Journal of design studio

Journal of **Design Studio**

AIM
The aim of the Journal of Design Studio is bringing different design studio researchers together on a multidisciplinary design studio research platform. This design studio research platform gives the researchers who made experimental studies in their design studio education to share their works with the other researchers in the same area or similar research fields. The scope of the Journal of Design Studios include all research and experimental works realized in all type of design studios.

SCOPE
Design studio pedagogy,
Design theories and methods for studio works,
Architectural design studio education,
Design principles for studio work,
Product design studios,
Interior design studios,
Urban design studios,
Landscape design studio,
Communication design studio,
Graphic design studio,
Media design studio,
Fashion design studio,
New trends in design studios,
Virtual design studios,
Design thinking,
Studio culture,
Studio teaching,
Innovative and creative works in design studios
Quality assessment in studio work,
Collaborative design studies in design studios,
Integrated design studio,
Design studio practice,
Design practice,
Design research,

Journal of **Design Studio**

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Editorial

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Editorial

Welcome to the first issue of the second volume of the Journal of Design Studio. Starting from late December 2019 approximately whole globe has been suffered with pandemic of COVID-19. The pandemic affected all sectors. Especially all educational facilities had been closed and many of them preferred to continue their educational activities by choosing online or distant education methods.

When we look to distant educational methods of design studio education, we saw that distant design studio educational facilities started at mid-nighties as virtual design studios. In the 1990's, some academicians examined virtual design studios (McCullough,M. et all:1990, Kvan, T.: 2001, Sheldon, D.:1995). Online studios in higher education design education have a short also interesting history. Many researchers at the beginning made some experimental studies on technological tools of virtual design studio especially possibilities of personal computers and communication and network systems. Distant education initiatives have taken advantage of the special possibilities of the internet to communicate fast, accessible exchange of information across distance places and spaces in design studios. The current technological improvements in internet communication gave important support to distant online educational facilities. Communication types in the online studio can be generally classified in two ways; synchronous and asynchronous. Asynchronous type of study base on working at different times, possibly on different parts of the design or different individual design projects without any simultaneous presence of other members of the study group. Technological progresses like email and FTP (file transfer protocol) also support asynchronous type of communication in distant design studio studies. On the other hand synchronous way of study implies the simultaneous presence and participation of all designers in the studio collaboration and is supported by high-bandwidth technology such as video conferencing, shared electronic whiteboards and chat rooms. Many examples use both basic communication types in working at design studio in different phases of process.

When we search by universities and design schools worldwide, the different ways of virtual/online/distant design studio examples have been existed in different design disciplines. Most of the examples of virtual/online/distant design studios are architectural, although some other cases have occurred recently in other disciplines of art, design and even in engineering. The virtual/online/design studio gives reference to a studio having interactions of network which organized in different space and time. Design Studio participants can be in various locations, and the design process and communication s between participants mainly base on computer mediated and computer supported or sometimes other digital tools like cell phones and other social media tools. Virtual/online/distant design studios' allow designers, educators and all other stakeholders like supervisors, jury members to be located anywhere yet still participate in a very collaborative work of design studio.

There are two review articles in the first issue of second volume of the Journal of Design Studio. The first article in this issue written by Beyza Şat Güngör and entitled as "Do Green Building Standards Meet the Biophilic Design Strategies?". The second article is entitled as "Critical Reflections on the Surface, Pedagogical and Epistemological Features of the Design Studio under the "New Normal" Conditions" which is written by Derya Yorgancıoğlu and is examined the above mentioned virtual/online/distant design studio.

The first article in this issue written by Beyza Şat Güngör and entitled as "Do Green Building Standards Meet the Biophilic Design Strategies?". The article is based on the idea of biophilic design strategies and green building standards interactions. Definition and different approaches to biophilic design explained in the introduction part of the article and the key strategies of biophilic design solutions in the following section. Biophilic design defined

in the article as a design way *"which inspired by nature, is a new juvenile design concept that gains importance day by day because of its positive effects on human wellbeing mood and relatedly human productivity"*. Many designers have problems of keeping in balance to comfort needs of users and low energy consumption while designing different building types. Biophilic design proposes to use the trends in human nature to connect with nature. In the biophilic design definition, all sensations that aid contact with natural ingredients such as natural light, natural ventilation, natural renewable energy, natural resources, some animal species such as plants or birds; holds an important place. Biophilic design aims to create a comfortable living space that uses renewable resources of nature for people as a biological organism in a modern built environment that promotes people's health, fitness and well-being. We all know that natural conditions of our environment have positive and/or negative effects on our physical and mental health, performance and well-being. While the need for beneficial contact with nature continues in today's established environment, the physical and mental health, performance and well-being of the users have an increasing importance than ever, especially in everyday life. The main aim of the research problem of the article to find the interactions, matching and un-matching conditions between biophilic design strategies and green building tools which are generally base on energy saving and other environmental protections approaches. The article also explores whether 14 biophilic design principles match 3 main mind-body system elements, stress reduction, cognitive performance and mood preference. To do this author use green building ratio tools which are an indicator to measure green architecture. When examining the interaction of Green Building Ratio Tools with biophilic design strategies in the conclusion part of the article; it is stated that Green Building Ratio Tools are insufficient to meet the needs of biophilic design, on the other hand, biophilic patterns are positive in mind-body systems, and it is necessary to provide new approaches and additions to meet these strategies in the concept of human well-being, good mood and efficiency. As a result of the research, it is emphasized by the author that biophilic design helps to shed light on the importance of human connections with nature in our built environment and it will encourage people to challenge to convention by making biophilic design models a vision for healthy homes, businesses and cities.

The second article is entitled as "Critical Reflections on the Surface, Pedagogical and Epistemological Features of the Design Studio under the "New Normal" Conditions" which is written by Derya Yorgancıoğlu, The article aims to make a critical reading on the constraints and potentials that emerge during the COVID-19 outbreak in design education through the transition from face to face teaching and learning experiences. In narrative research, it is tried to re-contextualize the emerging concepts of distance learning and learning into the broader context of the design studio pedagogy literature by critically reading contemporary discussions on architectural design education. *The theoretical framework of the study is based on the model developed by Shaffer (2003) in relation to the three main elements of design studio pedagogy (1) in relation to "surface structures", (2) "pedagogical forms" and (3) "epistemological principles".* The author demonstrates that the study, on the one hand, opens up ways to test the "new" tools, teaching and learning methods and experiences, on the one hand, and allows for a better understanding of potentials and well-functioners, and discusses future research, distance education and learning in design education " Instead of reducing it to a technology-driven 'paradigm shift', it should focus on the effects of changing pedagogical tools and practices on the manifold dimensions of 'human learning'. design pedagogy talks about its effects on epistemology. The article conclude as the current state of distance learning have the trend of "technology oriented approaches" in the case of the limits of the digital tools we use may affect the limits of teaching and learning experiences for both stakeholder teachers and students, and author suggest that this tendencies should not have effects on the potentials of intuitive, spontaneous and experimental dimensions of design education.

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Do Green Building Standards Meet the Biophilic Design Strategies?

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Abstract. Energy efficiency in buildings, comprises many things as mitigation effect of global warming and climate change, decreasing heat island effect in the built environment and also conservation of natural resources. Besides as a new phenomenon we should add biophilic design criteria to the green building tools to increase human productivity by considering human wellbeing. Biophilic design, which inspired by nature, is a new juvenile design concept that gains importance day by day because of its positive effects on human wellbeing mood and relatedly human productivity. Here some conflicts can be occurred between energy saving and human wellbeing; as natural ventilation and energy saving.

