

## SPATIAL POST-OCCUPANY EVALUATION OF INTERIOR DESIGN STUDIO IN RELATION TO PEDAGOGY

تقييم ما بعد الاستخدام لحيز استوديو التصميم الداخلي وعلاقته بطرق التدريس – دراسة حالة

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### ABSTRACT

*Learning environment plays a strong role in validating the integrity of the educational delivery. Students observe their studio with an eye for details to question their acquired knowledge in interior design. Post occupancy evaluation aids in identifying liabilities of current studios to provide recommendations based on users' experiences to enhance the space utilization. Research aims to identify tangible and intangible design aspects that affect the educational experience in an Interior Design Studio and investigate the spatial needs that allows the employment of different pedagogical approaches. Case study method is applied to evaluate an Interior Design Studio (IDS) at October University for Modern Sciences and Arts (MSA) in Egypt. The evaluation is based on a theoretical framework, observations for tangible aspects, focus groups for intangible aspects, and gamification-pedagogical workshop for identifiable spatial changes. In conclusion, spatial recommendation guidelines are discussed to propose solutions for IDS that enhance functionality, productivity and utilize its space in the light of changeable pedagogical approaches.*

### KEYWORDS

Interior Design Studio; Post Occupancy Evaluation; Learning Environment

### المخلص

تلعب البيئة التعليمية دوراً قوياً في تأكيد نزاهة اتمام العملية التعليمية. يقوم الطلاب بالتحقق بعين فاحصة من مدى تطابق الاستوديو من حولهم مع ما تلقوه من معلومات في مجال التصميم الداخلي. يساعد تقييم ما بعد الاستخدام في التعرف على عيوب تصميم الاستوديوهات الحالية بناء على تعامش وتعامل مستخدميها، فيوفر بذلك مقترحات لاستخدام أمثل للفراغ. يهدف البحث إلي تحديد جوانب التصميم الملموسة وغير الملموسة التي تؤثر على التجربة التعليمية في استوديو التصميم الداخلي والتحقق من الاحتياجات الفراغية والتجهيزات وطرق التأثيث التي تسمح بتوظيف مختلف طرق التدريس. تستخدم منهجية دراسة الحالة لتقييم استوديو التصميم الداخلي بجامعة أكتوبر للعلوم الحديثة والآداب (MSA) بمدينة 6 أكتوبر - مصر. يعتمد التقييم على إطار نظري وعلى الملاحظة للجوانب الملموسة ومناقشات جماعية مركزة للجوانب غير الملموسة وورش عمل بالتعلم من خلال اللعب للتعرف على التغيرات الفراغية. تتمثل نتيجة البحث في توصيات لتصميم حيز استوديو التصميم الداخلي من شأنها تحسين قدراته الوظيفية وإنتاجيته واستخدامه الأمثل في ضوء طرق التدريس المتغيرة.

### الكلمات المفتاحية

استوديو التصميم الداخلي؛ تقييم ما بعد الاستخدام؛ البيئة التعليمية

## 1. INTRODUCTION

The interior design studio (IDS) is where students of interior design focus on observing and witnessing the spatial realm as opposed to simply seeing their surroundings. Current design studio environments place a priority on communication to encourage students to work collaboratively. Faculty continuously explore the emerging pedagogical approaches and incorporate the appropriate technology accordingly (Wanless 2016). Therefore, a well-planned IDS contributes not only to the functional use of the learning environment but also to the confidence of the users involved in the teaching/learning process (Obeidat & Al-share 2012). The design studio inevitably contributes to the learning process where it becomes an educational resource as an illustration of learning by example. The design studio becomes an ideal pedagogical resource as it can demonstrate the expression of design principles, building systems, sustainability, material uses, connections and details. (Moje et al. 2001). Therefore, the studio interior design should be treated with a focus on the functional, tangible, and direct design aspects as well as the symbolic and intangible design aspects to serve as a catalyst to the whole educational process. This paper's focus is to apply a post occupancy evaluation (POE); "a process of systematically evaluating the performance of buildings after they have been built and occupied for some time" (Preiser 2002) on an interior design studio to identify potential drawbacks and drive the interior design field forward in terms of studio design. This evaluation is to encourage designers to constantly refine their designs solutions and embrace more efficient design decisions and solutions.

### 1.1 Problem Statement

IDS environments are often designed as practical spaces where the traditional studio is usually the dominant method of teaching. These spaces often disregard the continuously developing realm of education where new pedagogical approaches are constantly being explored. Technology development and the post pandemic situation highlighted deficiencies in the IDS environments. Even the fundamental requirements that can optimize the use of the ID studios are often overlooked. Post occupancy evaluations are rarely applied by educational facilities' management if a renovation strategy is not in the short-term plan. Yet, minimal refinements can change the whole experience within a space. POE can highlight the users' response to the built environment. Therefore, to optimize the use of learning environments in design education processes; post-occupancy evaluations on studio spaces should be implemented to assess and develop their performances (El Fekki & Saleh 2018).

### 1.2 Aims & Objectives

The aim of this paper is to propose spatial recommendations for IDS with the purpose of enhancing its functionality, productivity and utilizing its space in the light of changeable pedagogical approaches. That is by analyzing the IDS space from a POE standpoint to:

- Evaluate the physical environment with a focus on space functionality, tangible and direct design aspects as well as the intangible and symbolic aspects that relate to the students' needs.
- Expose the relation between the physical space, the pedagogy and the students experience to highlight the changes and propose recommendations that could be implemented in an IDS, with an objective to contribute to the enhancement of the whole educational process of interior design. To fulfil those objectives a literature, review here-below investigates the tangible and

intangible spatial aspects of an IDS. The traditional studio pedagogy and the learning through play/ gamification pedagogy are reviewed to investigate the impact of employed pedagogical approaches on the spatial needs within the IDS. The focus on these two pedagogies is to set a theoretical framework from which the case study method analysis is based on.

