scale, the global lockdown of public space affected the informal community, especially across the African continent where 60% of urban employment is highly dependent on the informal sector's usage of streets for selling goods (UN-HABITAT, 2020).

Unequal distribution of spaces, emerging vividly during the COVID-19 era, led to another form of evolution and spatial transformation, which is the use of rooftops. Since not every individual is blessed with a back garden, rooftops, whether in the Eastern or the Western parts of the world, established a civic democratic access to outdoor spaces shielding from the unwanted COVID-19-filled streets. In the major part of the Western hemisphere, rooftops are either empty spaces, reservoirs of maintenance, or luxurious penthouses that lack a clear vision of what

architectural value rooftops can provide. Concerning the Western Perspective of Rooftops, Melet & Vreedenburgh (2005) argue that rooftops are hardly appreciated in the West, i.e. intellectual ignorance of the creative aspect of rooftop architecture gives more space for mediocrity. The value of rooftops in the West was merely encircled around the notion of green roofs, and previous literature resources have adopted this philosophy to put forward proposals that diminished the role of democracy and participatory inclusion in the development of rooftop usage in cities. On the other end, some rooftops were left unutilized or transformed into empty space with no significant value other than hosting the unsightly technical utilities, e.g. HVAC units, antennas, wires, etc. (Smetanina, 2018). An example of such scenery can be seen in Barcelona, where 67% of the 70,000 rooftops are mostly unused, while 20% are vacant sloped roofs (Alforque, 2018). Contrary to the West, the use of rooftops in the East is a common phenomenon. They are well used due to their spatial economic necessity for the working class living close to the city centers. Activating rooftops in the East is not a luxury nor an obligation, rather it is a culture of its own, primarily spread across informal settlements. Werthmann & Bridger (2016) emphasize the necessity to design and activate rooftops as their quantity is in continuous growth, hence they are being utilized as shelters for the poor whose economic and social status are getting further and further apart from the higher social classes.

The different geographical perceptions of rooftops can provide academics and theorists basic insight on how it can be utilized within architecture studios. The role of architectural education has extended beyond the mere production of creative and professional designers to include also intellectually mature and socially responsible architects. This new outlook foregrounds the integration of sociology and cultural behavior with architectural design producing an architecture of exuberance. Mostafavi (2020) perceives those who adopt such a novel approach as the ones who use appropriate architecture as the proper response to contemporary society and systems of manufacturing. This is usually conditioned by the inclusion of the comprehensiveness of the natural growth of the urban fabric, i.e. real-world depiction of urban coherence. Salingaros (2000), whose theories will be closely explored in the paper, refers to the squatter settlements of the Global South as good examples of a developing complex system, owner-controlled, and follows a natural expansion preserving the spatial coherence of its elements.

This study aims to provide an educational framework of rooftop activation as a democratic spatial culture that preserves socio-spatial coherence to create prophylactic spaces. The main questions highlighted within this context are: How can we integrate rooftop activation within the architectural curricula? What is the cultural aspect of rooftop activation? How did the pandemic change the architects and planners' perception of rooftops? This study focuses on Egyptian architectural education, where there is a significant gap between theory and comprehension. Several urban theorists have highlighted the problem of lack of individual rebuilding in the Egyptian context concerning the surrounding environment, eventually producing negative heterotopian spaces lacking any source of fulfillment. The main conceptual framework takes a closer look at Salingaros' theory of the living patterns, in which coherent socio-geometric patterns create healing spaces free from environmental stresses.

2. Living Patterns: The Use of Society in the Architectural Studio

The pre-industrial times are often perceived as the nourishment of architectural intellectualism that comprehended effectively the dimension of design through its materiality, detail, and form (Salingaros & Masden II, 2010). These dimensions have been circling philosophical tradition as the invisible entities; referred to by Bouman & Van Toorn (1994) as: "...the infinite, the absolute, the unreachable, and it was seen as being with God, with the Platonic Forms of the True, the Beautiful and the Good, with the ghost in the machine or with the Weltgeist ". Yet, around 750 years of traditional intellectual scenery of humanism and enlightenment were mostly weakened by more than 125 years of the creative destruction of modern and post-modern radical doubt (Bouman & Van Toorn, 1994).

