Evaluating the Physical Environment of Design Studios: A Case study in Malaysian Private Architecture Schools

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ABSTRACT

Understanding the notion of learner's experiences in the design of physical environment of an architecture design studio is a necessity as it contains certain values of influence. It is due to the unique learning experiences which are accrued particularly in design studio that is continued during professional practice as well. Most architectural campuses in Malaysian Private Higher Education Institutions (MPHEI) are devoid of certain important elements and this issue needs to be looked into seriously. Apparently, most architectural design studios today have different physical settings, and have developed their own learning culture based on the typical space that they have. Reviewing the physical environment and how it contributes to the social environment in MPHEI's architectural context requires certain understanding on the learner's psychological needs, expectations and in the same time to meet the educational objective which is never an easy task. Hence, this paper reviewed the studies of the possible physical environment approaches in connecting the learner's connections in architecture studio learning environment. A questionnaire survey with Likert-scale components, and semi-structured interview on learners of five distinguished Private Architectural schools in Malaysia unveiled several significant findings that can lead entrepreneurs to upgrade the physical environment of these MPHEIs in order to cope with the demands of the stakeholders.

1. Introduction

Design studio is generally referred as the 'heart of architectural education' within the setting of architecture school. Understanding the experiences of design studio and learners' emotional involvement towards its physical environment can be considered as a core issue and it requires some deeper observation. Research on this relevant area is still limited. Most scholars' researches on this particular topic are too general and much focused on studio pedagogies and learning cultures. Apparently, not many research was done related to this topic, and more specifically in the context of Malaysian Architecture schools, it is a rarity. Considering a significant number of private Architecture schools there, where the tuition fee is quite high, the demand for better value of the money spent is presumably high, and therefore it needs research. Architectural studio has its own culture and values that are influential in defining learner's quality or performance. This is defined as the studio experiences. Scholars like Thomas Dutton and Kathryn Anthony called the consequences of this culture as 'Hidden Curriculum' of studio learning explaining that "hidden curriculum are those unstated values, attitudes and norms that stem from the social relations of the learning spaces" (Abdullah et al, 2011), thus stating learning spaces contribute significantly to social relations that eventually play a key role in learners' learning design skills, consequently resulting positive experiences. Unfortunately, one part of Malaysian architecture education system, and to be specific, Malaysian Private Higher Education Institutions (MPHEI)

do not hold a high standard to guide how the studio physical environment should be planned, designed and built.

2. Background of the Study

2.1 Perspective and Context of the problem

Architectural educational learning spaces are probably not just big square boxes, or converted shop houses, or commercial buildings, or converted non-architectural school buildings, as policy makers might be tempted to presume. Unfortunately, many MPHEI's business owner and the decision-makers probably feel that the design of these spaces should be nothing but a series of repetitive rectangular and squared spaces with long, and often dark semi-open corridors. Issues such as inadequate natural light, circulations, and movement patterns, meeting spaces, views, instructional places, green areas, poor color schemes and plain walls can lead to uncomfortable and ineffective environments effecting psychological needs of learners. Many educational buildings are almost badly located, exposed to noise, dust, unattractive, and repulsive in their external and internal appearance (Tanner, 2000). As mentioned, most MPHEIs need to be looked seriously in enhancing the learning environment of architecture studios in MPHEI's, and strengthen their business strategies based on this issue. Analyzing the function of space, operating systems, as well the physical design, and environment that requires fulfilling the learner's psychological requirements, expectations

and the program objective is never an easy task. There is indeed, no prior consideration on specific guidelines or enforced criteria on architectural setting required by Malaysian Architects' Board, or Ministry of Education of Malaysia, when comes to studio learning space design and environment for MPHEIs. Apparently, most architectural studios in MPHEIs today have different space setting and have developed their own learning environment or culture, based on the typical space that they have. Empirical observation that showed some of the issues with regards to ineffective studio physical environment in the particular context that led to this study included:

- The studio functions as a class room that is most likely to be available only during studio project hours. Due to this situation, students have shorter contact hours for studio involvement and effective learning opportunity. Learners take home their work after their class, and work individually and hence have the prospect of losing the enrichment available in the studio.
- Such lack of use of the design studios by architecture learners resulting in less number of learners working in the design studio during the learning and practical sessions.
- Within the environment and due to the limitation of learning space, learners are not exposed to work of fellow learners from different groups either during presentation (pre-post), critic sessions, or displayed work. There is no specific space such as discussion space, display area, open spaces within the studio area that could bring them together to share ideas as part of learning process to improve in knowledge, design creativity and social relationships.