## **2. INTERIOR DESIGN STUDIO (IDS) AS A LEARNING ENVIRONMENT**

Design studio is a learning environment devised of psychological, cultural, social, and physical aspects. According to the American philosopher and educator John Dewey (1938) the learning environment has an important role in the formation of experiences. There is an influential relationship between learners and their pedagogical environment (cited in Gislason 2007). In support to this, Weinstein (1981) discusses the influence of the learning environment in affecting the facilitation process both directly and symbolically. Additionally, he assures that the physical environment should accommodate the teaching objectives, student learning styles, and the social setting in which they ought to be treated with the same care as curricular materials and instructor preparation. The spatial characteristics contemporary design studio is sometimes perceived as just practical components that congregate to allow learning to take place. Research shows that the physical learning environment affects student achievement where there is a direct correlation of the learning environment on learning outcomes. The relationship between space amenities highly impact the learning progression including design solutions that address lighting, acoustics, air quality, thermal comfort, physical size, and cleanliness. The effort exerted in supporting the value of studio as an educational resource impacts on how a student engages with their learning (Cheryan et al. 2014; Osborne et al. 2011). According to Spruce (2007) the staff and students that inhabit a design studio can, over time, imprint their sense of personality and character. Student's claim desks as their own and staff adapt to the space to meet their own teaching delivery needs. The studio environment can transform from a physical make-up of chairs and tables that offers a place to study to a space that provides students with a sense of identity and value. Independent learning progresses in supportive learning environments allowing ideas and opinions to blend. Therefore, in addressing the physical composition of a design studio one should attend to the intangible aspects such as belongingness and ownership as well as the tangible physical aspects of the space that makes it inhabitable.

### **2.1 Design Studio Spatial Needs - Tangible Aspects**

Current studio spaces are advised to be designed for adaptability in order to stand up for changeable needs. In the occurrence of COVID 19, studios' environments were forced to reconfigure their layouts putting an end to the cramming of seats to allow for social distancing (Steelcase Post-COVID Learning Spaces 2020). Studies confirm that a large number of students within the design studio could result in the lack of participation and attention (Lewinski 2015). The focus transferred from creating cost-efficient studios to studios that put the user's well-being as a priority. Accessibility to nature and daylight highly influence productivity within studio space. COVID 19 pandemic confirmed the literature's continuous demands in considering proper ventilation that ensure safe indoor air quality and healthier material selections. (Obeidat & Al-share 2012). Not only to ensure the well-being of the students but also to teach deep ecological awareness using the studio's-built environment (Gislason 2007). The addition of up to date technology and visual tools became a necessity for

design studios to survive and operate. Incorporating space flexibility and furniture mobility not only makes the studio more adaptable, but also increases student and faculty engagement by creating experiential and dynamic learning. Products and furniture selections that are ergonomically designed in related studio learning essentially provide comfort and support (Rands & Gansemer-Topf 2017; Herman Miller 2008).

## **2.2 Design Studio Spatial Needs - Intangible Aspects**

The studio environment can become an uninspiring collection of furniture that fails to sustain the feeling of belongingness within the students. In a well-planned design studio, students feel encouraged to take responsibility for managing their own learning. The learning environment is contributory in influencing student's self-awareness, focus and synergy as well as their productivity, creativity, comfort, concentration, and psychological balance. Studio space can motivate students to learn (Ibem 2017; Spruce 2007). Flexibility in its freedom sense and openness can encourage student engagement and reduce their stress level. The removal of the spatial barrier between faculty members and students promote interaction where students feel that they are co-constructors of knowledge. (Rands & Gansemer-Topf 2017) Atmosphere and character play an important role in achieving an influential studio that allows students to develop their own design personality where colors, materials, and wall display impact is critical. Studio walls as a single element can on its own play a role in enabling students to "pin up" their sketches and present themselves. In this regard it is essential to allow students and facilitators to personalize their studio space. Visual accessibility to involved entities in the educational process is vital to achieve active learning. (Md Noor et al 2020). In retrospect students feel that they are the owner of their spaces and can take charge of it. Studio space can empower students to change their spaces as per their needs (Jiwane & Khan 2020).

## **2.3 The Relationship Between Pedagogy and Design of Learning Environments**

Defining which types of pedagogical directions are adapted in design studio by faculty members can aid the design team in providing more information about the "fit" of studio design solutions based on instructional needs (Henshaw et al. 2011). The studio as a space does not accommodate to the traditional studio practices only; it accommodates the whole education process in which different pedagogical approaches are explored, students' projects are showcased, jury discussions are assembled in order to serve the design education process as a whole. The envelope shape of the learning space and its layout can indicate the type of pedagogical directions that take place within the IDS. In that sense an instructor/facilitator that occupies a central position in the space signals the student's attention to be firmly fixed on an authority figure (J. W. Getzels, 1974). On the other hand, studio spaces that locate the instructor's/facilitator's space within the environment; increase students' sense of freedom. Therefore, spatial arrangements play a role in breaking down the pedagogical barriers allowing students to immerse themselves within their learning environment (Osborne et al. 2011; Rands & Gansemer-Topf 2017). Design facilitators, whether they are aware or not, frequently alter the studio space to allow interactivity. Personalized and adaptive characteristics of studios

can make self-learning and learning by doing possible. Participants, process and the environment as essential parts to achieve interactive learning in design studios (Jiwane & Khan 2020).