At the turn of the 20th century, architectural and urban radical thinking penetrated society revealing so much of the environmental challenges, and several literature sources started redefining the role of the architect and the urban planner which in turn led to reconsidering the role of the educational systems in meeting the needs of the current world (Dessouky, 2016). Glyphis (2001) argued that the new definition of the architect's role should be an agent of social change and an advocate of ecological development. The last three decades witnessed heavy criticism from academics towards the teaching of architecture. Hoteit (2016) identifies the educational curriculum in the Arab World through two models. First, the Black Box Model, which occurs inside the mind of the architect without any justified process, and the second is the Glass Box Model, where the design process is transparent and can be justified, yet may not be convincing for each phase and decision taken. To extend matters further, through a study carried out by Megahed et al. (2019) to explore the graduates' perception on urban planning, it was found that urban planning schools are focused more on the functional relationships between elements of land use and urban activities (75.7%) and preparation of design and execution sheets (55.7%) at the expense of integrating environmental and social studies in urban planning (11.4%) and studying values and ethics of the urban profession (20%).

The concept of living patterns addresses the idea of integrating psychological reassurance to the ordering of elements. The main goal is to design healthy spaces providing comfort through coherent geometrical patterns

instead of strict ones. Nikos Salingaros' long-life passion for patterns is revealed throughout his writings and his admiration towards traditional architecture, in which different components of the urban fabric are coherent. Coherence produces living structures which then allow people to live life fully (Salingaros, 2017). Living Patterns, however, are not merely physical patterns between objects and their sense of connectivity, but also they reveal a certain level of social attachment between both individuals and the surrounding environment and between individuals and themselves. Hence, there is an underlying sociological pattern that produces the intellectual vision of architect Giancarlo De Carlo about the organization of society and design (Wood, 2017), claiming: "...architecture is an organizational activity; it has to do with the ordering of space".

Living patterns are anti-templates that requires no pre-existing ideology, and defies mainstream practice and training. For this reason, living patterns, as a conceptual tool, is an educational necessity for architecture schools that, for decades, have intoxicated their students with the ability to control human lives disregarding the elements of a suitable living structure (Salingaros, 2017). With the springing high-rise towers and mega-commercial structures in some parts of the world, Egypt for example, in parallel with an unusual phenomenon of the COVID-19 outbreak, it has become inevitable to socialize healthy living spaces within the educational framework of architecture schools. Rooftops are structural spaces that combine living patterns with social coherence within the democratic parameters of design and usage. Not only they can provoke creative patterns in students' minds, but also redirect architects and planners' attention towards healthier utilization of public spaces on a macro scale.

3. The 'New Normal': A Vital Part of the Architectural Educational System

One of the early intellectual takes on the spread of COVID-19 and its impact on cities, carried out by Honey-Rosés et al. (2020), and outlined a series of questions that might speculate the future of individuals' behavior and the possibility of the emergence of new design typologies addressing this phenomenon. One of the questions outlined was: "Do we need a new typology for public space?" New design typologies, as part of the speculative new normal, are in continuous need of new methods of socio-spatial communication and interaction. Additionally, new typologies require specific mindsets that should be included in the educational system. Hence, to define a new typology for architectural education, we need to define and comprehend the current framework.

Salama & Amir (2005) analyzed the curricula of 14 architectural programs in 8 Arab countries. Their output revealed the emphasis of university programs on aesthetics and history courses rather than social, cultural, or economic issues and development within the built environment. Furthering these findings, Elshater's (2014) analysis of urban design studios in Egypt, with a specific focus on Cairo University, depicted an educational model similar to that of the European and American "the art of the city" ideology which became widely known during the mid-sixties. This ideology has penetrated its way till the present day where urban design students are taught more about the functions and appearance of the city with little or no attention to its essence or underlying morphological patterns. In this particular point, Salingaros has pointed out his point of criticism towards the modern city that lacks coherence and socio-geometric comfortability.