2.2 Malaysian Private Higher Education Institutions (MPHEIs) System

At this point, it would be useful to take a brief look at the MPHEI systems in Malaysia. In a global phenomenon, Higher Education Institutions (HEIs) are widely spread and well established whereas in Malaysia context, it has its specific policies. The Malaysia government in the 1980s recognized that it would be unable to educate more than six percent of its population through its own institutions, thus it began to partner with international institutions to supplement its system of higher education. During the last 50 years, many Malaysians were sent to host countries, especially to English speaking nations to study at chosen HEIs. However in recent years, the government has invited foreign universities to operate in Malaysia. With this move, government has made decision to turn Malaysia into an education hub, and these prepared both public and private HEIs to take greater owner-ship and responsibilities for the overall products and services that they offer to their customers. This has resulted many private HEIs to seriously adopt some form of business strategies, in particular marketing strategies, in strategizing their operations. In the private higher education industry, students can become potential campus customers (Padlee et al., 2010).

The reorganization of Malaysian higher education institutions in the mid '90s has resulted in the MPHEI sector to develop into two categories of institutions: private universities and private colleges. As the demand for education increased and competition for student intensified, MPHEIs have been very creative in use of marketing approach and many techniques to recruit and attract students. Apart from that, private HEIs in Malaysia were backed by big corporations with big capital, thus these universities and colleges had major differences in their facilities, strategic location, and environment. Many MPHEIs were increasingly viewing learners as consumers, and MPHEIs were forced to equip themselves with the necessary marketing intelligence and information that would enable them to face the challenge, especially in the international markets. As for learners, they now have a 'membership' relationship with the education service. They consider themselves to be the main decision-makers. In other words, international as well local students demand better value for their money, and are more selective in choosing an educational institution. Therefore, criteria of the choices of study destinations have been widely researched, and researchers have come out with different results. The main findings regarding choices of criteria within the HEIs' environment showed the multi-dimensional nature of this concept. From Padlee et al. (2010) review, few aspects proved to be significant such as, HEIs with large faculty and facilities appeared to attract more learners, and the environmental surrounding of the learners such as campus life, safety, campus design, social life, and people surrounding the HEI compounds had bigger impact.

2.3 Defining Architecture Design Studio

After the brief overview of MPHEI, a contextual picture of Design studios in Malaysian Private Sector can also be enlightened here. The concept of Design studio evolved after industrial design during the early 1900s from the Bauhaus School of Design in Germany, and later was adopted by workshop-based design programs in colleges and universities (Brandt, 2011). A century ago, design studio targeted to meet the needs of another age. As learning environment trends, demands and needs changed with time, now in the 21st century, studio is to prepare students to not only be expert in design, but also to become socially and practically productive person. Therefore, the quality of space needed for such learning might need to be rediscovered (Abdullah et al., 2011).

Understanding the design studio experiences and its emotional power requires some deeper observation. Design studio education requires a specific setting that facilitates learning activities. As mentioned in problem statement, apparently most architectural studios today come in standard rectangular forms and functions as a classroom that are available only during studio project hours. As referred to Kathleen J. Moore, in 1920s, the factory model (cells and bells) was necessarily a rectangular room for a large group instruction and teacher centered lecture with table at the front of the room. That meant, "It is a philosophy that starts with the assumption that a predetermined number of students will all learn the same thing at the same time from the same person in the same way in the place for several hours each day" (Moore, 2007). Abdullah (2011) questions, "how can we expect future architects to design our built environment when they themselves are training to live a dysfunctional life? Is something to think about", raised deep concerns about the failure of such rigid system and environment. In fact, he described the need for a change in the typical environment in a romantic way as follows, "Those who have studied architecture undoubtedly have vivid memories that characterize their design studio experience. Working late nights, exciting projects, extreme dedication, lasting friendships, long hours, punishing critiques, predictable events, a sense of community, and personal sacrifice all come to mind. Those aspects are not usually written into the curriculum or even the design assignments, but they are likely the most memorable and influential. The experiences, habits and pattern found within the architecture design studio make up what we have termed studio culture".

2.4 The Theoretical Framework

Based on school climate model adapted by Owens and Valesky (2007) which has been highlighted by Gislason (2008) on the linkage between ecology (building design, technology and other material elements), organization (pedagogy), students milieu (learning and motivation, social climate), and staff culture (values and behavior) in the school

environment, this study had been specific further on the relationship between two factors: ecology and students milieu in the context of architecture studio. The first one, that is reminiscent to MPHEI's studio physical environment, was categorized into several physical indicators under four sets of patterns, namely functionality, adequacy, safety and quality, as defined by Tanner (2000). The indicators included structural, design and natural indicators of physical environment which were discussed in detail in the following section.