#### **2.4 Traditional Studio vs Learning Through Play / Gamification**

In traditional studio practices, the IDS adapts teacher-centered pedagogy where the seating distribution is directed facing the instructor; this usual setup is unfortunately common. Traditional studio pedagogy is essential at certain situations, but designers of IDS sometimes fail to attend to the need of a constantly adaptable studio, disregarding the IDS role in enhancing interaction and peer scaffolding. Students can often learn from each other's as much as they learn from their instructors. By Encouraging gamification pedagogy, "application of game elements in a non-game environment" students can engage and interact through an enjoyable process. (Deterding et al. 2011) In an experiment conducted by Torrington (2000) students were engaged in an architect – client simulation (role-play) within the studio. Design representatives were appointed for preparing meeting with the clients to obtain relevant briefs. The students met with their working group after the specialists' meetings to review the success of their questioning strategy and to share their learning experience. This study showed that the meetings, group discussions and role-play setups alternated throughout this process where an adaptable space was needed. Another study conducted by Plumb (2016) on incorporating gamification methods in interior design curriculum concluded that interior design educators found the gamification pedagogical approach promising; however, supporting research and resources to appropriately implement gamification activities within IDS spaces were needed. The spatial resources could, as identified as Sanoff (1979) discussed it in his book Design Games, sensitize users about their built environment in regard of this pedagogy's spatial needs, relying on Robert Sommer observation; that the built environment "affects most people just beyond the focus of their awareness". In this sense the integration of gamification methods into design education provides students with a design approach that is far from memorization (Damla, 2019). It is believed that according to the intangible design aspects of the studio these activities could positively impact the students' experience if applied, again resulting in the need of design adaptability.

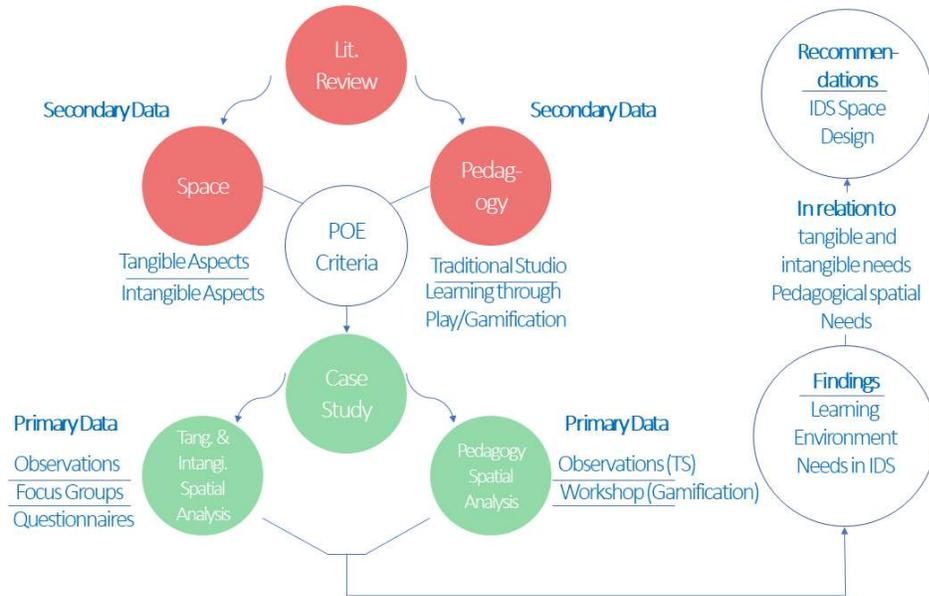
### **3. METHODOLOGY**

The method of research is an exploratory case study in October University for Modern Sciences and Arts (MSA University) Faculty of Art and Design – Interior Design Department's main studio. The spatial evaluation relies on the information provided in the literature review in evaluating the studio in its Tangible/Physical aspects, the intangible /symbolic aspects, and the pedagogical spatial needs.

Therefore, POE categories are segmented into four main evaluation aspects according to the literature. A Post – Occupancy Evaluation criteria was summarized as follows:



The three methods collaboratively concluded the research findings and recommendations regarding designing a learning environment of an interior design studio for future developments. This POE evaluation tool aims to support interior designers and architects by aiding them in identifying the tangible and intangible spatial needs and in accommodating their design solutions to different pedagogical approaches.



*Flow Chart (1): research methodology diagram  
(Source: the authors, 2021)*

### 3.1 Research Constraints

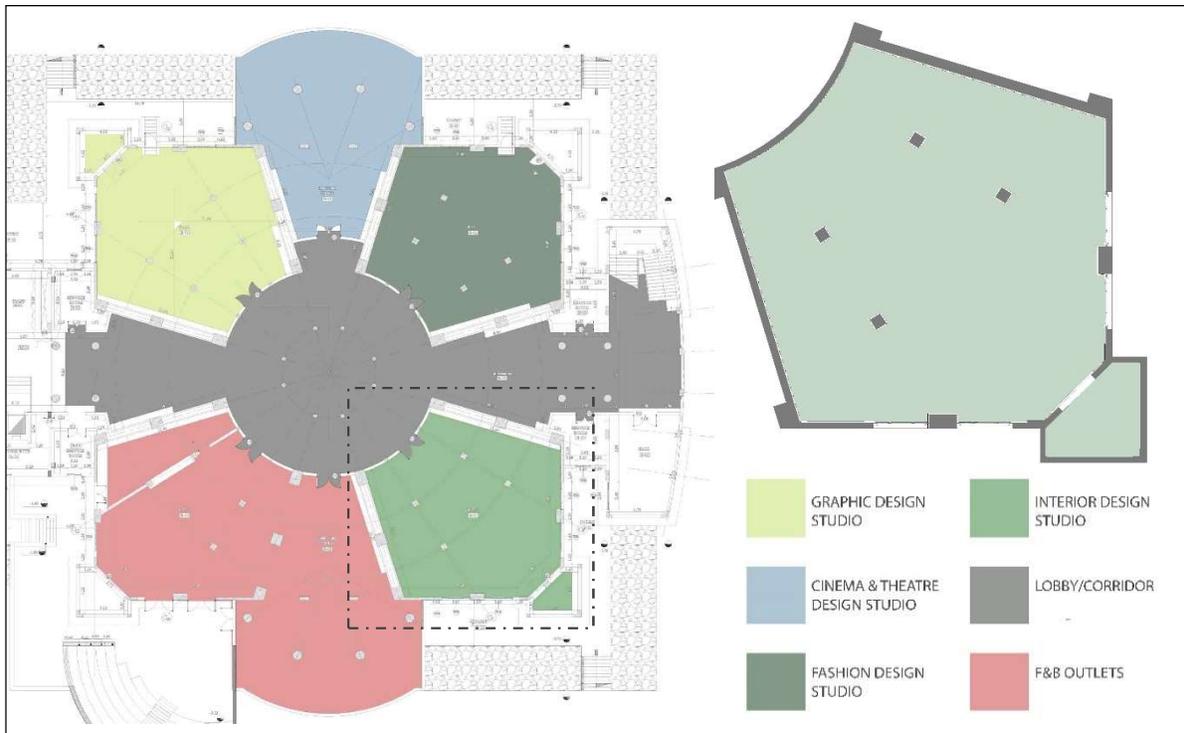
Focus groups’ discussions were conducted with the students only in covering the intangible design aspects in the case study. Research revealed that focus groups or separate interviews with faculty members could have enriched the study in understanding the intangible aspects that the IDS can affect, tackle, and attend to. The intangible part was difficult to be investigated in-depth as it is a very symbolic and imperceptible aspect in a space analysis; a more thorough investigation with all IDS users could have added to this study. Another constrain was while conducting the focus groups; the researchers were unable to reach batch Grad2016 and resulted in a gap in the longitudinal study.