3.1. Prophylaxis: A Re-emerging Design Theory

The term prophylaxis is not a new term, but it trended the charts following the outbreak of COVID-19. Prophylaxis is a medical term, also named preventive healthcare, which is a series of actions or measures taken to prevent further contamination of diseases. Health has had a direct impact on the emergence of 20th-century modern architecture which attempted to tackle the global spread of tuberculosis. Le Corbusier was among the prominent architects who expanded the medical argument from the scale of the house to the city (Colomina, 2019). His approach, the exact air theory, tackles degenerate streets by cutting through the fabric allowing free circulation of air. Taking a closer look at the urban health conditions of the 20th century, Colomina (2019) claims that it was such deteriorated conditions that initiated the association of health with modernism, where buildings had similar features as medical equipment, i.e. transparent glass windows and wide interior spaces. Le Corbusier's perceptive take on urban prophylaxis stemmed from the metabolic process occurring within the human body while exercising and sunbathing. Fast-forward to current times, a few cities, e.g. Vienna, Oakland, and Bogota, directed towards reducing cars on the road giving more space for bike lanes and pedestrians (Laker, 2020; Bliss, 2020).

3.2. Prophylactic Urbanism: A Call for Social Inclusion

Many of the prophylactic measures introduced during the global lockdown led to the focusing of the general attention to cities and the role of architects in the big picture. During the webinar, *Transforming the World through Architecture in the Post-Pandemic Era*, acclaimed architect Melike Altinsik proposed a few bottom-up approaches, e.g. social sustainability, density balance, distributed flexible systems, micro-environments, and micro-communities (Share Architects, 2020). Unlike top-down management which makes the system more fragile, bottom-up approaches strengthen cities' structure and were seen blooming during the crisis. Communities around the world were forming several clusters creating micro-cities inside big cities. The idea of having space within a space can act

as a transition zone from being exposed to a high number of individuals towards a more introverted area where, despite being enclosed within space, is a private intimate zone to enjoy the open air. This takes us to another point discussed during the webinar, the rediscovery of home as a central structure. The lockdown period made citizens more aware of the importance of their private residences, hence the emphasis on the right to access to private space, i.e. rooftops. The role of the architect here emerges as the creator of basic principles of design that strengthens the close relations of humans to nature, as well as a protector from any exterior inconveniences. The following section will focus on the framework of the basic principles of design coherence of rooftops and how they can act as democratic passages to residents.

4. Rooftop Design Framework in a Post-COVID World

Cairo has seen a major increase in the construction of malls as public assembly spaces in the past five years. As the globe experiences a pandemic, having closed assembly spaces as the leading recreation component of a city is problematic. Cairo's recreational urbanism is best described as "Under one roof" urbanism, the enclosures and enclaves reflect a desire to leisure in a segregated or controlled setting. The question to ask here is, how will a city build on enclosed recreation sustain itself in a pandemic ridden world?

4.1. Defining Living Patterns on the Roof

During a senior-level Architecture Design studio taught by Nikos Salingaros and Kenneth G. Masden II, it was noticed that the concept of adaptive design was foreign to students. Their intellect was encircled with materialism and globalized novelty rather than adaptation and innovative solutions. Many architecture schools operate within what Ashraf Salama calls 'dynamic conservatism', which is ceasing to change, and fighting to stay the same. The system in architecture schools in Egypt has not shifted their focus towards a more inclusive architecture believing in strengthening the association with the market, where form is not language as much as it is materialistic. The choice of rooftops in this research work was to divert readers' perceptions from a set of object-based beliefs to the essence of design theory.