Biophilic design comprises inherent human inclination to affiliate with nature. All sensations which help to be in contact with natural components as daylight, plants or some animal species like birds; plants occupy an important place in its definition. Biophilic design seeks to create good habitat for people as a biological organism in the modern built environment that promotes people's health, fitness and wellbeing. Scientific studies reveal that contact with nature has significant effects on people's physical and mental health, performance and wellbeing. This phenomenon has, an increasing importance more than ever before, especially in daily life. The need for beneficial contact with nature continues in today's built environment. This paper aims to determine whether the biophilic design strategies are match with green building tools that mostly targeting energy saving in built environment. Also paper handling whether the 14 biophilic design patterns are match with 3 main mind-body systems that are; stress reduction, cognitive performance and emotion mood preference.

Keywords: Biophilic design, natural systems, energy saving, green building tools, mind-body systems

The Term biophilia and biophilic design?

The term 'biophilia' was first used by social psychologist Eric Fromm (1964) at "The Heart of Man" and later popularized by biologist Edward Wilson (Fromm, 1964; Browing et al., 2014). The American biologist and entomologist, Edward O. Wilson, was the first to clarify the importance of contact with nature for the psychological development of people. Edward O. Wilson introduced and popularized the hypothesis in his book, "Biophilia". He defines biophilia as "the urge to affiliate with other forms of life". The term biophilia means interact with other living systems and he describes the connections that human beings subconsciously seek with the other forms of life (International Well Building Institute, 2019); for millions of years our species was related to its wild environment, created a kind of dependency, an overwhelming emotional need to be in contact with other living beings. This inherent need was called Biophilia (Wilson 1984, 1993; Sanchez et. Al. 2018). The scientists Roger S. Ulrich and Stephen Kellert gave the final approach to the term Biophilia by defining it as "the innate human affinity for nature" (Sanchez, 2018).

Although the term biophilia, named by Fromm, has been proposed and defined over many times (Browing et al. 2014), it is also defined by

Kellert (2008) as an inherent human inclination to natural systems and processes and it urges us to affiliate with other forms of life (Kellert, 2008; Xue et al., 2019a). The concept of biophilia is the idea of human contact with nature. This connection has been thought beneficial for human physical and mental well-being. A study reveals the benefits of nature as healing effect (Reeve et al., 2017). As pointed out by Beatley (2016), nature is not optional, but an absolutely essential quality of modern urban life. The essential benefits of biophilia urges us not only to conserve and restore the natural elements that already exist but, insert new forms of nature for the twenty first century (Xue et al. 2019a; Beatley, 2016).

Biophilic design came in sight after the term biophilia. Alexander (2002) defines biophilic design as "integration" or sometimes "manipulation" of natural elements or systems to create sense of "life" in the built environment (Alexander, 2002). Biophilic design, defined as a response to the inherent need of human beings to be in contact with nature, improves productivity in the workplaces (Sanchez, 2018). Recently, the concept of biophilic design has received attention among practitioners and environmental psychologists (Lee, 2019). Kellert et al. (2011) explained that biophilic design inspires firms to use natural systems and processes in the design of the built environment. Biophilic design fulfills the human need for exposure to nature and several studies have shown benefits of natural features and systems into the built environment on people. Studies revealed that adding natural light and windows significantly improve participants' mood

(Kellert et al., 2011; Zadeh et al., 2014). This effect of biophilic design considered since it is related with human productivity. People's concentration increases after they spend time in nature or even view scenes of nature; reduces stress, improves cognitive functions and creativity (Lee, 2019). As the world population continues to urbanize these qualities will be ever more important (Browing et al., 2014). The United Nations predicts that by 2030, 60% of the world's population will live in urban environments (UN-HABITAT, 2019).

When the biophilic design considered to increase human productivity, the studies' direction changes to follow those related subjects; Sutermeister (1976) defines performance as a quality considered output per employee hour. Accuracy and speed are the two distinct aspects to measure of human performance. Accuracy is defined as a measure of the quality of behaviour (Sanchez et al., 2018). Biophilic design modifies and apply the natural systems in the built environment for human wellbeing in many aspects and indirectly effects human performance. Biophilic spaces have been defined as spaces that strengthen life and support the sociological and psychological components (International Well Building Institute, 2019).

Key strategies of biophilic design
According to the biophilic design concept, 25 biophilic design strategies are identified by considering the related references. The key strategies of the Biophilic Design have been analysed and summarized as below table (Xue et al., 2019a).

Table 1. Key strategies of Biophilic Design (Xue et al., 2019a).

Biophilic Design Aspects	Indicators	Strategies	References
Biophilic Infrastructure	Biophilia ratio	Increase green space coverage ratio;	Barton and Pretty (2010)
		Promotes plant canopy configuration for shading and sheltering;	Xue et al. (2017b)
		Enhance native species ratio;	Oldfield et al. (2015)
		Enhance biodiversity level;	Maes et al. (2016)

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		Enlarge water area;	White et al. (2010)
		Diverse water configuration and appearance;	(Hunter et al. 2010; Ulrich et al. 1991)
	Biophilia management	Natural landscape promotion and with minimal management;	Hwang and Yue (2015)
		Permeable surfaces for stormwater management;	(Beatley 2011; Stovin 2009)
		Enhance natural ventilation and airflow design;	Ignatius et al. (2015)
		Enhance daylight and shadow design;	(Aries et al. 2015; Hraska et al. 2015)
Sensorial Design	Visual connection with nature	Optimize window view of the natural landscape, i.e. forest, seascape etc.;	(Ambrey and Fleming 2014, Schweitzer 2004)
		Optimize window view of weather changes i.e. sunshine, rain, snow;	Kellert et al. (2008)
		Provide indoor potting plants;	Chang and Chen (2005)
		Provide indoor green walls;	(Beatley 2000, 2012)
		Provide observable art works i.e. painting, sculpture etc.;	Zbaśnik-Senegaènik and Kuzman (2014)
	Non visual connection	Natural sound design i.e. wind, song of birds and insects etc.;	Browing et al. (2014)
		Aromatic plant design;	Mlnar and Vodvarka (2004)
		Urban farming, plants touching and tasting activities;	Gonzales and Kirkevold (2014)
	Thermal comfort and airflow	Openable window for natural ventilation;	Gou et al. (2014)
		Thermal comfort controls as air temperature, humidity;	USGBC (2013)
Biophilic Setting and Performance	Biomorphic forms and patterns	Biophormic building form and façade for energy cost reduction;	(Senosiain Aguilar 2003, Zevi 1959)
		Biophormic ornament design;	Pawlyn (2011)
		Surface pattern design from natural environment;	Pawlyn (2011)
	Natural material and color design	Natural material selection as wood, bamboo, rock etc.;	(Tsunetsugu et al. 2007, WGBC 2014)
		Color selection to enhance creative environments	Lichtenfeld et al. (2012)

Briefly the included biophilic design strategies according to the biophilic design aspects are explained below;

Biophilic infrastructure aspect includes biophilia ratio and biophilia management; biophilia ratio is the percentage or quantity of natural elements available to users, green area cover ratio, plants canopy configuration, native species ratio, biodiversity level, and water area and appearance. Biophilia management measures the quality of the elements such as how natural landscapes require minimal management: the availability of permeable surfaces for stormwater management, the use of natural ventilation and airflow as well as the presence of daylight and shadow design.

Biophilic infrastructure is more related on quality than quantity.

Sensorial design aspect, includes visual connection, non-visual connection, thermal comfort and airflow. Visual connections with nature are the most obvious methods of biophilic design and can be achieved through having window views of natural landscapes. Non-visual connections with nature engage the other senses such as through natural sound design, aromatic plant design natural elements related art works. Natural ventilation is another factor allows people to feel in-touch with nature.