The influence of these physical indicators on students' milieu was investigated under Maslow's theory of human motivation. Maslow explained humans perceive different needs to be fulfilled in order to achieve an ultimate goal of self-actualization. Therefore, this theory provided a perfect base for this research while measuring learners' perception on how individual indicators of studio physical environment can help them to achieve the different levels, ultimately hinting how they can achieve that "students' milieu". Maslow used seven terms: physiological (e.g. needs of oxygen, food, water, shelter etc.), safety and security (e.g. safe workplace), belongingness (e.g. involvement, production and motivation), self-esteem (e.g. help oneself feel valued and respected and driving up self-esteem), cognitive (e.g. need to know, understand and to explore), aesthetics (e.g. symmetry, order and beauty) and self-actualization (e.g. person's need to do that which he/she feels they are meant to do) to describe the pattern that human motivations generally move through. However, Maslow's needs were assumed to be conditional, in a vertical relationship, meaning that a need at a higher level can only be addressed as long as the one at the lower level has been satisfied. When applied to physical environment, this condition was withdrawn, and was assumed to be in a horizontal parallel relationship. It is because human life is a progressive development, but a physical environment can provide all the needs at the same time, and the human users can explore through them according to the level they achieve one by one. Therefore, the success of a physical environment could be ascertained by judging how many of these needs were present, and to what degree. It is unlike the vertical relationship of Maslow's original scale, where achieving a certain level automatically means those in the lower level had already been achieved.

The design patterns were used as the domains inside which the physical indicators were nested. The indicators represented the different needs to be satisfied at different levels according to Maslow's theory. Student's perception on those indicators were assumed to help understand which levels and subsequently, which physical indicators were to be primarily recognized so that learners' psychological needs can be fulfilled to motivate them to produce better academic results.

2.5   *Indicators and their connection to psychological needs*

A few studies on the physical environment in relation to general educational buildings have been conducted (Tanner, 2000:2008:2009; Abdullah et. al., 2011; Brandt, 2011). However literatures concerning the effects that the studio physical environment on architecture students' learning perceptions are very limited. The Designs Patterns were described in this study followed the Tanner (2000)'s patterns such as functionality, adequacy, safety, and quality, under which, several physical design indicators could be grouped. Those that were found to be contextual for this study were discussed in brief below after theoretically combining them to the perceptions.

2.5.1   Indicators linked to 'Functionality'

There are some indicators in connection with the functionality of the educational buildings. The indicators include the followings:

(a) **Linking to main areas**: Walkways connecting central outside areas, ideally located to major activity centers, natural and built structures that perhaps connected by walkways or pathways (covered or uncovered) and/or promenades that contributes to educational purpose, places that designed to provide focal points or directions to particular locations such as displays of students, meaningful posters, work, benches or plants appear to be influential on achieving the perception of safety and security.

(b) **Clear Pathways**: Areas that allow freedom of movement among structures which play a fundamental role in interacting with buildings, can also generate the sense of belongings to users, as well as providing the feeling of security.

(c) **Instructional neighborhoods**: Places that include teacher planning spaces such as flex zones, small and large group's areas, teaching planning area, hearth area where this place is used for reading and resting time can offer the sense of belongingness.

(d) **Private spaces**: Community places (inside or outside) where a small group of students may prefer for privacy (i.e. quiet places, reading areas, reflection areas, listening areas, etc.) can provide the sense of belonging as well as fulfill psychological needs.

(e) **Welcoming entrance area**: A welcoming and inviting space that connects the outside world to the inside world, highly visible or approachable to learners and visitors not only has aesthetic values, but also can inject self-esteem to the users as they can take pride by attaching themselves with that.

(f) **Indoor circulation patterns**: Indoor spaces for circulation should be wide allowing for freedom of movement within the learning environments. These can instigate a cognitive connection.

(g) **Building on student's scale**: A place designed and built to the scale of learners (e.g. door handles or handrails, standard steps, views from window/door that allow the student to view outside environment) can meet the psychological needs of the users.

(h) **Ceiling heights**: A variation of ceiling heights allows individual comfort and intimacy within the learning environment. Psychological satisfaction can be the bi-product.

(i) **Administration centralized**: A centralized and grouped administrative offices that allow connection and convenient accessibility can provide a safe and secure atmosphere to the users.

2.5.2   Indicators linked to 'Adequacy'

The following indicators are linked to the 'adequacy' aspect:

(a) **Natural light/full spectrum**: Natural light and artificial light from the outside can create psychological satisfaction.

(b) **Doors and windows**: They are the elements that bring the natural light, invite outdoors inside and views overlooking life. However, they also bring in the aesthetic satisfactions.