## 4. CASE STUDY: MSA UNIVERSITY – FACULTY OF ART & DESIGN – IDS

### 4.1 Case Study Background

MSA University is a private university that was founded by Dr. Nawal El Degwi in 1996. It adopted a British education system, and its programs were validated later, either by the University of Greenwich, Middlesex University or University of Bedfordshire (which accredited the faculty of art & design in 2015). This research focuses on the main Interior Design Studio (IDS) that belongs to the Faculty of Art & Design. The studio was established by 2010 when the university was getting ready to initiate the faculty of Art & Design; however, its actual

operation started in 2012. The first batch of interior design students started their journey in 2011 but they used the foundation stage studios. The Faculty of Art & Design shares the same building as the Faculty of Pharmacy; occupying the ground and basement floor. The interior design studio is located in the basement floor along with the studios of graphic design, fashion design and cinema and theatre design.



*Figure 1, basement floor - faculty of art & design – blowup plan IDS*  
*(Source: faculty of art & design, 2020 – blowup plan by authors)*

#### 4.2 Tangible Learning Environment Aspects of the Studio. (Field Observations)

Tangible Aspects		Observation Reflection
Studio Configuration	Layout	The studio mostly adapts the traditional studio practices with teacher-centered orientation. Fig. 2 shows how the studio setup is prepared in a beginning of an academic year. Students and faculty members rarely realize that this is the actual set up of the studio as changes occur all the time.
	Capacity	The studio is set to accommodate 50 students per class prior to the pandemic; post pandemic this number was reduced to 25 students.
	Envelope	The envelope of the studio is an irregular shape. The main challenge in its shape is the four columns in the middle. The columns and the exposed beams (Fig. 3) inevitably divide the space; therefore, the mostly used space by the students is the middle area between the columns. Researchers observed that students hide behind those columns if they do not want to be seen. The observation also indicates that the facilitator continuously demands the students to be seated in the middle area to encourage engagement.

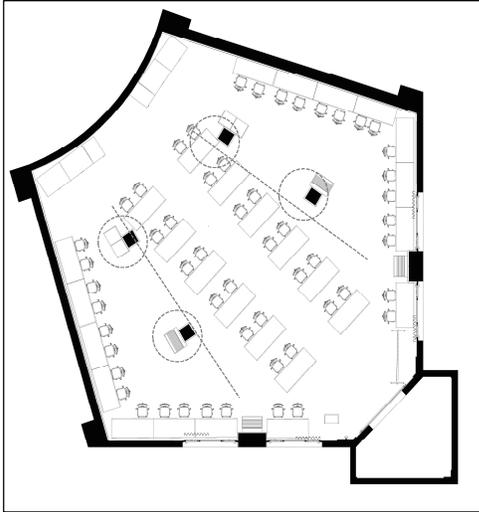


Figure 2, studio main setup  
(Source: Authors, 2021)

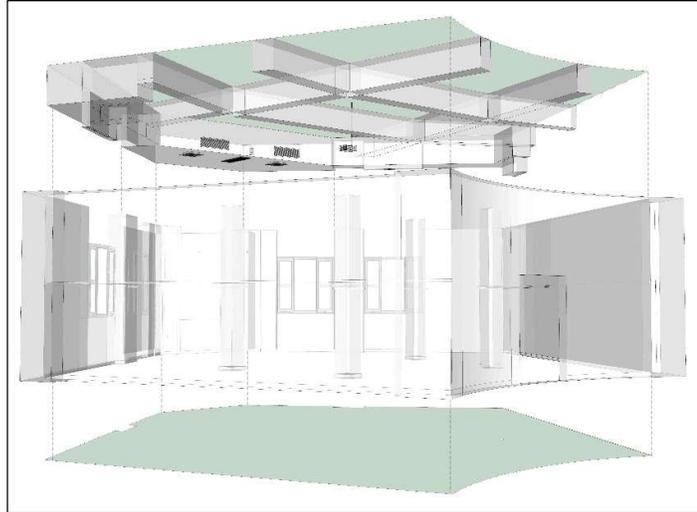


Figure 3, exploded view diagram  
(Source: Authors, 2021)

Tangible Aspects		Observation Reflection
Visual Accessibility	Nature	The studio is located in the basement (Fig.4). The architecture of the space compensates to this by creating an English court that is visible from the studio windows. A green slope is created with artificial greenery in the court (Fig. 5). There are four windows in the studio (Fig. 6). Students inside the studio see the lower part of other students walking and sitting in the court. It was observed that as much as the court is allowing a nature outlet to the students; this area is creating a distraction to the students within the studio. Therefore, Faculty members tend to close the windows when explaining something on the board/projector to avoid these disruptions.
	Daylight	These widows (Fig.6) allow daylight to enter the front part of the studio including the faculty members area and the first few rows. This encourage students to sit in front; however, the ones who end up at the back can feel claustrophobic from the space. Curtains are usually closed to avoid the glare created by the daylight that affect the visibility of the projector screen.



