

*Creative Learning Environment: A Collaborative Study Defining  
the Characteristics and the Adaptable Prototype*

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**Abstract**

In teaching-oriented academic institutions, the focus is often mainly on teaching requirements rather than research components. Frequently, faculty have limited time to engage in research activities, and one of the strategies is to integrate empirical research into the teaching component. The purpose of this two-fold qualitative study was to generate creative learning environment characteristics and an adaptable prototype while engaging students in undergraduate research. The study took place at CIDA accredited interior design department, at American University in Dubai in the United Arab Emirates. Two sections of twenty-two undergraduate Interior Design students in junior level studio voluntarily participated in the study led by two course instructors. The first step was to introduce the project and its relevance, and to provide background knowledge. Herman Miller Research Center contributed with contents and resources. Students participated in a variety of data gathering. Based on the analysis of the data, spatial layouts were elaborated, facilitating the faculty's definition of creative learning environment characteristics and adaptable prototypes, shaped as regular modular forms allowing further module addition as the learning identity and its needs grow. As a creative learning environment needs to accommodate a variety of learners and adapt to different learning topologies (Hoy, 2013), three major characteristics were identified: flexibility; comfort and wellbeing; and technology. Students were exposed to an advanced level of research study that has provided preparation for a senior thesis project, while fulfilling program learning objectives.

Keywords: Creative Learning Environment, Learning Experience, Adaptable Learning Prototype

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## **Introduction**

Creative Learning Environment (CLE) is a study on formulating creative learning environment characteristics and producing an adaptable prototype. The focus is on creative Studio learning environment that is applicable to any major that employs active learning student center model of teaching.

In teaching-oriented academic institutions, the attention is often predominantly placed on teaching requirements rather than research components. Frequently, faculty have limited time to engage in research activities, and one of the strategies is to integrate empirical research into the teaching component. Certainly, there are other strategies, but this methodology is allowing to perform effective teaching activities in a more efficient timely way.

In addition, this approach allows faculty to participate in academic research while providing valuable lessons to students (Shields et. al, 2020). The strategy is focused on undergraduate components in an academic environment. With the abundance of available information, it is important to educate students as early as possible on the methods of retrieving the research information, on the quality of resources and data, and most importantly, on how to analyze and apply located data. Undergraduate research is an element that is being woven in any undergraduate courses, for any major, not just English learning course, but also major specific courses. In this study, undergraduate research methodology was used with junior level students majoring in Interior Design as participants.

The study took place at CIDA accredited interior design department, at American University in Dubai in the United Arab Emirates. CIDA is Council for Interior Design Accreditation, an independent, non-profit accrediting organization for interior design education programs at colleges and universities in the United States and internationally. From CIDA Mission: “The Council for Interior Design Accreditation advances the interior design profession as the definitive source for quality standards and accreditation in higher education” (Council for Interior Design Accreditation, 2022).

The two studio sections involved twenty-two undergraduate Interior Design junior level students. They voluntarily participated in the study led by two course Professors, Prof. Annamaria Lambri and Prof. Natalia Albul. Students received detailed information about the study and acknowledged their participation. The purpose of this two-fold qualitative study was to analyze the typical learning environment, engaging students in undergraduate research and defining innovative creative learning environment characteristics, developed then on an adaptable spatial model/prototype.

The first step was to introduce the project and its relevance, and to provide background knowledge. Then, the work on the studio project had begun. First, the lectures were provided by faculty and special seminars were presented by Herman Miller Research Center. Herman Miller is a leading worldwide office furniture Company with a research-based approach implemented by his highly informative and active Herman Miller Research Center. Many resources were available to students to gather data and academic research strategies were reviewed. Students began the process of literature review about the innovative classroom design.

Another form of data was assigned to gather for students – their own perception and evaluation on their individual experience at their high schools in terms of space configuration

and benefits. It was a successful assignment that culminated in a great studio discussion. Students also researched and reviewed existing literature on innovative classroom design and existing successful studio classroom layouts. Each student had an option to focus on specific aspects of studio design. Next step was to create a survey and administer that to students, staff, and faculty on the aspect of studio design. The final data step was for students to elaborate an analysis paper where they combined their personal experience, literature review and conducting surveys, narrowed down to their understanding the characteristics of an ideal creative studio environment.