(c) **Technology for students**: Spaces with technologies such as computers, internet connections, learning packages, television and video, provide self-esteem to users, as well as help to meet cognitive needs.

(d) **Compatibility**: The learning environment that is compatible with surroundings and facilitate the education program brings in self-esteem and also cognitive satisfaction.

(e) **Secured storage**: Protected and secured spaces for storage personal belongings, tools and supplies both for teachers and learners gives self-esteem to users.

(f) **Climate control**: a system that designed to maintain a comfortable temperature in the studio environment provides physiological satisfaction.

(g) **Activity pockets**: Spaces designed for small group work are good for social interaction as well as several other needs.

2.5.3 Indicators linked to 'Safety'

The indicators are:

(a) **Safe location**: The site, location and learning environment that are free from massive traffic and noise (non-pedestrian) can ensure the feeling of safety and security.
(b) **Bathrooms location**: Effective location of bathrooms gives comfort, convenience and safety to students.

2.5.4 Indicators linked to 'Quality'

The indicators are:

(a) **Living views**: Indoor and outdoor spaces with views such as gardens, animals, fountains, mountains, people and etc. allow minds and eyes to take a break, and meet several needs such as aesthetic, or self-esteem.
(b) **Visual stimulation**: Walls (internal and external) and their finishes should in fact display color and vivid patterns. It is not only for aesthetics, but also because it has the power to develop self-esteem.
(c) **Background detail**: Spaces with colorful displays on walls and doors such as wall outlets, louvers and surface raceways can also serve the same purpose.
(d) **Green areas**: Outside spaces that are close to the building where greeneries may be seen give aesthetic as well as psychological pleasure.
(e) **Quite areas**: Private places (inside spaces or outside spaces) where learners may go for self-refreshment, and relaxation in a quiet setting, can generate sense of belongingness.

2.6 Design Studio Learners' Perceptions

After introducing and consequently attempting to link the physical indicators with Maslow's psychological needs, the focus of the study became more specific to students in architectural design studio. Design studio can be defined as a center or a physical site of teaching and learning where interaction between learners themselves as well as faculty takes place. Learners experience the space as an observer and also as participants. They become aware of light, form, proportion, scale, color and texture as well as the perceptual feeling that these physical components create. In a broader scale, learners learn to see and experience spaces and forms in a way that would enable them to understand not only visually, but also from the environmental, cultural and social aspects of the natural and built environment around them (Abdullah et al., 2011). Studio work place is a combination of home and work place that allows one-on-one contact in daily (and nightly) with learners peers. The large amount of time spent in the studio creates certain pattern of learner's behavior and attitude. In regards to learning spaces, there are hidden messages about physical setting and social environment. Few results based on learner's perceptions on studio experience reviews were discussed by Tumusiime (2013). According to the study, most learners agreed that studio more than just classroom; a flexible space for most type of activities. The awareness of spaces (e.g. proportion and scale) was much helpful for 1st year learners, who don't really understand when lecturers give examples on size and dimension. They disagreed on spaces that were rigidly defined, whereas loose boundaries allowed some motivation for learning new stuffs as they overlooked a bigger number of people and what they were doing. When stuck with work and hoping to get some inspiration, if all they could see was just walls, and while looking outside, no one was passing by, it deactivated the free thinking process. Much preferable was painted wall with combination of bright and dark. It proved to be uncomfortable to attend classes when such facilities were not in place. Observing what people were doing around allowed learning more, and time spent in studio directly related to the number of people around, sometimes it was the kind of people around too.

In summary, the relationship between the physical indicators and perceptions were summarized in this section. Table 1 showed it from the perspective of perceptions, while Figure 1 showed it from the perspective of the physical indicators including the total theoretical framework.

Table 1 Relationship between Perception of psychological needs, and Physical Indicators