Figure 4, studio's exterior windows  
(Source: Authors, 2021)



Figure 5, interior nature view  
(Source: Authors, 2020)



Figure 6, studio interior space  
(Source: Authors, 2020)

Tangible Aspects		Observation Reflection
Comfort	Artificial Lighting	Artificial light is available to compensate to the lack of daylight availability in studio area. Florescent light units 60x60cm are placed between the beams to create general lighting. The corners, where there are drawing tables facing the wall, are poorly lit. The ceiling design itself is as practical as it could be. Light units are surfaced mounted rather than flushed “recessed” flushed mounted with no considerations to aesthetics (Fig.7). Mostly the artificial lighting is functional enough to allow students to work and clearly see their drawings.
	Thermal Comfort	Prior to covid-19 the windows were kept closed for most of the time to allow faculty members to use the white board and the projector screen. Therefore, there was a general issue with the ventilation, with limited windows to be opened, the space was sometimes suffocating. The ACs were the main ventilation source most of the time. The area below the ACs’ false ceiling “instructor’s zone” (Fig.7) is always problematic for faculty members because the AC does not cover this area.
	Ergonomics	Space ergonomics were comfortable in general. Old chairs were comfortable but poorly maintained whilst the new chairs did not consider ergonomics (Fig.9). The drawing tables (Fig.8) allowed two students to use it together – in group work it was helpful; but when students need to draw using their T-square ruler they were forced to sit facing each other on a single table, as much as it was engaging to the students, when the facing students move their rulers they cross path in the middle. However, it is noted that the use of the T square ruler decreased by time. This study focuses on the studio use from 2012 till current state, according to observations, students replaced the T-square ruler with their laptops which made the table of a great use. The observation also indicate that the drafting courses as architectural drawing fundamentals were moved to other studios where the tables are adjustable and allows the use of drawing instruments and large drawing sheets.



Figure 7, studio’s ceiling  
(Source: Authors, 2021)



Figure 8, drawing table accommodate 2 students  
(Source: Authors, 2020)



Figure 9, current vs old space chairs  
(Source: Authors, 2021)

Tangible Aspects		Observation Reflection
Technological Support	Technology Audio/Visual	A regular projector is installed in the studio with an audio system. Staff members rarely used the mic, but they used the speakers for video displays etc. Audio and visual systems stayed the same from 2012 till 2021 regardless of the technological development that occurred throughout these years.
	Communication outlets	Wi-Fi connection is installed to cover the studio area; however, its reach was weak at certain times. After the pandemic, the university worked to provide stronger connections within the studio to stream the lectures.
	Electricity Outlets	As discussed above due to rapid technological state the use of laptops increased over time. The studio was not prepared for this by any means. Students faced a huge problem finding a socket to charge their laptops. Sockets are available on the periphery of the space obligating the students to sit facing the walls where it affected their psychological state profoundly. To handle this issue, it was observed that students come in with socket extensions to plug their laptops in rather than having to fight over a plug spot and face the wall.

### 4.3 The Intangible Learning Environment Aspects of the Studio. (Focus Groups)

Intangible Aspects		Focus Groups Reflections
Atmosphere and Character	Colors	Graduates did not quickly recall the general color scheme of their studio when they were asked. The comment ‘neutral’, ‘practical’ and ‘beige’ was common in the 6 focus groups. The studio’s color scheme is in fact neutral, but it had a very significant flooring color which was green. Some did recall the color but described it as uninspiring. (Fig. 10)
	Materials	The flooring material (Fig.11) was the easiest recall, many within the focus groups described it as a slippery ceramic flooring. The wooden tables were discussed in terms of creating warmth in the space. The beige walls were recollected as dull and boring in many of their discussions.
	Personality	Students were asked if they believed that the studio had its own personality. Many of them agreed. Some believed that its personality was about being an IDS where practicality and hard work are its main characteristics. One graduate interestingly elaborated that if a student from a different department used the studio; he believes that the studio would not accept him. Another category of comments was that the studio had its personality whether this personality was a pleasant one or not.
	Display & Storage	One of the interesting features of this studio is that the students’ work is always displayed on its walls. The posters change annually or semiannually for the faculty’s exhibition. Students from all levels see these posters on the walls. There were diverse reflections from the focus groups on where it was useful or not. Some did state that they were helpful being a source of inspiration while they work. Others liked it but believed they were poorly displayed with no considerations to the framing, size, and layout ideas. On the other hand, some felt it bounded their creativity. There were suggestions to incorporate material boards on these walls to be an interesting informative tool that can aid in their education. All students remarked that all storage units in the studio were for faculty use for kept projects. Additionally, they highlighted that the side walls (Fig. 12) and their tables were rarely used by them because they were always crammed used as a space to store portfolios.



Figure 10, studio's general atmosphere showing displayed work (Source: Heba Eissa, 2018)



Figure 11, flooring material green ceramic 40x40 (Source: Authors, 2021)



Figure 12, storing portfolios on the periphery (Source: Authors, 2021)

Intangible Aspects		Focus Groups Reflections
Visual Accessibility	Facilitator	Students' reflections in the facilitator/ instructor visibility criteria was that if the students wanted to hide, they would stay on the side walls or behind the columns where they cannot be seen. Also, some of them, while showing them the layout (Fig. 13), did confirm that they moved the side tables to the sides of the columns to see. But mostly they would just pull the chairs and sit 5 or 6 on one table. Graduates/students recalled that they were continuously asked by the facilitators/instructors to come in front so they can see them.
	Peers	This was not an issue to anyone they felt they were able to collaborate specially with the large tables a group would all gather on one table for discussions.
	Displayed Work	The projector screen and the white board students remarked that they all had to move closer to the front to see. Some of them stated that if they missed a spot in front they know that there will be no recollection of the running class.