Students presented creative learning environment characteristics. The culmination of the project was a spatial solution that students designed based on the analysis. Students produced design of creative studio learning space with modules 10x10 meters combined as suitable for their concept. Modularity was used as relevant for the project to identify the areas and make it interchangeable for the definition of the prototype.

After students completed their work, faculty engaged in their research part, after the course was completed. The faculty evaluated students' analysis reports, reviewed, and supplemented literature reviews, and evaluated successful spatial examples. Following all evaluations and analysis, Faculty produced a final set of creative learning environment characteristics and an adaptable prototype.

During the complex process with undergraduate research components, faculty researchers have formulated creative learning environment characteristics and an adaptable prototype. Students were exposed to an advanced level of research study that has provided preparation for a senior thesis project, while fulfilling program learning objectives.

## **Foundation Research**

To understand how university learning spaces were formed and developed, it is important to understand the model of the educational learning spaces that was present at the school settings for the children. At least some elementary form of education was compulsory in Europe and after 1600s in the United States.

Most of the layouts of the schoolhouses were rectangular or square one room buildings that contained rows of tables and chairs for scholars of varied ages. Boys and girls were separated within the one room learning space and often had separate doors to use to access the schoolhouse (Cummings & Miller, 1868). The conveniences were present outside and were simple outhouses. Even though the model of rectangular schoolhouses was dominant with the teacher in the head of the classroom, a few other forms were present such as octagonal shapes or rounds shapes (Randall, 1868). The octagonal and round shapes layouts positioned teacher in the center with his or her pupils around, it promoted more active learning environment, but was not a common form (Da Silva, 2018).

This typology was transferred to the university classroom in the early American post-secondary institutions and in Europe. When Harvard College was founded in 1636, the first campus building that was devoted to instruction had a typical classroom layout as in one room schoolhouses. This type of space warranted passive instruction, where the teacher was located at the front of the room and students remained seated for lecture (Folkins, et. al., 2015). Due to the space minimal interactions had occurred between teacher and students or between students themselves. Casual interactions absent in the classroom typically occurred

in secondary spaces such as corridors or hallways or other areas of common encounters (Da Silva, 2018).

This traditional form of the learning spaces is still highly dominant in the higher education institutions and while it works for certain types of educational instructions, it is not appropriate for the student centered or active learning.

There is a variety of learning spaces present on a typical university campus such as standard classroom environment with rows of chairs and tables and instructors' station at the head of the room, as just mentioned; classroom environments with loose furniture that allows for collaboration and suitable for active learning; lecture halls; auditoriums; seminars; and computer or technology classrooms (Arizona State University, 2011; University of Connecticut, 2016).

In this study the focus is on the second type of learning space mentioned - classroom environments with loose furniture that allows for collaboration and suitable for active learning or as studio spaces where practicum learning instructions take place such as studio space for creative majors. However, this type of space could be used for any major that requires an active style of learning.

Learning takes place in other spaces rather than just the classroom itself. To have student centered spaces, there is a need to provide components for the spaces to exist. As a creative learning environment needs to accommodate a variety of learners and adapt to different learning topologies (Hoy, 2013), three major characteristics were identified: flexibility; comfort and wellbeing; and technology.

Classroom flexibility is especially important for learners. An ability to change furniture to accommodate for a variety of the classroom activities can create an engaging environment that will support different student learning personalities and styles (Gurzynski-Weiss, et. al, 2015). Moreover, an ability to rearrange furniture based on the activity promotes learning and gives more power to students (Sinem, et. al, 2016).

Comfort and wellbeing depend on ergonomic furniture that can be adjusted to individual user's needs (Hoy, 2013). Building systems are critical for providing a healthy learning environment. Appropriate HVAC systems that support comfortable temperature and humidity levels, and functional lighting systems that create suitable lighting levels are important for overall health standards. It is imperative to incorporate technology into a classroom environment to create inclusiveness and to provide seamless interactions for in-person and distance learning.

According to Herman Miller study related to the impact of design on student learning outcomes and overall learning experience in higher education, the quality of the general student's experience is becoming increasingly important to strategically incorporate goals of higher education institutions. The questions of "What matters?" identifies the key relevant elements impacting the relationship spaces and learning experience: basic needs, sense of belonging, learning outcomes, workplace readiness, and sense of ownership (Herman Miller UK Research Center, 2019).