Biophilic setting and performance aspect includes biomorphic forms and patterns and natural materials and colors. This creates a visual connection with nature with other benefits such as enhancing creativity (Xue et al., 2019a).

The visual connection with nature is an important strategy in the field of art, since implementation is relatively easier to create. Especially art works inspired by natural systems are in demand recently.   This form of art combines natural daylight with natural inspired artwork. Stained glass designed by inspiration of natural cells structure, is used as the contemporary artwork in a public space, as shown in the example provided in Figure 1 and visual connection with water element that reflects light and weather conditions from above and invites by-passers to touch it, as in the example of the Luxembourg Gardens in Paris in Figure 2. Children or adults spend time by floating their wooden model sailboats and enjoy the pool's climatic effect.

Figure 1: contemporary stained glass art work inspired from cells by Ayşe G. Süter . Photo By: Pere Virgill (Süter, 2015).

Figure 2: *Water use in Luxembourg garden in Paris Photo Jiel Beaumadier CC BY-SA (Beaumadier, 2006).*

Biophilic design strategies and Green Building Ratio Tools (GBRTs)

Green Building Ratios are an indicator to measure green architecture. They are more focused on energy efficiency. How can we measure the biophilic designed space meets human wellbeing and improve productivity? This question's answer is a challenge. Actually there are many indoor stressors effective on human wellbeing and productivity, such as excessive thermal factors, lighting aspects, moisture, noise and vibration, radiation, chemical compounds, and particle fluctuations. In a place, a whole range of effects has been associated with these stressors that known as Sick Building Syndrome (SBS) (Sanchez et al., 2018). A research implemented in Keio University – which focused on the element that is most valued at the work environment - shows that in top five natural light was the most valued element, followed by indoor plants and vivid colours. Use of daylight is most effective on reducing the fatigue feeling.

Biophilic design strategies are added to the principles of Green architecture. In fact, biophilic design includes some of the green building standards but it targets not only energy saving but also human wellbeing, good mood and productivity. Biophilic strategies and their sub-relevant categories are matched with updated Green Building Rating Tools (GBRTs) as LEED (Leadership in Energy and Environmental Design), BREEAM (Building Research Establishment Environmental Assessment) GM NRB (Green Mark Non-Residential Building), GBL (Green Building Label), WBS (Well Building Standard) and LBC (Living Building Challenge). The framework is used in a recent study to emphasize the shifting of GBRTs from the energy-oriented approach to a human-oriented approach through biophilic strategies (Xue et al., 2019b).

Table 2: Selected GBRTs

Selected GBRTs	Classification
LEED BREEAM	Internationally most widespread, industry standard for sustainability (Shan and Hwang, 2018; Xie and Gou, 2017).
GBL GM	Developed and employed in the local situations and are tailored to native climates and contexts: respectively China and Singapore (Hwang et al., 2016; Shan and Hwang, 2018; Ye et al., 2015; Zou et al., 2017).
WBS LBC	Innovative green building regulations which focus on human health and wellbeing. First protocol to address human wellness into the built environment (Morton, 2015).

Each GBRT credit has been assessed in terms of its intent to improve human health and wellbeing. Some credits such as thermal comfort and air quality are dedicated to improving human health; these credits are easily identified as human-oriented credits. Some credits such as public transport and cycling have multi-purposes including reducing greenhouse gas emissions while improving health and wellbeing. These credits are also human-oriented credits. Other credits that are dedicated to energy efficiency and greenhouse gas emission reduction are excluded. Prominently, WBS and LBC have more credits

on human health and wellbeing. The GBRT credits are generally grouped in 8 categories: Place, Transport, Energy, IEQ (Indoor Environmental Quality), Water, Material, Health and Management. The relationship between the 8 categories of GBRT credits and the 6 different GBRT's are analysed in a cross-table by considering biophilic design strategies (Xue et al., 2019b).

As seen in Table 3.1 the biophilic infrastructure deals with essential comfortable conditions for human wellbeing as natural ventilation and day light.

Table 3.1: GBRTs matching with "biophilic infrastructure" design category and strategies (Xue et al., 2019b).

Strategies	LEED	BREEAM	GM	GBL	WBS	LBC
Increase green space coverage ratio;	Place		Place	Place	Place	
Promote plants canopy configuration for shading and sheltering;	Place	Place	Place	Place	Place	
Enhance native species ratio;	Place	Water	Place	Place		Place
Enhance biodiversity level;	Place	Place	Place	Place		Place
Enlarge water area;						
Diverse water configuration and appearance;			Place	Water		

Natural landscape promotion with minimal management;	Water	Place	Place	Place		Place
Permeable surfaces for storm water management;	Place	Water	Place	Place		Water
Enhance natural ventilation and airflow design;	IEQ	IEQ	IEQ	IEQ	IEQ	IEQ
Enhance daylight and shadow design;	IEQ	IEQ	IEQ	IEQ	IEQ	IEQ

"Enlarge water area" biophlic infrastructure design category does not match any of the GBRTs and "Diverse water configuration and appearance" category just match with two of the GBRTs. In this table we can summarize just three of the credits as water, place and IEQ related with biophilic infrastructure design category.

Table 3.2 presents the sensorial design category of biophilic design strategies that match with GBRT credits like Place, IEQ (Indoor Environmental Quality) and Health.

Table 3.2: GBRTs matching with "sensorial design" design category and strategies (Xue et al., 2019b).

Strategies	LEED	BREEAM	GM	GBL	WBS	LBC
Optimize window view of the natural landscape. i.e. forest, seascape, water motif, etc.;	IEQ	IEQ		IEQ	IEQ	IEQ
Optimize window view of weather changes (i.e. the sunshine, rain, snow);	IEQ	IEQ			IEQ	
Provide indoor potting plants;			Health		Health	
Provide indoor green walls;			Health	IEQ	Health	
Provide observable artworks (i.e. painting, sculpture);			Health		Health	Health

Natural sound design (i.e. the wind, song of birds and insects);					Health	
Aromatic plant design (i.e. certain trees and flowers);						
Urban farming (i.e. plants-touching and tasting activities);	Place				Health	Place
Openable window for natural ventilation;	IEQ	IEQ	IEQ	IEQ	IEQ	IEQ
Individual/group thermal comfort controls (i.e. air temperature, air speed, and	IEQ	IEQ	IEQ	IEQ	IEQ	IEQ

"Sensorial design" category includes only three credits as IEQ, health and place. Place has seen just at LBC tool. Health and IEQ seen as more related with sensorial design category in biophilic design strategies.

Table 3.3. presents the relation to the built environment, through materials, textures, forms and structures. It is at this level where energy efficiency provided by the thermal insulation and ventilation is tackled.

Table 3.3: GBRTs matching with "Biophilic setting and performance" design category and strategies (Xue et al., 2019b).

Strategies	LEED	BREEAM	GM	GBL	WBS	LBC
Biomorphic building form and façade for energy cost reduction;			Health			Health
Biomorphic ornament design (i.e. Golden mean and Fibonacci series);			Health			Health
Surface pattern design from natural environment (i.e. pattern of animal skin);			Health			Health
Natural material selection, i.e. wood, bamboo, rock, etc.;	Material	Material	Material	Material	Material	Material

Color selection to enhance creative environments.	Health				Health	

"Biophilic setting and performance" category includes mainly health and material credits in biophilic design strategies. Mainly GM and LBC matches.

Table 3.4 emphasized the fact that Place, Health and IEQ (Indoor Environmental Quality) credits are dominant in the transportation connectivity category of biophilic design strategies.

Table 3.4: GBRTs matching with "transportation connectivity" design category and strategies (Xue et al., 2019b).