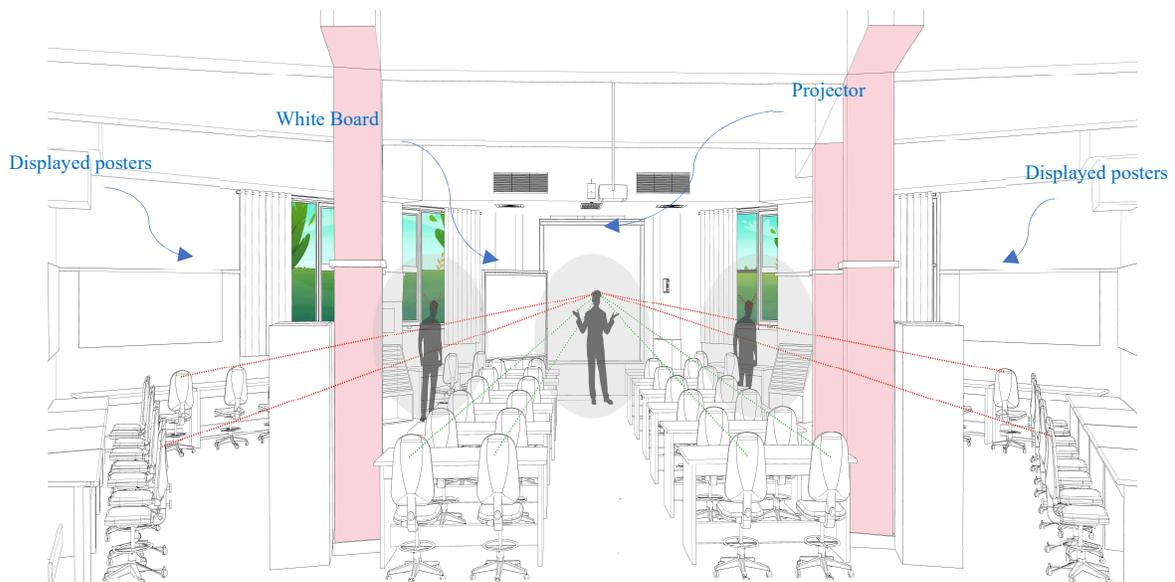


Figure 13. visual accessibility within the studio (Source: Authors, 2021)

Intangible Aspects		Focus Groups Reflections
Psychological Demands	Territoriality	The studio did not bounce the vibe of territoriality for students. There were no pin up boards for students to put up their work up for critique or inspiration or any means of personalizing their own space.
	Privacy	Although students did not use the walls to create their own personal displays, they did have a sense of privacy. It was confirmed in several discussions in the focus groups. The columns did seclude the side areas from the middle area. So, if there is nothing to be displayed on the projector and it is a regular critique session, students could easily have a private zone to work on their projects if they wanted.
	Freedom	From the discussions it was significant that the mobility of the chairs highly influenced the engagement and the students' sense of freedom. Students would move their chairs, chat, and discuss with their peers and come back to work on their projects.
	Belongingness	When the question of belongingness was brought up in the focus groups' discussions, the majority agreed that regardless of the memories associated with this studio – demotivation, frustration, or exhaustion- the studio was, described by many, a “home” for them.

#### 4.4 Accomodation of used Pedagogy on the Relationship Between Pedagogy and Design of Learning Environments. (Observations and Gamification Workshop)

The studio of interior design provides to the whole educational process within its space. It is observed that whether the learning environment was set to accommodate to the changeable needs or now, the faculty members do their best in improvising solutions that fit their needs. In the case of the IDS of MSA University, the different uses of the studio were diverse. However, these diverse uses of the studio space were not to adapt to different pedagogical approaches. The different uses were related to different activities. For example, the studio is set to a traditional classroom layout (Fig. 14) facing the instructor highlighting the teacher-centered pedagogy. According to the traditional studio practices, there are some activities that accompanies the design process. Students present their projects in a jury set up for discussions and examinations shown in (Fig.16). After each semester the faculty organizes an exhibition to show case students' work. At that point the space alternate to become a part of the exhibition as in (Fig. 15).

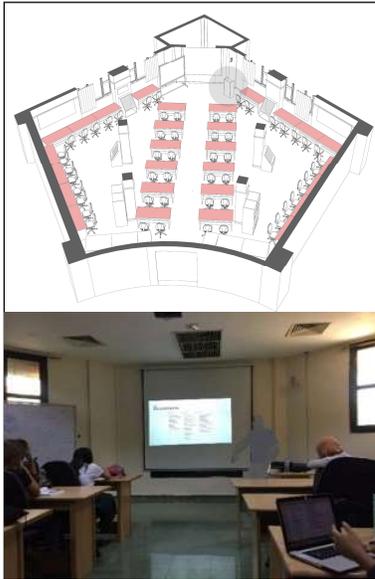


Figure 14, tradition studio teaching layout  
 (Source: Authors, 2020 diagram by the author)



Figure 15, harvest exhibition  
 (Source: MSA Website, 2019 diagram by the authors)



Figure 16, jury discussions  
 (Source: faculty staff, 2015 -2019)

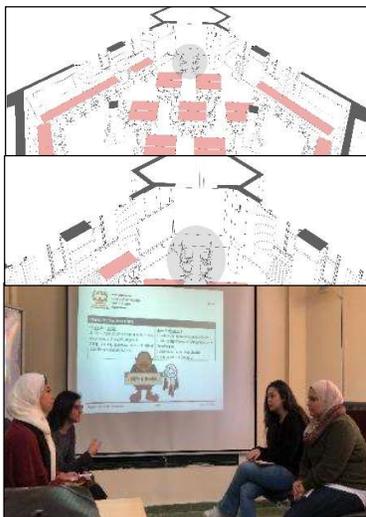


Figure 17, role play  
 (Source: authors, 2020)



Figure 18, studio layout  
 (Source: authors, 2020)



Figure 19, group discussions  
 (Source: authors, 2020)

Pedagogical Spatial Needs		Workshop/ Spatial Use Reflections
Flexibility in Furniture	Mobility	It was very difficult to alternate the layout of the studio. Prior to the workshop by one day the facilitator had to spend a day moving the large and heavy tables to create a group work set up in which students, that might not know each other, collaborate in a gamification instructional delivery as shown in (Fig. 18 & Fig. 19).
	Adjustability	Space is available to accommodate to adjustability. The researchers believe that adjustability should be accompanied by mobility features or light equipment to make this change quickly. The chairs were easy to move in the role play part in (Fig. 17).
	Size & Modularity	The size and weight of the drawing tables were major obstacles during the workshop. The researchers were able to confirm that a smaller modular table can add value to allow for space adaptability.
	Stack-ability	In the workshop there were extra tables that needed to be removed to create a relaxed feeling to the workshop, but it was almost impossible to do so. The facilitator had to push them together at a side while preparing for the workshop. If the furniture can be easily stacked the space can become totally clear to allow any type of educational games to occur.