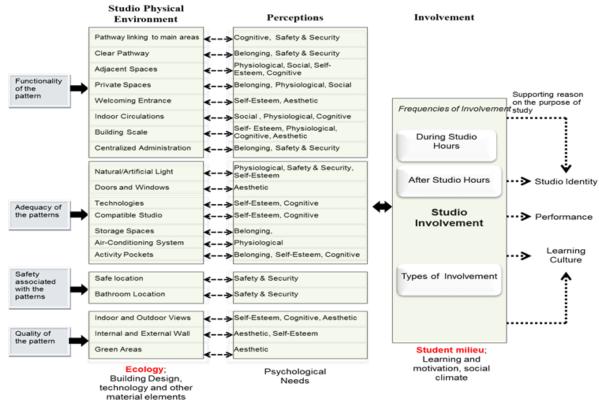| Psychological Needs	Independent Variables (Indicators)	Pattern Descriptors
Physiological	Indoor & Outdoor views, natural & artificial Lighting, appropriate scale, air-conditioning system	Quality, Adequacy
	Internal and outdoor circulation, adjacent spaces, pocket of spaces	Functionality, Adequacy
Safety and Security	Location, Bathroom location, pathway linked to main areas, clear pathway, natural & artificial lighting, centralized administration,	Functionality, Safety
Sense of Belonging	Clear pathway, private spaces	Functionality
	Secured storage spaces, activity pockets	Adequacy
Social	Indoor and outdoor circulation, activity pockets, adjacent spaces	Functionality, Adequacy
Self-Esteem	Appropriate studio scale, natural and artificial lighting, adjacent spaces, welcoming entrance, activity pockets	Functionality, Adequacy,
	Technologies, compatible studio	Adequacy
	Indoor and Outdoor views	Functionality, Quality
Cognitive	Technologies, compatible studio	Adequacy
	Circulation, adjacent spaces, appropriate scale, pathway linked to main areas, activity pockets	Functionality, Adequacy
	Indoor and outdoor views, adjacent spaces	Quality, Functionality
Aesthetic	Interior and External wall colors	Quality
	Air-conditioning, compatible, storage spaces, Indoor & outdoor views, visible doors & windows, natural & artificial light, appropriate scale, green areas, indoor circulation ,welcoming entrance	Adequacy, Functionality, Quality
Self-Actualization	Pathway linked to main areas, clear pathway, adjacent spaces, Welcoming entrance, private spaces, indoor and outdoor circulation, appropriate scale, natural & artificial lighting, visible door and windows, technologies, compatible, secured storages, air-conditioning, pocket of spaces, internal & external views, internal & external wall colors, green areas location, bathroom location, centralized administration	Functionality, Adequacy, Safety, Quality

Figure 1 *Theoretical Framework*

3. Research Methodology

The background study led to hypothesize in this study that the design patterns for MPHEI's Studio Physical Environment influenced Learner's needs and motivation, and Learners' Satisfaction was considered as fulfilling the psychological needs (Figure 2). The indicators related to design studio physical environment were strategically linked with the seven different levels of needs, assuming that the physical environment must address all of them in order to develop their learning skills.

Observation and Questionnaire Survey (with structured Likert-scale questions and semi-structured interviews) was used for the data collection. The samples for this research were taken from five major Private Architecture schools in Malaysia, which offer various diploma, degree and master degree programs; in house as well as twinning programs of all level of program years. The questionnaire was designed based on the theoretical framework of the study that searched the current state of relevant physical indicators in these
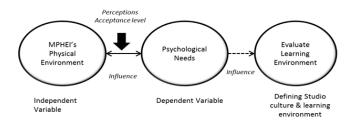

Figure 2 *Conceptual Model*

institutions that can fulfill learners' satisfaction, and identify the significant ones. The learners were given a set of questionnaire which included a needs analysis on learner's satisfactory evaluation on their studio environment design, student's involvement and psychological perception. The number of architecture learners participated in the survey was 120. In the first section, there were two stages. In the first stage, learners required to rate their institutions' studio physical environment indicators (the independent variables). This rating was measured by using Likert scale questions ranging from the lowest point 1 (strongly dissatisfactory) to highest point 5 (strongly satisfactory), allowing the recording of the 'degree' to which a design indicator is satisfactorily present. There were 20 indicators classified under four patterns such as functionality, adequacy, and safety associated with pattern and quality. The questionnaires were given to identify the learners' involvement within the institutions' current setting of studio space and environment. It comprised related questions such as number of hours students' spent in studio during and after studio hours, number of connections, type of connections and what type of studio mode they had been mostly accommodated in their current university or college, in order to evaluate students' satisfaction with the physical environment (See appendix for a sample of the questionnaire). These questions worked as item variables under the four bigger domains of functionality, adequacy, quality, and safety. In the second stage, these item variables were evaluated through Confirmatory Factor Analysis in order to confirm their contribution to the four domains. Then, the factors (i.e. the four domains of patterns) were used to correlate with overall satisfaction, which were addressed in the second section.

In the second section, there were two sub-sections. The first sub-section attempted to measure the learners' involvement in studio mostly in the form of 'duration' of their stay in the studios. In the

second sub-section, learners' satisfaction (the dependent variable) was evaluated by using related item variables having five points Likert-scale questions ranging from the lowest point 1 (strongly disagreed) to the highest point 5 (strongly agreed), allowing the recording of the 'degree' to which learners feel satisfied and motivated. Statistical software SPSS 21 was used for the quantitative analysis. Semi-structured interviews were conducted with learners in order to evaluate and validate their perception on the seven needs. Qualitative analysis was conducted in the form of member checking, after correlating and regressing the dependent and independent variables in order to finding the research outcomes.