Strategies	LEED	BREEAM	GM	GBL	WBS	LBC
Locate public bus/MRT station within 300m walking distance;	Transport	Transport		Transport	Transport	Transport
Provide a fully connected pedestrian network;	Transport	Transport			Transport	
Provide shaded corridors/bridges between buildings and districts;						
Provide fully accessible and dedicated cycling lanes;	Transport	Transport	Transport	Transport	Place	
Configure with bike parking facilities;	Transport	Transport	Transport	Transport	Place	Place
Configure with change room and shower facilities;	Transport	Transport	Transport		Place	Place
Provide landmark in public open space for attraction and gathering;						
Effective visual information system design for wayfinding and collaboration;	Place	Transport			Place	
Locate public bus/MRT station within 300m walking distance;	Transport	Transport		Transport	Transport	Transport

"Transportation connectivity" category includes just transport and place credits in biophilic design strategies match. GM and LBC seen weaker in this category match.

Table 3.5 indicates "place" and "management" credits that meet with the work-live-play integration category of the biophilic design strategy.

Table 3.5: GBRTs matching with "work-live-play integration" design category and strategies (Xue et al., 2019b).

Strategies	LEED	BREEAM	GM	GBL	WBS	LBC
Share public green spaces, open plaza and community spaces;	Place	Management	Management	Place	Management	Place
Share food & beverage, food court facilities;	Place	Management			Management	
Share learning and collaboration facilities;	Place	Management		Place		
Security management (i.e. patrol, CCTV);		Management				
Enhance facility and site maintenance;	Management	Management	Management	Management	Management	Management

"Work-live-play" integration category includes just management and place credits in biophilic design strategies match again GM and LBC seen weak in this category match. "Green space place making" *category mostly matches with* WBS and includes just place and management credits.

Most of the biophilic strategies (%85) are matching with GBRTs. 5 biophilic strategies that are presented below does not match any of the GBRTs;
- enlarge water area,
- aromatic plant design,
- shaded corridors/bridges between buildings and districts,
- landmark in public open space for attraction and gathering
- shaded outdoor seats for café and restaurants.

Table 3.6: GBRTs matching with "green space place making" design category and strategies (Xue et al., 2019b).

Strategies	LEED	BREEAM	GM	GBL	WBS	LBC
Provide shaded outdoor seats for café and restaurants;						
Volunteer-engagement for urban farming;					Place	Place
Provide Friday/holiday market (vegetable, food, and other commercial sales);	Place				Place	
Provide outdoor performance/exhibition of art events during lunch breaks (i.e. live		Management	Management	Management	Management	Management

Biophilic patterns and mind-body systems
Mind-body systems that relate directly with people's health and well-being are impacted by the environment. Table 4 clarifies the relationships between 14 biophilic design patterns and mind-body systems with related references. Biophilic design addresses to people as a biological organism, respecting the mind-body systems as indicators of health and well-being. There are three factors identified in mind-body systems. Those considered main mind-body systems are; stress reduction, cognitive performance and emotion mood preference.

Table 4: *14 Biophilic Design Patterns matching with Mind-Body Systems (Browing et al., 2014).*

14 patterns	No[*]	Mind-body systems		
	3	Stress reduction	Cognitive performance	Emotion, mood preference
Nature in the Space — Visual connection with nature	2	Lowered blood pressure and heart rate (Brown, Barton & Gladwell, 2013; van den Berg, Hartig, & Staats, 2007; Tsunetsugu & Miyazaki, 2005)	Improved mental engagement/ attentiveness (Biederman & Vessel, 2006)	Positively impacted attitude and overall happiness (Barton & Pretty, 2010)
Non-visual connection with nature	2	Reduced systolic blood pressure and stress hormones (Park, Tsunetsugu, Kasetani et al., 2009; Hartig, Evans, Jamner et al., 2003)	Positively impacted on cognitive performance	Perceived improvements in mental health and tranquility (Li, Kobayashi, Inagaki et al., 2012; Jahncke, et al., 2011; Kim, Ren, & Fielding, 2007; Stigsdotter & Grahn, 2003)
Non-rhythmic sensory with stimuli	2	Positively impacted on heart rate, systolic blood pressure and sympathetic nervous system activity	Observed and quantified behavioral measures of attention and exploration (Windhager et al., 2011)	

			(Kahn et al., 2008; Beauchamp, et al., 2003)		
	Thermal & Airflow with variability	2	Positively impacted comfort, well-being and productivity (Heerwagen, 2006; Tham & Willem, 2005; Wigö, 2005)	Positively impacted concentration (Hartig et al., 2003; Hartig et al., 1991; R. Kaplan & Kaplan, 1989)	Improved perception of temporal and spatial pleasure (alliesthesia) (Parkinson, de Dear & Candido, 2012; Zhang, Arens, Huizenga & Han, 2010; Arens, Zhang & Huizenga, 2006; Zhang, 2003; de Dear & Brager, 2002; Heschong, 1979)
	Presence of Water	2	Reduced stress, increased feelings of tranquility, lower heart rate and blood pressure (Alvarsson, Wiens, & Nilsson, 2010; Biederman & Vessel, 2006)	Improved concentration and memory restoration (Alvarsson et al., 2010; Biederman & Vessel, 2006) Enhanced perception and psychological responsiveness (Alvarsson et al., 2010; Hunter et al., 2010)	Observed preferences and positive emotional responses (Windhager, 2011; Barton & Pretty, 2010; White, Smith, Humphryes et al., 2010; Karmanov & Hamel, 2008; Biederman & Vessel, 2006; Heerwagen & Orians, 1993; Ruso & Atzwanger, 2003; Ulrich, 1983)
	Dynamic & Diffuse light	2	Positively impacted circadian system functioning (Figueiro, Brons, Plitnick et al., 2011; Beckett & Roden, 2009) Increased visual comfort (Elyezadi, 2012; Kim & Kim, 2007)		
	Connection with natural systems				Enhanced positive health responses; Shifted perception of environment (Kellert et al., 2008
Natural Analogues	Biophormic Forms & Patterns	1			Observed view preference (Vessel, 2012; Joye, 2007)
	Material Connection with Nature			Decreased diastolic blood pressure (Tsunetsugu, Miyazaki & Sato, 2007) Improved creative performance (Lichtenfeld et al., 2012)	Improved comfort (Tsunetsugu, Miyazaki & Sato 2007)
	Complexity & Order	2	Positively impacted perceptual and physiological stress responses		Observed view preference (Salingaros, 2012; Hägerhäll, Laike,

Nature of the Space			(Salingaros, 2012; Joye, 2007; Taylor, 2006; S. Kaplan, 1988)		Taylor et al., 2008; Hägerhäll, Purcella, & Taylor, 2004; Taylor, 2006)
	Prospect	3	Reduced stress (Grahn & Stigsdotter, 2010)	Reduced boredom, irritation, fatigue (Clearwater & Coss, 1991)	Improved comfort and perceived safety (Herzog & Bryce, 2007; Wang & Taylor, 2006; Petherick, 2000)
	Refuge	3		Improved concentration, attention and perception of safety (Grahn & Stigsdotter, 2010; Wang & Taylor, 2006; Wang & Taylor, 2006; Petherick, 2000)	
	Mystery	2			Induced strong pleasure response (Biederman, 2011; Salimpoor, Benovoy, Larcher et al., 2011; Ikemi, 2005; Blood & Zatorre, 2001)
	Risk/Peril	1			Resulted in strong dopamine or pleasure responses (Kohno et al., 2013; Wang & Tsien, 2011; Zald et al., 2008)

* numbers are giving the patterns which are supported more empirical data

Discussion and Conclusion

When we examine the GBRT's with biophilic design strategies; it is obvious that the GBRT's are insufficient to meet the needs of biophilic design. New approaches and additions should be provided to meet those strategies in the concept of human wellbeing, good mood and productivity. In the other hand it is obvious that biophilic patterns are effective on mind-body systems positively. However, it needs more empirical data on that. Some nature interactions can even induce stress or fear responses. Fortunately, an emerging number of studies teach us which specific interactions with nature are restorative and which are stressful. Understanding how people viscerally respond to nature and how such beneficial experiences can be supported in urban settings is essential to shaping a healthy and vibrant society. Biophilic design must be implemented correctly to optimize health benefits (Ryan, 2014).