Pedagogical Spatial Needs		Workshop/ Spatial Use Reflections
Flexibility in plane divisions	Multi-Purpose Space	By applying mobility, adjustability, modularity, and stack-ability; a studio space will be able to expand and contract according to the pedagogical needs.
	Separators	The use of space dividers can allow the studio to act as multi-purpose space to accommodate to different pedagogical approaches and area changes.
Pedagogical Spatial Needs		Workshop/ Spatial Use Reflections
Ecology/ Sustainability		Although ecology and sustainability studies were not the focus of this workshop. While evaluating the experiment the researchers found it as a major issue. When the pedagogical direction is in favor of ecology the space should reflect that. In the case of this IDS this factor was not considered at all. Relying on AC only for ventilation, the use printable materials, and selection of unsustainable material did not match with the teaching of the studio.

## 5. STUDY FINDINGS

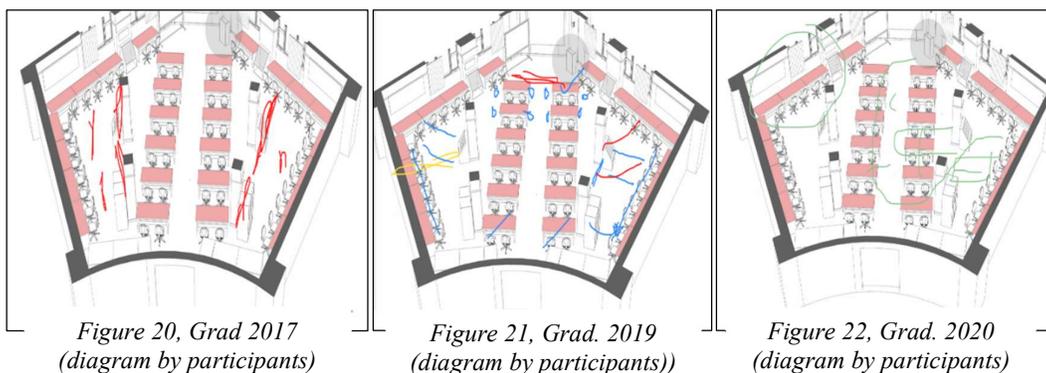
### 5.1 Findings based on Tangible Design Aspects

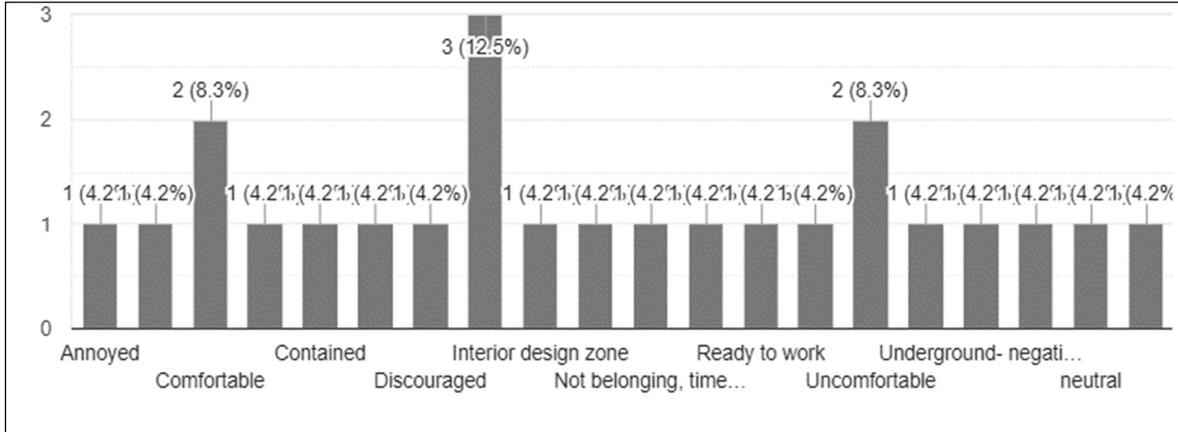
Study reveals that the location of a studio influences the physical composition of its space. The basement location created a feeling of containment. The space itself, due to its location, had many obstacles disturbing the visibility of many educational elements. Compensation to the basement location was done by the English court, allowing nature and daylight accessibility. However, findings show that less than 50% of the space was benefiting from this solution; therefore, it was not sufficient. Artificial fluorescent light supported the functional use of the space. However, the sustainable educational direction was compromised; faculty members always direct students to use energy efficient lighting systems which was contradicted in their exemplary IDS space. Thermal comfort and ergonomics need to be studied carefully. As per the observation findings, students spend many hours within the space working on their design projects regardless of their scheduled timings. Furniture selection plays a great role not only in accommodating to the comfort aspect, but also to the intangible aspect and the support of the pedagogical practices - elaborated in the next two points 5.2 & 5.3. The study indicates that throughout the investigation from the years 2012 up until 2021, the design tools changed. The

use of laptops became essential so anything that can facilitate their use should be considered, including the availability of electricity outlets, Wi-Fi and visual/audio tools. Furniture selection has also differed as well; during the early years the drawing table was found problematic as it hindered the students to work face to face. The table nowadays have proven to be of great use as they allow students to work with their peers allowing scaffolding. In that sense, as stated Obiedat & Al Share (2012), not only the interior designers, but also educators, facility managers, and stake holders should pay enough attention to what contributes to make such environments more effective and useful. Users of the learning environment should be involved in the designing process.