Starting from the Paris world exhibition of 1867 when German master builder Carl Rabitz expressed to the public the advantages of flat roofs (Elpiniki et. al, 2009), architects and planners have widely perceived rooftops as spaces of local usage and accessibility. Rooftops encourage citizens to feel free from anxiety and feelings of unease induced by hostile buildings and surfaces. Concerning the city fabric, rooftops metaphorically express the evolution of living spaces and the built form. They are the results of several social iterations carried out over the years to form the current scenery of contextualization and experimentation. Hence, rooftops are not perceived as sculptural objects that do not naturally interact with their users or surroundings, rather they carry the potential of healing spaces on the psychological and physiological levels. Figures 1 and 2 show the contrasting imagery of two spaces with two different geometrical composition. The first space implies a healthy inviting gesture that promotes social interaction and manifests into the intertwined connection between individuals and the built surroundings, giving rise to an enhanced architectural collective product. On the other hand, the second space is a typical post-modern composition of 'star-elements', each functioning within its boundaries giving little attention to the whole environment.

4.2. A Shift in Discourse

To adapt, a shift in the discourse surrounding public space must occur. Adding more green space alone is not a solution. The point to raise is how to increase public space and how to make it usable. This paper focuses on rooftops in specific, and why they are not being used to their full potential. If one was to think of the area rooftops occupy in the city, it will be the footprint of every building only at different heights. According to Statista, in 2015, Cairo's building footprint area amounted to approximately 2,019 square kilometers. That figure is only 30 square kilometers smaller than the total land area of the island of Mauritius. Not using this much area in a city seems shiftless. This section will examine the rooftop at 3 scales: the architectural scale, the neighborhood scale, and the city scale.

4.2.1. The Architectural Scale

Before pushing the use of rooftops, one must examine the possible reasons behind why they are not currently used. According to Nikos Salingaros' living structures and patterns, there are a few guidelines that may catalyze the process of activating a space (Salingaros & Masden II, 2010). Ones that are most relevant to rooftop spaces would be the following:

1. Creating positive outdoor space by defining its wall elements.
2. Protection from nearby observers, a canopy, or an element that creates a sense of privacy is crucial.
3. Having a space within the space, an alcove, or a more intimate zone in the roof that acts as a transition from the feeling of being enclosed to being out in the open.

Cairo has a majority of flat roofs and most of the space is used for satellite dishes and storage of old furniture. Through mere observation, one can see that very few rooftops in Cairo are seen as anything other than leftover space. Salingaros discusses the importance of defining the space architecturally and creating shelter through shade,

very few rooftops have shading structures and therefore it becomes more understandable why they are not used in a hot climate city like Cairo.

On an architectural level we can start by establishing the need for the following:

- Shading systems for the sun and privacy.
- Cooling techniques, indirect evaporative cooling created through the presence of vegetation.
- Defining the space using wall-like elements.
- Designing for a hierarchy of space – from indoors to semi-outdoors to outdoors.

4.2.2. The Neighbourhood Scale

Although the architectural scale guidelines are important tools on how to make a space more usable, an aspect that plays a major role in the equation is the relationship of the rooftop with the urban environment. By initiating the activation of rooftops, a city will create miniature urban pockets that play a major role in the micro-recreation of its people. This result will impact the neighborhood. When activated, the roof will become a shared public space for the building's residents, and perhaps even the neighboring buildings' residents as well. Therefore filling a recreational gap in the neighborhood. A neighborhood with a majority of active rooftops will feel more vibrant. A rooftop's stakeholders may decide to keep the roof private or public. If the roof intends to cater to an entire neighborhood, it should offer activities that are not currently found in the neighborhood. An easy way to read neighborhood activity is to define a walking radius, assume it to be 15 minutes, and map the activities in said walking radius. In doing so, the findings will show you the activity gaps that need to be filled, and those missing activities can be exactly how to activate a rooftop. If the roof intends to remain private and cater only to the building's residents, a quick survey would suffice in finding the activities to activate the roof.

On a neighborhood level, the guidelines would be as follows:

- Determine the type of rooftop use: is it for public use or is it for private use?
- If it is for private use, conduct a quick survey with the roof's stakeholders and determine the types of activities needed or requested.
- If it is for public use, conduct a neighborhood study and find the missing activity types. These activities could range from film screenings to cafes.