The therapeutic influence of the natural environment on human is being lost, touch of nature into our daily lives can raise this again. The scientific results that supporting biophilic design is still emerging. Deep down, we know that the connection to nature is important. While empirical evidence is accumulating, we ought to go about restoring the human-nature connection in the built environment. In coming decades, it is projected that 70 percent of the world's population will live in cities. It makes human more be in search of nature to feel fresh. This is estimated that biophilic design will get more important day by day. Biophilic Design helps shed light on the importance of the human connections with nature in our built environment and encourages people to challenge convention by bringing biophilic design patterns into a vision for healthy homes, workplaces and cities.

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Critical Reflections on the Surface, Pedagogical and Epistemological Features of the Design Studio under the "New Normal" Conditions

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Abstract. This study aims to make a critical reading on the constraints and potentials that emerge through the transition from face-to-face to screen-to-screen teaching and learning experiences in design education during the COVID-19 pandemic. By making a critical reading of current discussions, mostly in narrative surveys, on architectural design education, it is attempted to re-contextualize the emerging concepts of the remote teaching and learning to the broader context of design studio pedagogy literature. The theoretical framework of the study is based on the model developed by Shaffer (2003) regarding the three main elements of the design studio pedagogy as (1) "surface structures", (2) "pedagogical forms" and (3) "epistemological principles." The study revealed that the current situation, on the one hand, opened the ways for us to test "new" tools, methods and experiences of teaching and learning, and on the other hand, allowed us to better understand the potentials and well-functioning aspects of the "existing" pedagogical models. Rather than reducing the discussions on remote teaching and learning to a 'technology-driven' paradigm change in design education, future research should focus on the effects of changing pedagogical tools and practices on the manifold dimensions of 'human learning', which in turn will have implications for the epistemology of design pedagogy.

Keywords: COVID-19, architectural design education, design studio pedagogy, remote teaching, new normal, human element.

1. Introduction

From March 2020 on, the lockdown resulted from the COVID-19 pandemic has created tremendous impact on various fields of life; the field of higher education was not an exception. This impact manifested itself unexpectedly, and the higher education area has entered into a process of new adjustments. Adjustment efforts also continue in the field of architectural education and especially architectural design education. The studio tutors are trying to find their ways through the quick transition from formal education at the campus to remote teaching at home. While the design reviews have altered in scope and format, we're trying to discover the procedures of digital platforms, which some of us have recently heard, to serve

for design reviews in synchronous and asynchronous setups. For the field of architectural design education that dwell on a studio tradition spanning more than a century, the obligatory removal of the physical studio environment and of the inter-subjective communication generated through 'design crits', is transforming the ongoing teaching and learning practices and experiences. In this environment that is defined as the "new normal," the technological problems such as lack of computers, lack of reliable Internet access or the limited licenses for the universities (archinet.com), are merging with the emotional and psychological tensions both for instructors and students arising from the change of established pedagogical approaches and

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commitments. The emotional and psychological problems vary from the feeling of anxiety due to the uncertainty of post-pandemic environment, the inability of students to focus on their projects on the pandemic period and the feeling of loneliness resulted from social isolation, to the fact that they do not have any sensory or spatial escape in online teaching (archinet.com). What is more, for some students even sitting in front of the computer and expressing themselves to the camera can be a source of anxiety itself (Acar, 2020). While we're still trying to define this ongoing process, scenarios about "post-pandemic future" of higher education are already drawn. Some scenarios are dwelled on the commitment of "big tech's entrée into higher education" (James D. Walsh, May 2020) and how this situation will support the cooperation between education and industry for inline education (Patricia Morton, April 2020). Additionally, there is a consideration that, once the potential inequities regarding Internet access is resolved, the teaching and learning practices to be carried out on virtual platforms will support equity, diversity, flexibility and mobility in design education (Jonathan Massey, April 2020). There is also an optimistic idea that this new situation would support ""self-directed study" for the students (Barbara Penner, April 2020).

The definitions of what we're experiencing today is varied; while some scholars address a shift toward "online teaching", "online learning" or "distant learning" (Carlo D'Alesio (April 2020) a more critical perspective underscores an "emergency remote teaching/instruction" or "emergency remote learning" as the best definition of our ongoing experience in architectural design education (Brett Milligan, April 2020; Andrew Herscher, April 2020; Kadambari Baxi, April 2020). Fred Scharmen (April 2020) notes: "Online teaching requires far more structure and planning than any of us have had the capacity to provide. This is better considered as crisis management and harm reduction. We are in a reactive mode, and the best we can do is to try to avoid causing any more damage." While the design education practices that we're trying to adjust ourselves in the pandemic environment are defined as "new", the practices we experienced few months ago are already defined as "old"; there is an emerging view that nothing will be the same anymore.

Evidently, the changing conditions resulted by the COVID-19 pandemic compel us to question several aspects of the mainstream architectural education; however, will this situation transform the whole pedagogy of design studio education? Is something really "new" replacing the "old"? This situation that is common all over the world opens the way for us to test new tools and methods of communication and teaching/learning practices; the tools previously used as tools of representation and simulation are now serving as pedagogical tools. Yet, is it possible to say that the established pedagogical models will be completely redundant? How realistic is it to model the design education of the 'future' while we're still trying to define the conditions of 'now'?

The technological dimension of the ongoing remote teaching process has been, to a great extent, solved with the tools currently used, and these tools will be developed according to the data to be obtained from our experiences. Providing more access to these digital tools by the students and the instructors is a critical issue to be solved and there is an inequality of access especially for students living in rural areas. However, the researches should focus more on the effects of the use of digital tools in teaching and learning practices on the "human" dimension of the design pedagogy and on human learning. The changes in the nature of learning experiences and the transmission of knowledge bring forth pedagogical dilemmas: what kinds of knowledge, what kinds of doing, what kinds of creativity are at issue? How will the tacit knowledge embedded in subjective creative endeavor and in inter-subjective communication in the conventional design studio be influenced? What will be effects of new digital platforms (or the new usage patterns of existing digital platforms) and new forms of exchanges on the pedagogy and culture of the design studio? These questions can hardly be answered now, since it will take time to observe the effects of ongoing remote teaching/learning

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in different contexts, to analyze them in order to unfold their positive and negative aspects for design education. Therefore, it is still early to make suggestions about what architectural education and design education will transform into in the near future.

This study aims to make a critical reading on the constraints and potentials that emerge through the transition from face-to-face communication to screen-to-screen on the basis of design studio pedagogy. Therefore, by reviewing the current discussions, mostly in narrative surveys, in national and international circles of architectural education and design education, it is attempted to be re-contextualize the emerging concepts of the remote teaching and learning to the broader context of design pedagogy literature. The model regarding the three main elements of the design studio pedagogy developed by Shaffer (2003) — (1) "surface structures", (2) "pedagogical forms" and (3) "epistemological principles" — constitutes the theoretical framework of this study.