4. Results and Analysis

4.1 Statistical Analysis

The indicators that received score of greater than 3.0 were considered satisfactory if they passed the means t-test of significance. The results of the first section showed several indicators to be satisfactory, and several others not. Table 2 showed the 10 significant satisfactory indicators grouped under the 4 patterns: functionality, adequacy, safety and quality. These included: clear studio pathway, adjacent spaces, appropriate studio scale, indoor circulations, air-conditioning system, natural and artificial lighting, visible studio doors and windows, studio location, bathrooms location and indoor and outdoor views.

The indicators that were not satisfactory were shown in Table 3. There were 10 of them that included: studio pathway linking to main areas, welcoming studio entrance, studio private spaces, studio within the centralized administration, compatible studio (furniture's and display), pockets of spaces, studio with technologies, secured storage spaces, studio internal and external wall colors, and greens areas. However, the last two did not satisfy means t-test.

Next step was to validate the independent variables' ability to predict the overall satisfaction. As listed in Table 4, Confirmatory Factor Analysis (CFA) below was used. The initial model did not fit, and several items (having factor loading less than 0.6, shown as 'not bold') were subsequently excluded, following which, the model fit. The standardized regression weight shown in Table 4 indicated that 'Quality' of pattern's estimation scores were not contributing to overall satisfaction ('Learners' Satisfaction'). It coincides with the results in the first stage, and therefore, the item variables were not used for further analysis. Therefore, this stage concluded that few selected item variables under functionality, adequacy, and safety pattern are more likely to be

Table 2 Descriptive Analysis Results- Satisfactory Indicators

Pattern Descriptors	Design Pattern Indicators (Independent Variables)	Mean Scores
Functionality	Clear Studio Pathway	3.1667
	Adjacent Spaces	3.1162
	Appropriate Studio Scale	3.0455
	Indoor Circulations	3.0253
Adequacy	Air-Conditioning System	3.5505
	Natural and Artificial Lighting	3.4949
	Visible Studio Doors and Windows	3.3485
Safety	Studio Location	3.3737
	Bathrooms Location	3.1717
Quality	Indoor and Outdoor Views	3.3788

Table 3 Descriptive Analysis Results- Not Satisfactory Indicators

Pattern Descriptors	Design Pattern Indicators (Independent Variables)	Mean Scores
Functionality	Studio Pathway Linking to Main areas	2.9394
	Welcoming Studio Entrance	2.8182
	Studio Private Spaces	2.7677
	Studio within the Centralized Administration	2.6515
Adequacy	Compatible Studio(Furniture's and display)	2.7727
	Pockets of Spaces	2.6616
	Studio with Technologies	2.5758
	Secured Storage Spaces	2.4242
Quality	**Studio Internal and External Wall Color**	**2.9040**
	Green Areas	**2.7071**

Table 4 Standardized Regression Weights: (Group number 1 - Default model)

Item Variables	Factor	Estimate
Functionality	Learner Satisfaction	0.992
Adequacy	Learner Satisfaction	0.967
Quality	Learner Satisfaction	0.763
Safety Pattern	Learner Satisfaction	0.982
Pathway Linking to main areas	Functionality	0.397
Clear pathway	Functionality	0.694
With adjacent spaces	Functionality	0.504
Private spaces	Functionality	0.704
Welcoming Entrance	Functionality	0.636
Circulation	Functionality	0.565
Centralized Administration	Functionality	0.704
Appropriate Scale	Functionality	0.494
Natural/Artificial Light	Adequacy	0.437
Door and windows	Adequacy	0.453
Technologies	Adequacy	0.724
Compatible studio	Adequacy	0.691
Secured Storage	Adequacy	0.657
Air-conditioning	Adequacy	0.412
Pocket of spaces	Adequacy	0.722
Views	Quality	0.187
Visual Stimulations (Wall colors)	Quality	0.677
Green areas	Quality	0.707
Safe Location	Safety Pattern	0.471
Bathrooms location	Safety Pattern	0.586

contributors to learner's satisfaction. Therefore, the assumption was that 'quality' patterns must have some issues in the context. To investigate further into this, the section two of the questionnaire, which comprised likert-scale item variables related to the seven psychological needs, were investigated. At first, the descriptive analysis with mean scores showed (Table 5) showed that learner's perception on **Aesthetic needs** were the lowest comparing to the other needs (shown in 'bold'). This was in line with the findings of the previous section, as the 'aesthetic' needs were all closely connected with the 'pattern' of 'quality' already highlighted in section 2.5.3. The obvious