4.2.3. The City Scale

From an overall city standpoint, if the area of rooftops in Cairo – which was found to be as big as Mauritius Island – turns green it will have a great impact on the urban heat island effect and contribute to an environmental change. This drastic change will add a significant amount of small elevated urban parks. The only difference is that they will not be felt walking down the street. Mentioned earlier in the paper is Cairo's dire need for urban green/open space. A city that has a heavy built environment that has implemented a strategy to activate the rooftops is Barcelona, Spain. If Barcelona is taken as an example, *the Guia Terrats I Cobertes Verdes* (a guide to terraces and green roofs) published by the City Council is a good way to communicate to the public the different ways a rooftop may be used. The guide provides different designs depending on factors like location, building conditions, and design intent. These categorizations make it easy for people to choose what works best for them and improve on it. There will never be a one size fits all solution, but the Barcelona guide is a step in the right direction.

Another important factor to note about the effect activating rooftops has on a city is perspective. Being on a rooftop and enjoying a dinner or just enjoying the company has a different feeling than being on the ground. The city's lights and dynamism are seen from the rooftop and all the different layers of the city are given the chance to be appreciated and experienced. You will find that major cities like Seattle and Paris have the Needle and the Eiffel tower with viewing decks that overlook the city. For the city scale, this will have to come in the form of policy or neighborhood collective decisions. Although greening a roof could easily be implemented on an individual level, to have an effect on the urban heat it will have to work as a collective effort. This type of intervention will require governmental intervention with policy or a guideline booklet similar to that of Barcelona. The activation of rooftops and their usage as multi-purpose spaces adds to the value of the architecture, aesthetically, and overall quality of life. It not only increases the value on the building level but can easily have effects on the neighborhood level and the city level (Alforque, 2018).

5. Conclusion

The paper is a conceptual investigation of rooftops as an abandoned spatial culture that has been recently revived following the outbreak of COVID-19 at the beginning of 2020 with a possibility of integrating it within the educational curricula in architecture. The research has attempted to fill the gap of architectural education as a catalyst for societal improvement through studying rooftops, where the local community and its interaction with the rest of the city fabric is vivid and vitally explored. Additionally, the paper has attempted to highlight the concept of 'living patterns' concept by Nikos Salingaros as a prophylactic tool to create healthy spaces on the rooftop. To highlight this

approach, the paper enables a theoretical examination of the living patterns. The main questions that guided this study: How can rooftop activation be integrated into architecture teaching? How can living patterns enable a prophylactic mode to create healthy spaces?

The findings in this paper are not fixed statistical data, rather they are an exploration of an ongoing culture seeking revival. The results propose a new design framework to be adopted by architecture schools in Egypt which have been operating radical modernist thinking for the past 50 years. Previous literature showed that post-modern architecture schools force students to initiate novel innovation without taking into consideration social inclusion or the surrounding environment. Several analytical surveys were conducted on a few architecture schools in the Middle East, and the outcomes revealed the lack of humanism and sociological intellect within the curricula, whereas the emphasis was more on architectural design and technical building systems.

It is necessary to mention that this paper does not aim to negatively deconstruct efforts towards improvement in education, rather it sheds light on an alternative perception of rooftops as an important tool in developing intellectual output. Since global transformations seem faster than what we think, whether by natural or artificial causes, one's curiosity might question the speed of our learning and awareness level? Are we updating ourselves with stark changes, or are we resisting any sort of changes to our perceptions? The presence of the architect and urban planner in the scenery has become dependent on hyper-connectedness and accelerated communication with society more than before. Their work progress is no longer confined within enclosures but a vital part of community enhancement. The outcome of this research work can be used as basic principles for future implications for public space during the times of crisis. It's an integration between sociological aspects of design and the creation of coherent geometrical patterns, eventually composing elements that are sustainable and healthy to dwell within. One suggestion for future studies would be exploring the possibility of creating living patterns in association with artificial intelligence and smart cities. Architects and planners will no longer think of short-term projects serving a small portion of society, rather their vision would include rising futuristic environmental settings creating opportunities for more democratic engagement with urban spaces.

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Conflict of interests

The Authors declare no conflict of interest.

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