2. Design Studio Pedagogy
Shaffer (2003) explains the model based on the analysis of the Oxford Studio as his case study as follows:

> *"In the Oxford Studio, surface features such as time, space, access to experts, and media of expression came together to form a structure organized to support specific learning activities. That is, the learning activities provided consistent and coordinated relationships among the surface features of the environment. Similarly, learning activities came together to form a pedagogy by virtue of the fact that they were arranged to convey a particular approach to understanding based on the properties of architectural ideas. The understanding of architectural ideas, in turn, became a coherent epistemology when instantiated in the structure and pedagogy of the Oxford Studio." (Shaffer, 2003, p. 27)*

Gray (2016, p. 272) notes, in Shaffer's (2003) model while the surface structures refer to "the physical, readily apparent elements of what

comprises a studio environment", the pedagogical forms are more related with the "instructional landscape of the studio" that derive from the ways the teaching and learning activities peculiar to design education are performed by the tutor and the students; and finally the epistemological principles are made manifest through the "'hidden curriculum' of how a student's progress is judged, what kinds of behaviors are rewarded and, ultimately, what the discipline values and/or rewards." These three features of the Oxford Studio model offered by Shaffer (2003) point to the basic components of the design studio pedagogy in general, which is complex and multilayered in nature. It necessitates the active engagement of both the tutor and the students, and offers a holistic experience of learning and of meaning making for all actors. In terms of the teaching and learning strategies employed by the tutors and the students, the design studio supports the students' abilities with regard to "knowing about design, being able to design, and becoming a professional" (Crowther, 2013, p. 20), which signify the three main features of "signature pedagogy" as defined by Shulman (2005).

2.1. The "Surface Structures" of Design Studio
The primary change in our transition to remote teaching in architectural design education at the COVID-19 pandemic occurred in the removal of physical studio environment, which resulted in the lack of embodied encounters. As underlined by Shaffer (2003), the physical features of the design studio influence the modes of interaction between tutor-student and student-student. In the so-called "new normal" conditions, the physical space of the studio, as an element of the "surface structure features" (Shaffer 2003), is replaced with the rooms of our homes. While the physical studio environment was a 'shared space' structured through the social interactions, the instructor and each student partake in the virtual design crit platforms from their 'personal spaces.' Robin Tremblay-McGaw (April 2020) explains: "Academic education is relocating to bedrooms, home offices, kitchen tables, couches, the steps of institutions with free wi-fi

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…, to cars, to basements, in a variety of states, countries, time zones." The interaction between the studio and the rest of the campus that used to be an essential feature of the tutor's and students' spatial experiences also disappeared; our mobility is reduced to our moves from one room of our homes to the other. In the physical studio, an interaction between digital media and physical media was generated through the design crits; the tutor was able to share his/her feedbacks about students' projects presented on the screen of a laptop by using a hand drawing sketch on a tracing paper. The virtual/physical interaction was also generated by the tutor giving examples of structural details by showing the details of the physical space of the faculty building or the campus. Now, such kind of interactions has also disappeared.

Mireille Roddier (April 2020) related the loss of physical space in giving design crits remotely with the loss of the critical distance between the work and us:

> *"... the interface flattens one thing that most requires depth, which is the fluctuating range between foreground and background — not only in space but also in one another's presences; we lose the dynamics between working on a computer and stepping away from it; between pinning a print out on a wall and backing up to observe it; between focusing on one's project and wandering away to a peer's desk to inquire on their progress..." (Mireille Roddier, April 2020)*

Remote teaching practices also changed the time allocated to design crits. Normally, the review duration usually extends beyond the scheduled hours in the physical studio. This situation continues in remote teaching for several reasons. In synchronous design crits, the participation percentage of students in scheduled common hours may decrease. Problems such as Internet access, not finding suitable spatial conditions for online design crit for students living with their families, can reduce the participation in synchronous design crit. For those who cannot attend synchronous courses or because of the critiques that cannot be completed during the scheduled review time,

tutors usually have to allocate extra time for delivering their feedbacks beyond the scheduled time. In the design critiques given on the digital platforms --such as Zoom, MicrosoftTeams, Skype, etc.-- students seem to be connected to the meeting at the same time. Yet, the students generally prefer not to open their cameras before their review turn; thus, it is not possible to make sure that the students listen to their peers' critiques, as it was the case in the physical studio. This can weaken the possibilities of learning from each other and learning together. On a positive side, the access to experts is strengthened since the external reviewers from different parts of the world are able to participate to design crit sessions. Sharon Haar (April 2020) notes: "At Taubman College, we've been using remote interfaces for a while to bring in national and international visiting critics on a more sustained basis, to organize lunchtime speaker series, and to interact with other schools on studio projects." Thus, remote teaching interfaces may result in new gains for multiplicity of voices in design crits.

The media of architectural expression and representation, which Shaffer (2003) defines as an element of surface structure of design studio pedagogy, are also changing. Acar (2020) underscores the emergence of "simultaneous multi-contact" as a new form of communication in remote design teaching and learning experiences. In the view of Acar (2020), on the one hand this brings responsibility for the tutors, on the other hand it offers new opportunities for the students. The important thing is to discover and apply the tools that will transform the knowledge that the students acquire from the multiple online content, in the direction of their own interest, into an input for the design process.

Remote teaching in the pandemic environment also affected the role of three-dimensional modeling that is an essential tool in studio-based learning: there is a transition from physical models to digital models. Problems arise from the scarcity of materials and the students' inability to go out to get more materials. Students mostly get critiques from

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the digital 2D or 3D drawings of their projects. Although, at a lower rate, some students continue to produce physical models, the interactive and iterative experience of the model making in the studio has disappeared. Alternatively, the students focus more on a 'finalized product' to show to the tutor in order to receive feedbacks on design crit sessions. One of the resultant problems is, the students do not prefer to share anything in-the-making of their design projects. Unless the project is developed to stage the students want to share, the students themselves eliminate the initial stages of the design process. Whereas, the draft models that are used to be produced in the studio were efficient tools for initiating observations and discussions regarding the interim stages of the project. That was an essential feature of formative evaluation that aims to inform the students about how much they have progressed through the design process and to facilitate reflection into their learning processes. A general definition of model is made by Archer (1992, p. 7) as "anything which represents anything else for informational, experimental, evaluative or communication purposes." Model making is an important tool for studio-based learning in design education. In the view of Akalın and Sezal (2009), model making acts not only as a vehicle to communicate with others. It is through the relative accessibility of such concrete modeling that learners have access to their own 'thinking-in-action'" (Akalın & Sezal, 2009, p. 15). Similar to the fact that drawing is related to the act of thinking, model making acts as a form of expression for mental thoughts and imagination (Davies & Elmer, 2001). What is more, model making allows the designer to test the effectiveness of her design decisions, to evaluate the spatial and/or structural details of a project and to conceive scaling (Parkinson, 2007). In the view of Susannah C. Drake (April 2020), "understanding scale and the relationship of forms loses meaning when translated into photos or videos for screen consumption." In a similar vein, Sharon Haar (April 2020) underscores "the reduction of design to representational space" and the lack of "analog and digital fabrication capacities" of design students in the remote teaching platforms.