Pattern Descriptors	Independent Variables (Indicators)	Psychological Needs	Survey Questions	Mean
Quality, Adequacy	Indoor & Outdoor views, natural & artificial Lighting, appropriate scale, air-conditioning system	Physiological	Physiological Question 1	2.8283
Functionality, Adequacy	Internal and outdoor circulation, adjacent spaces, pocket of spaces		Physiological Question 2	2.9444
Functionality, Safety	Location, Bathroom location, pathway linked to main areas, clear pathway, natural & artificial lighting, centralized administration	Safety and Security	Safety and Security Question 1	3.0152
Functionality	Clear pathway, private spaces	Sense of Belonging	Sense and Belonging Question 1	2.9646
Adequacy	Secured storage spaces, activity pockets		Sense and Belonging Question 2	3.0152
Functionality, Adequacy	Indoor and outdoor circulation, activity pockets	Social	Social Question 1	3.4242
Functionality, Adequacy	Indoor and outdoor circulation, adjacent spaces		Social Question 2	3.5808
Functionality	Indoor and outdoor circulation		Social Question 3	3.4899
Functionality, Adequacy	Appropriate studio scale, natural and artificial lighting, adjacent spaces, welcoming entrance, activity pockets	Self-Esteem	Self-Esteem Question 1	3.0253
Adequacy	Technologies, compatible studio		Self-Esteem Question 2	2.9798
Functionality, Quality	Appropriate studio scale, Indoor and Outdoor views		Self-Esteem Question 3	3.0556
Adequacy	Technologies, compatible studio	Cognitive	Cognitive Question 1	3.0253
Functionality, Adequacy	Circulation, adjacent spaces, appropriate scale, pathway linked to main areas, activity pockets		Cognitive Question 2	3.0404
Quality, Functionality	Indoor and outdoor views, adjacent spaces		Cognitive Question 3	2.9747
Quality	Interior and External wall colors	Aesthetic	Aesthetic Question 1	**2.4848**
Adequacy, Functionality, Quality	Air-conditioning, compatible, storage spaces, Indoor & outdoor views, visible doors & windows, natural & artificial light, appropriate scale, green areas, indoor circulation, welcoming entrance, Internal and external wall colors		Aesthetic Question 2	**2.6465**
Functionality, Adequacy, Safety, Quality	Pathway linked to main areas, clear pathway, adjacent spaces, Welcoming entrance, private spaces, indoor and outdoor circulation, appropriate scale, natural & artificial lighting, visible door and windows, technologies, compatible, secured storages, air-conditioning, pocket of spaces, internal & external views, internal & external wall colors, green areas location, bathroom location, centralized administration	Self-Actualization	Self-Actualization Question 1	2.8586
			Self-Actualization Question 2	2.8636
			Self-Actualization Question 3	2.7929

connection suggested that the absence of 'quality' patterns that were supposed to fulfill the 'aesthetic' needs were significantly absent from the existing physical environment.

4.2 Learners Involvement Analysis

This was the results from the first stage of the second section of the questionnaire. Based on survey data results, 56.7% studio learning spaces at MPHEI's are classroom based studio and 42.4% are architecture dedicated studio. This data showed that most MPHEI's learners spent time on their work mostly during scheduled hours. In fact, surveys revealed 61.6% of learners spent only one to four hours at any favorable time from scheduled eight hours of their studio time. This concludes that lacking on frequency of involvement at studio.

5. Finding and Discussion

The statistical analysis indicated certain directions. The key statistical findings included learners' satisfaction on existing components of physical environment, identifying the most significant 'patterns' that contributed to the learners' satisfaction, the 'psychological needs' that the students are the most deprived, as well as to find the clue to bind these findings together to develop meaningful qualitative outcomes. The information collected through semi-structured interview were used to validate or strengthen the quantitative findings. Member checking, i.e. going back to selected interviewees helped to improve the credibility of the qualitative findings.