### 5.2 Findings based on Intangible Design Aspects

Throughout the focus group discussions, the study identified a very important intangible factor that highly impacts the students' feelings about the space which is the nature of the courses taught in the studio. For example, the students that were using the studio in design courses only felt better about their studio, demonstrating higher sense of belongingness. Other students that were using the studio in technical courses such as working drawing had feelings of contempt imprinted on their memory of their design studio associating senses of containment (Fig. 23). The feeling of territoriality and privacy can both be implemented in allowing students to personalize the space and add to their sense of belongingness. Additionally, incorporating a sense of privacy while allowing the instructors to see what is happening in the studio is challenging. However, if this balance is achieved; it can add to the students' level of productivity. The benefit of daylight and nature's visual accessibility became general knowledge; however, sometimes logistics and availability of spaces control these aspects. The effect of insufficient daylight and lack of scenery was highlighted in the POE study. Design educators and students spend much of their time in the design studio where both theoretical and practical teaching/learning processes are accommodated. In the focus groups the researchers showed each batch the diagrams showing different layouts that were observed within the studio. A major realization was that the students were not able to identify these layouts, explaining that everything alters when they start working within the studio. The students preferred to pull the chairs and stay in front and dismiss the use of the side tables. The researchers asked them to elaborate on those alternations on the diagrams. They revealed that they do not recall exactly what has changed but it was a common comment that everything was more scattered and unorganized. The different drawings shown in (Fig. 20 & Fig.21 & Fig.22) from separate focus groups.

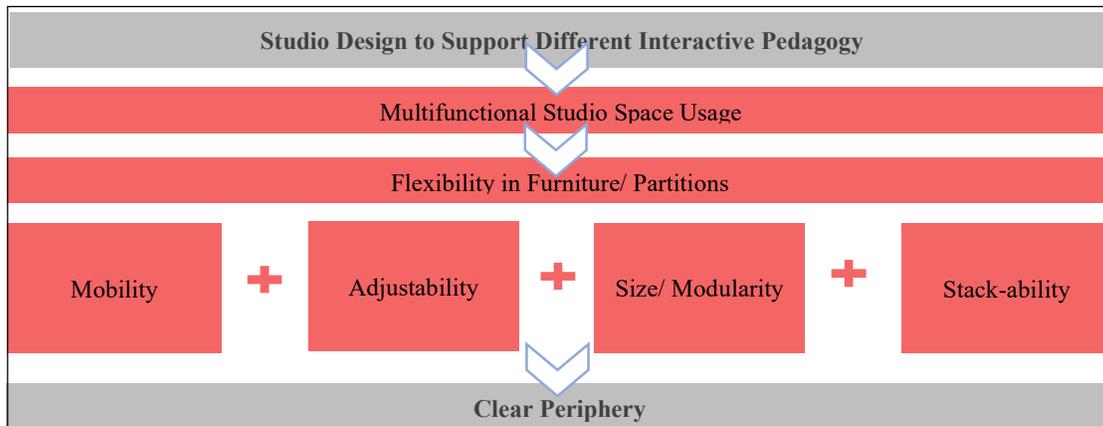




*Figure 23, Grad. 2020 (extracted from focus groups' questionnaires)*

### 5.3 Findings based on Pedagogical Practices – Observation from a Facilitator’s Standpoint

The researchers concluded from the pedagogical practice in the gamification workshop and the traditional studio; that the accommodation to the day to day emerging pedagogical direction adaptability is essential. This is summarized in (Flow Chart 2) stating that to support different interactive pedagogies, IDS should be designed to be a multifunctional space where flexibility is the main element. To achieve that it should be associated with mobility, adjustability, modularity and stack-ability.



*Flow Chart 2, pedagogical needs findings (Source: by authors)*

### 5.4 Results’ Discussions:

The research reveals that while designing a studio a deep understanding of the IDS tangible aspects, intangible aspects and pedagogical spatial needs should be considered within the design process. Including faculty members in the design phase to understand their instrustional design plans helps develop the IDS adaptability for an active learning environment. Applying POE on current interior design studios gives a holistic understanding in identifying studio

design problems from the users point of view. There are many further implications to this study beyond methods of utilizing the IDS and shedding light on how to design future IDS that supports comfort, productivity and high engagement level. Learning environments were clearly challenged in the times of the COVID-19 pandemic where theoretical frameworks that discussed the design guidelines of learning environments throughout the years were tested in action. The validation of these studies became an eye opener to the interior designers involved in designing the learning environments. Literature that dates back to the early 1900s foresaw the relation between the learning environment and the pedagogy in use. Environmental researchers were calling out for proper ventilation, daylighting and nature integration and their impact on users' health. Unfortunately, designers tend to overlook these demands in order to retain more short-term cost efficient solutions. Faculty managements also may be pressuring designers to allow more students in a space in order to admit more students in their programs. Planning ahead of time can always save designers from future happenings; forecasting the implications of chosen design solutions can help develop a better life for the general public. Therefore, POE implementation can give designers a head start to what to expect in the future. Even when renovation plans are not in action, at least new learning environments can be based on real evidence rather than solely on improvisations.

## 6 STUDY RECOMMENDATION AND FURTHER STUDIES:

Researchers recommend more case studies to be examined with the same POE analysis tool in order to have a more holistic understanding to users' needs including students and educators. By developing the design of the IDS learning environments, innovative pedagogical practices can be explored which will result in optimizing the whole educational process. Additionally, study recommends that fast, easy and minor changes that can help in utilizing IDS learning environments to be immediately put in action in order to alter the spatial experience of the users and to enhance the whole educational process. The researchers recommend that POE analysis should be implemented as a longitudinal study where it could be updated every academic year by adding the reflections of graduating students as well as junior students to adapt to occurring rapid changes. Finally, in-depth studies regarding the intangible aspects in designing an IDS are needed. Collaboration between psychologists, interior designers, and educators will be of value to this line of research. By revealing more intangible aspects affecting the users in the IDS – the IDS learning environment can be utilized to enhance the whole education process of interior design.

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