2.2. The "Pedagogical Forms" of Design Studio

Architectural design studio pedagogy is informed by (1) learner-centered approach as the effective paradigm, (2) the communication / interaction methods between the actors of the learning experience, and (3) the design studio, as a physical and social space, where the learning experience and interaction between these actors takes place. In the process of COVID-19 pandemic, although the actors of the design studio as the tutor and the students are the same, the media through which these actors communicate have changed, and the physical space where they coexist has entirely disappeared. This situation brought forth changes in the pedagogical roles of the tutor and the students as well as the formal and informal interactions between them. In the design studio the pedagogical roles of the tutor inform the ways in which students learn how to design, how they develop design expertise and how they perceive themselves as members of a community of designers (Yorgancıoğlu & Tunalı, 2020, p. 22). In the condition that the teaching and learning practices of the pandemic process continues, it is probable that students' ways of learning design, developing design expertise and their self-awareness as members of a community of designers would vary in nature. This change will not happen immediately; it needs to be monitored and analyzed. The effects of the pedagogical change in design education will be best comprehended through the human experiences. Carlo D'Alesio (April 2020) notes: "We will see if – and when – the real digital transformation will come on a deeper, human level."

In the so-called "new normal" of design education, the shift from face-to-face to screen-to-screen communication the in tutor critiques, peer critiques and jury, brought forth the challenge of "how to communicate meaningfully in this digital space" (Anna Livia Brand, April 2020). The design feedbacks are usually given through digital media that allows drawing sketches on the screen.

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Conventionally, drawing multiple sketches by folding the tracing paper and developing alternative solutions served for the iterative nature of the design process; now, the potential of sketches for generating new ideas are limited to the capability of the user to manage the use of digital media for sketching. What is more, instructors question the tacit dimensions of inter-subjective communication in design feedback based on screen sharing. Alison B. Hirsch (April 2020) underlines the significance of "the feedback I get from my students' faces and the ability to adjust to the messages their faces and bodies convey" in physical studio, which is replaced by "[t]he small matrix of students' faces, the neutralizing glow of their screens" in Zoom meetings. In a similar vein, David Smiley points to the lack of collaborative experience embedded in inter-subjective communication that used to be generated in desk crits:

"Online teaching seems to flatten both excitement and worry, eliding subtle tensions and side-long glances. The spectrum of communication and connection feels incomplete… desk crits usually consist of groups of students talking with two or three faculty members. This arrangement, meant to acclimate students to collaborative processes and multiple voices, is not well served by current online platforms." (David Smiley, April 2020)

Alternatively, there are supporters of the idea that the removal of face-to-face communication from design crits would not create negative effects for design education; yet the major challenge would be how to increase the "willingness" of students to participate to remote teaching model (David Heymann, April 2020).

When the learning paradigm embedded in design studio pedagogy is considered, it is evident that learning experience is generated as a social activity as much as it is subjective: "collaboration, language, verbalisation, discussion and dialogue" are the critical elements of the learning process in which the tutors and the students are engaged in the "co-

construction of meaning, rather than simple transmission and reception" (Cohen et al., 2010, pp. 36-37). In the design studios, the physical and intellectual dimensions of tutor-student interactions bring about potentials for co-construction of knowledge and meaning through experience; one of the questions we confront is how much the screen-to-screen communication on online platforms would generate such experiences. This is echoed in the question raised by Nicholas Pevzner (April 2020): "How can this creative, collective space be accessed from home?". Due to the social isolation brought by the COVID-19 pandemic, the disappearance of this social environment became one of the basic problems not only for architectural design education but also for higher education in general. The question raised by Jesse LeCavalier (April 2020) is meaningful in this regard: "How difficult will it be to sustain the university — the society of students and teachers — without the everyday sociality of the campus?"

Nowadays, the students are perhaps able to digitally access much more content than before, and the access channels to the online content and their access duration have increased; however, the fact that they are physically alone at their home can negatively affect the intensity of their active engagement in learning. The stress of being isolated and alone can make it difficult to develop the discipline and concentration needed to initiate and complete the learning process. Some tutors are developing strategies to increase the student participation into the learning process by promoting self-regulated learning in remote teaching practices. Orla Murphy and Emmett Scanlon (April 2020) mention: "We are concerned for students' diminishing agency and control over their education as a result; we place students in a role of peer with their teachers and value a culture of mutual esteem" (Orla Murphy & Emmett Scanlon, April 2020).

In the design studio, self-regulated or self-directed learning is also supported through peer review experiences (Grow, 1991; Gray, 2013). Peer review, either initiated by the tutor or among students themselves, encourage students

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to explain their ideas about their peer's projects, reflect on their own experiences, recognize different directions that they had not considered and begin to learn according to which qualities an architectural project can be evaluated (Cowan, 2005). Now, the removal of informal interactions between the students weakened the pedagogical potentials of cooperative and peer learning experiences. Susannah C. Drake (April 2020) notes: "Seeing how classmates experiment, learning from one's peers, getting direct guidance from instructors on the craft and making of models and drawings — these are challenging if not impossible online." What would be alternative strategies in remote teaching model that would foster learning from each other and learning together for architectural design students? Elizabeth Donovan (April 2020) reflects on her attempts to generate "peer-to-peer learning" strategies as part of remote teaching model:

"The current situation has illuminated the irreplaceable importance of this form of learning not only in transmitting knowledge but also in inspiring, motivating, and supporting students. In an attempt to emulate these interactions as much as possible, we are using online platforms where students can share and interact, and comment on each other's work. We are organizing large group discussions (with about 30 students) and weekly recaps in an effort to maintain opportunities for the cross-fertilization of ideas." (Elizabeth Donovan, April 2020)

Learning by doing, an essential component of studio-based learning is also changing into a new phase. As discussed in the previous section, not only because of the scarcity of materials, but also because of a change in mindset, concrete modeling has been replaced by digital modeling. However, the pedagogic contribution of physical model making to the learning process is evident. The lack of this experience results in weakening of the students' perceptions regarding the 3-dimensionality and scale of architectural space. What is more, their volumetric comprehension is flattened and their discoveries regarding the nature, potentials and

constraints of different materials are disturbed. Nicholas Pevzner (April 2020) notes that this situation is even more challenging for 1st year students "who don't yet have a good handle on the basics of tectonics, representation, and materiality"; he continues to explain: "If the campus shutdown continues next fall, we will need to reassess the foundational tools of design."

The practices of remote teaching also challenge the formative assessment nature of design crit resulting from the 'iterative' nature of the design process. In remote teaching, we can hardly be involved in the students' design processes, since the tutor cannot observe the in-progress status of the projects. Although the digital drawings or physical models are shared by the student on the screen, the student does not continue working within the scheduled online design crit; nor the tutor has the chance to give feedbacks while the students is working. The student focus on an end product to be reviewed rather than sharing the intermediate stages of the design process or design alternatives they developed. Thus, the more intuitive, spontaneous or experimental dimensions of design iterations that were generated by the students while working at the studio are interrupted. Susannah C. Drake (April 2020) explains this situation as follows:

"In my classes, I expect students to sketch out ideas on trace paper and explore multiple design options before presenting finalized plans. It is hard to see and understand their processes without seeing the messy iterations — and this is much harder online. Design is not a linear process, and I encourage them to embrace distraction. But these days they don't need my encouragement for that — and it's hard to pull them back and get them to concentrate." (Susannah C. Drake, April 2020)

2.3. The "Epistemological Principles" of Design Studio
Due to the lack of embodied encounters in design studio, how the new (digital) communication modes between tutor-student

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and student-student will shape the social interaction between the actors of the design studio and what kind of norms, values and attitudes will develop from them becomes a critical issue. What dynamics will shape the formation of students' identities as designers? What will happen to the studio culture when the physical space of the studio disappears and the manifold interactions taking place at the physical studio environment shift into other forms of digital interactions? Linda C. Samuels (April 2020) asks: "Is it possible to build the same studio culture without the physical places that shape it? And do we want to?" The answers to these questions may give some implications about the epistemological structures of the design studio in the "new normal" of design education.