5.1 A studio Classroom should be more than just a classroom

Learner's experiential perceptions of the studio environment were varied. However, most learners agreed that studio spaces learning should be more than just a studio classroom, rigid structure and environment. Agreements were very much over the demand and expectation on favorable education learning environment. Some of the responses were as follows. *Learner 1*: "University should consider the best of facilities and spaces for us; we pay more fees than other university students". *Learner 2*: "I am looking for inspiration while am stuck with ideas, what is see just white walls everywhere. I wish the walls are well painted with relaxing colors or patterns". *Learner 3*: "Sometimes I am stuck with ideas; do I have an alternative spaces for relaxing or to look at to shift my mind for a moment?"; *Learner 4*: "if I spent my time working at my home, I can mix coffee, hear music's and fast internet anytime but if I am here at studio the internet sometimes slow and café is too far". *Learner 5*: "I wish our studio corridors are well lighted and have greener areas around for discussion and relaxing. Too long hours in enclosed studio room are stressful"; *Learner 6*: "It's inconvenient for me to come with so many stuffs like drawing equipment, drawings papers and model making stuffs for a short period of time then carry again to home or sometimes to next class. I rather stay with my stuffs at home and work from home"; *Learner 7*: "sometimes I want to sit and watch my seniors work or watch other activities from where I sit rather walking up and down and get tired. It's worst feeling to be at top floor and sees nothing but just walls"; *Learner 8*: "Not many greens like plants and trees around, I feel so stuffy sometimes. I wish more greens around the studio"; Learner 9: "when I see my roommate not going to studio and work at home, I stay too"; *Learner 10*: "I don't really like to be at one place. I prefer to work at different space like library or coffee corner with my laptops but the location of these places is not convenient to me to move". Except for one or two, most of the responses indicated lack of facilities that can fulfill the aesthetic needs. These include dull outlook of spaces, including circulation and connective spaces. Mostly studio internal and

external walls were painted in white plain color, non-finished, and non-patterns that tend to deem down learner's inspiration when they needed it most during touch hours. Adding to that, the comments hint a higher level of expectation among students about the feeling of the studio spaces. When a student expresses preference of home to studio, others implicitly agree that a studio should actually give a feeling like a home, not just a workplace, or at least more than just that.

5.2 *Studio needs to be strategically located with activity areas and outdoors*

Considering the comments from the interviews, and combining with the statistical results, some specific physical indicators were proved to be most significant. From Table 5, besides aesthetic needs, the self-actualization needs scored the minimum among the needs. This was related various indicators. However, from interview, specific problems were identified. The first one was the location of the studios. Most of the time the studios were not ideally connected to major activity areas such as café, center courtyard, students work display areas and school office. There were lacking in design considerations on providing focal points and directions to specific locations for easy and free movement. Moreover, their connection with green areas were also poor. Green areas play a vital role on learner's vision, mind refreshment and healthy environment. If green areas are intelligently located with the studio to create a connection between indoor and outdoor, the spirit can be lifted up among the learners. Considering solid walls and rigid spaces located non-strategically with activity areas; and devoid the green areas design in most MPHEIs studios environment directly dampened learner's aspiration to achieve the highest peak of their abilities, hence not-satisfying the self-actualizing needs.

5.3 *Lack of personalization of space may cause some learners disconnected*

As stated in section 4.2, 56.7% of selected MPHEI's learning spaces are classroom based studio. The remaining 42.4% are dedicated studio space. The survey data from the first stage of the second section of the questionnaire showed that bigger percentage of learners was spending their time in the studio during scheduled hours with timetabled project hours and lecture time. Responding to that, learners' lacked personalizing of space and ownership. In most situations, scheduled eight hours of project studio saw many learners utilizing less than eight hours in studio by attending late in studio class. Nothing is fixed there, learners need to keep moving their stuffs. Due to that reason, there was an overall lack of commitments on provided spaces, and many learners chose to work at home, especially if they needed to work on their project models and manual drawings. The rigidly defined spaces and facilities possibly could not allow social setting, which eventually caused is disconnectedness to many, thus providing lack of impetus essential for architectural learners towards molding as future architects.

6. Conclusion

The data presented here emphasized on how the studio physical environment is grounded in relationship with human environment and psychological needs and expectations. The analysis was conducted to evaluate the pattern indicators of studio physical environment and its influences on learner's perceptions. Few patterns that evolved from this study reflected highest dissatisfaction on learners current studio setting particularly on the perception needs of 'aesthetics', which indicated lacking on quality of patterns considering: *internal and outdoor views spaces* such as viewing gardens, mountain, hills and people to allows minds and eyes to take a break from their studio work; *Visual*

stimulation **such as internal and external wall** that should display colors, vivid patterns and spaces for colorful displays on walls; and spaces that close with *green areas or quiet areas* where learners may go for self-refreshment and relaxation. Physical environment and psychological dimensions are important to various needs of the learners as supportive tools of 'being there' or socially involved or acquire an emotional significance. When learners showing dissatisfaction with specific condition of environment, physically or psychologically, there is a tendency to search for favorable place. For MPHEI's business point of view, this means losing customers.

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