Basic needs include security and autonomy that allows students to have freedom of actions and decisions. Status as recognitions for contributions and achievement as strive for

excellence and purpose for the spaces are all basic factors required for the space to be functional.

A sense of belonging provides connections with space and with other students and professors. Educational environments should enhance academic performance, learning and collaboration. Learning space should be the place that students find enjoyable and would want to stay there. Learning outcomes are linked to the spaces as the learning environment is the physical aspect of the process of achieving students' and institutional goals. Workplace readiness is the learning environment space that focuses on ease of use. Finally, a sense of ownership is the ability to personalize and provide flexibility.

### **Development of a Modular Prototype**

Based on data, research and study faculty were able to define the Modular Prototype and its characteristics. The adaptable prototype is a vibrant place that supports knowledge and innovation based on creative learning environment characteristics. It is shaped as a regular modular form facilitating further module addition as the learning identity and its needs grow, envisioning constant expansion in contents, and learning spaces. It is a hybrid model inspired by principles of Distributed Collective mode (focusing on participation and collaboration) and Distributed Individual mode from the Modes of Learning Framework by Prof. Richard Elmore, Research Professor at the Graduate School of Education, Harvard University (Elmore, 2018).

The model is based on a “hub” concept where learning experiences happen in various forms and learners have choices; it is developed in both physical and digital means.

The model has a strong identity. It supports knowledge and innovation based on constructive collaboration and contributions linking learners, academia, community, industry, and society at large, benefiting all the parties involved and the overall development of the main domain. It is a recognized space where learning opportunities and experimentation of new and alternative forms of learning are fostered and in constant development.

The aim is to create a physical and virtual space perceived as familiar and comfortable for learners, where learning is easy and natural. It promotes a sense of community, collective and individual learning based on the field of interest with multidisciplinary inputs. The Learning experience is enhanced by exchanges, links, connections, collaboration and networking, empowering members as active participants and contributors. Learning opportunities are many, reinforced and supported by the model itself: teamwork and/or individual work, guided learning and/or learning self-reliance, physical and/or remote. Activities are both structured, coordinated, and spontaneous.

The model welcomes and encourages members' inputs in a spirit of collaboration and advancement. The Learning space, both physical and digital, provides various and dynamic forms of learning through flexibility, personalization of experience and adaptability, nurturing learners' well-being and fostering a lifelong learning mindset. It responds to learning and needs with transformation and modification. Exploration of new and innovative learning opportunities is supported, helping to grow the overall learning experience.

## Prototype

The adaptable prototype includes innovative creative learning environment characteristics. As previously mentioned, it develops through modules facilitating further modules addition as the learning identity and its needs grow. The prototype is based on a few main conceptual Zones, identified by key words: Learn, Explore and Think Zone; Design and Produce Zone; Co-Working Zone; Meet and Relax Zone; and Garden Zone. The zones are all equipped and part of the general concept, boundaries are limitless and often merge.

- Learn, Explore and Think Zone focuses on individual and collective research and study.
- Design and Produce Zone focuses on creative activities, innovation, designs providing specific labs.
- Meet and Relax Zone focuses on meeting, entertainment, gathering and networking, socialization, it may contain food and beverage outlet/area. It also includes lounge areas and, occasionally, recreational activities.
- The Garden Zone is where activities are developed in a green environment with trees and grass. The internal layout can be adapted to fit more specific needs. It focuses on exchange forums, exhibitions, displays, local initiatives, design initiatives involving the community and industry, and seminars. These activities may also be in other zones.
- Outdoor Zone focuses on various-use external zones, fostering social interactions and potential collaborative initiatives. Internal and external areas often merge.
- Co-working Zone focuses on professional work, interaction, collaboration, and networking.

The overall space is developed in consideration of human factors. Physical human factors: the physical location allows easy and comfortable multi-use with effortless adaptability and flexibility. It considers internal see-through partitions, movable or foldable panels enabling different space configurations when needed. Enclosed areas are for services such as toilets. Learners are encouraged to shape the space by moving the furniture for the creation of different zones diversifying the learning options, different typologies of ergonomic furniture are provided. In addition, modular and movable individual acoustic pods are available for individual or team use.