Gray (2013) notes:
"The environment and personal assumptions or beliefs about critique proved to be influential in the actual process of critique. This interplay of personal agency, belief, and action interact through the social construction of normative behaviors and beliefs—in a shared understanding of what comprises the habitus of the studio."

The "habitus of the studio," as Gray (2013) underlines it, points not only to the pedagogical practices that shape the signature pedagogy of the design studio model, but also the more implicit references that inform the understandings and behaviors of the tutors and students, the ways that the students learn how to think and act as designers, how they use practice-oriented discourse and how criticize other students' projects by using this discourse. Parnell et al. (2007, p. 136) note: "The crit is not just a place to develop skills and knowledge, but also a place where attitudes are developed." The pedagogical method of design crit encourages the formation of a climate of critical thinking and questioning and of a multiplicity of voices and opinions, which in turn supports the development of a negotiation basis for design learning. The formation of a studio culture is realized through the contribution of both the tutors and the students; it takes a long time and it is passed on over the years. Design studio

culture is generated and practiced within the studio environment, and continues informing the practices of the professional community beyond the academic community.

In the views of Anthony (1991) and Crysler (1995), the design studio culture is also "power-laden" by its nature, and it is the "hidden curriculum" what makes it so. The "hidden curriculum" informing the design studio refers to the "values, attitudes, and norms that stem from the social relations of the school and classroom as well as the content of the course" (Dutton, 1991, cited in Abdullaha et al., 2011, p. 28). "Hidden curriculum", not limited to design education, is considered as one of the components of learning process in any educational context, which should be critically considered by instructors and administrators regarding "what their pupils are learning without specifically being taught" (Cohen et al., 2010, p. 34). These are often learned in the social context of the studio and are shaped through the communication modalities practiced between tutor-student and student-student. The "hidden curriculum" also shapes the ways knowledge is selected, organized and disseminated among actors in the design studio. It is being discussed that this can generate tensions of the power relations between the tutor and the student and it can suppress student voice in the studio (Dutton, 1987; Anthony, 1991). In the present conditions, the effect of "hidden curriculum" on the epistemological principles of the design studio is likely to change due to changes in the tools and methods of both tutor-student and the student-student communication and social interaction, as well as due to who will access the information, how the information will be transformed and disseminated.

The epistemological basis of the design studio pedagogy can also be related with the ways of tacit knowing that are embedded in design communication and making. In the view of Carolina Dayer (April 2020) "tacit knowledge, body language, the emotional rhythms and mutual understandings that are animated when we are all together in a room," the elements that influence how the tutor and the students define

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their stances as designers, are likely to "recede to the point of invisibility in distance teaching." In a similar vein, Carlo D'Alesio (April 2020) points to the tacit knowledge embedded in physical human interaction at the design studio, noting: "I realized how important non-verbal communication is in being fast and effective. Take a grunt, a smile, a sketch, a red question mark on a printed technical drawing. These information packages may integrate a thousand words into a couple of seconds." The shift from face-to-face to remote teaching in the pandemic environment brought forth the question of what strategies both the tutors and the students will develop to express themselves, reflection of their ways of thinking and doing. Will the limits and potentials of the digital tools determine the limits and potentials of the representation patterns of individuals about themselves and about the design work they produce? Or, as architects and architect-to-be individuals, will we develop critical and creative solutions to adapt these digital tools used at remote teaching according to the peculiarities of design thinking and doing? It is probable that such critical and creative solutions would derive from our reflection on our experiences, on our ways of doing, while we're doing it.

Another epistemological implication of the ongoing process of remote teaching in design education can be related with the profile of studio tutor as a role model. The tutor is usually a role model for students through her personal stance and appearance, with her knowledge and expertise, and ways of designing. The diverse methods of design feedback (desk critique, jury, etc.) that constitute the signature pedagogy of the studio model generate a ground upon which the effect of tutor's role model is realized. The "one-on-one communication" (Goldschmidt, 2002) between the tutor and the students fuels this process. The remote teaching or distance learning experiences, where communication between tutor and students is always 'mediated' and realized through an 'interface,' changes the tools and reduces the potentials of observing teachers for students. Will new role models emerge for design students who are not able to physically interact with their studio tutors, but at the same time are able to get access to

different studio processes throughout the world?

This situation also changes the prevailing hierarchy between the tutor and the students deriving from the way they define their pedagogic identities. Since the design students can simultaneously access various knowledge domains in different digital platforms, they are able to collect, de-construct and re-construct knowledge within their design processes. Thus, the role of tutor will be more of a "facilitator" (Belluigi, 2016) than a "source of knowledge" or "source of authority" (Goldschmidt, 2002). The "asymmetrical power relations" between the tutor and the students (Webster, 2007) will probably get softer, both in the weekly design feedback sessions and in the jury sessions. Philip Ursprung (April 2020) raises the questions of whether meeting online in diverse digital platforms could "prefigure a new way to meet" and "open up the hierarchies that we have established in our education over the years." We need to analyze the teaching and learning experiences we derive from remote teaching processes, and then, we will be able to generate more information on the results from this analysis, which will take time.

3. Conclusion
The rapid transition from face-to-face education to remote teaching because of the COVID-19 pandemic brought with it a process of challenge and experiment for us, as studio tutors, who are firmly committed to the tools and methods of the mainstream design pedagogy. While experiencing this process, the change in the environment (space), tools and methods we are accustomed to, not only caused an anxiety and uncertainty about how to implement the practices we have been doing for years, but also forced us to adjust ourselves both as tutors and students to the conditions defined as the "new normal" of design education. That is why the ongoing process is mostly defined as "emergency remote teaching."

This article focused on the problems experienced within the transition to remote teaching, the new needs that arise, as well as an awareness of the lack of key elements of the physical studio environment: what was

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important and why was important in traditional design studio pedagogy. The study was based on a critical re-reading mostly of narrative surveys on the teaching and learning experiences at pandemic environment. It is aimed to re-contextualize the emerging issues in "new normal" conditions into a general framework on the "surface structures", "pedagogical forms" and "epistemological principles" elements of the design studio pedagogy, adapted from the theoretical framework of Shaffer (2003).

It is revealed in the article that, the current situation that is common all over the world within the scope of the COVID-19 pandemic, on the one hand, has opened the ways for us to test "new" tools, methods and experiences of teaching and learning, and on the other hand, allowed us to better understand the potentials and well-functioning aspects of the "existing" pedagogical models. Therefore, instead of reading this situation as a process in which "new" pedagogical models will replace the "old" studio-based learning model, we have better consider it as an opportunity to reflect upon the challenges and potentials of both digital tools/platforms and traditions design studio model, and to initiate experiments for the development of a new approach that would support each other and move in parallel.

In order to do that, it will be necessary to look at the outputs of the process we are already experiencing, collect data by research and look at the findings from the analysis of these data. The ongoing process can hardly be defined as a paradigm shift in design education due to the lack of sufficient experiences and data. Future research needs to focus on the effects of changing pedagogical practices on the dimension of the 'human learning', which in turn have implications for the epistemology of design education. It is evident that the learning styles, situations and environments are closely related to each other. As underlined by Gray (2016, p. 272), a "holistic view of the studio involves a fusion of physical or virtual learning environment, instructional experience, and enculturation into a discipline." If the teaching and learning practices are to be designed

according to new tools, this should be done after redefining learning and teaching models in design education. What is more, new strategies need to be developed in order to respond to the ways of "tacit knowing," which cannot be taught directly. In the condition that the current situation of remote teaching and learning is reduced to a 'technology-driven' paradigm change, the limits of the digital tools we use will begin to determine the limits of teaching and learning experiences both for the tutors and the students. This will weaken the potentials of the intuitive, spontaneous or experimental dimensions of design learning that are embedded in design education.

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