Elements of biophilic design and sustainability are also introduced. The relationship with nature contributes to physical, emotional, and general human well-being and stimulates motivation. Natural light is present, artificial light will be sustainable and chosen based on similarities to natural light. Focused attention is on acoustic solutions for noise control and temperature control, to allow a pleasant experience. Smart design strategies and technologies are implemented as well. The link with the territory is achieved through design references. As an example, being in Dubai UAE, a reference to the culture may be accomplished by adopting typical *mashrabiya* see-through panels and patterns, as reminders of the local context. The general colors are soft and natural. The members, integral actors in the space definition, are encouraged to personalize and “color” the space through work display (both digital and physical), in a continuous evolution and modification. Space is alive, the learners “live” the learning experience, they are proud to be part of it and to contribute to its development. This strengthens the sense of community and belonging.

Cognitive human factors: learners are actively involved in problem-solving; they exchange and challenge their knowledge through positive interactions, links, and connections. The space (physical and digital) supports these factors and stimulates motivation along with engagement, creativity, reactivity, and constructive critical thinking, shaping powerful comprehensive learning experiences where knowledge is gained naturally.

Social human factors: social interactions are sustained and promoted at various levels and with different modalities. Both the physical and digital model foster an exchange culture based on constructive connections and collaborations.

Cultural human factors: mutual interests and goals contribute to shaping the norms, the habits, and values of space. The member contributes to values development.

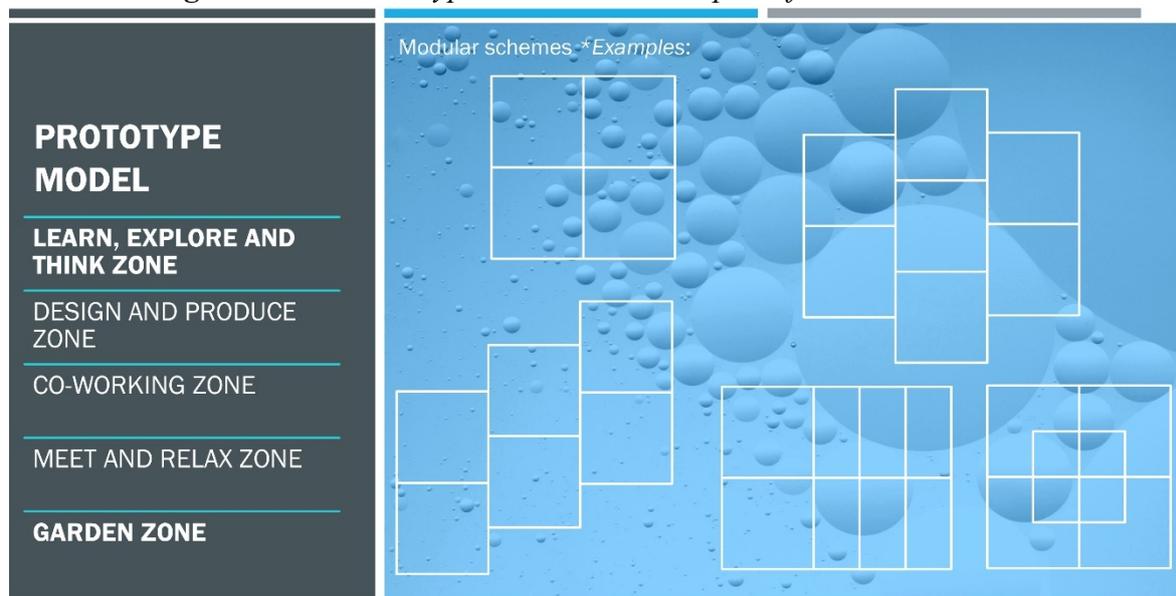
Emotional human factors: the learning model develops a sense of belonging and positive attachment. They feel free to express themselves, they are guided to achieve their full potential. The community is important to create constructive experience and raise confidence.

Space allows face-to-face interactions or other hybrid solutions. Digital space is the translation of physical area in remote modality through interactive digital platform. This is an opportunity to expand the concept internationally for unlimited knowledge exchange. Physical and digital spaces are linked together and supported by the digital platform.

### Students' Case Studies of Modularity Schemes

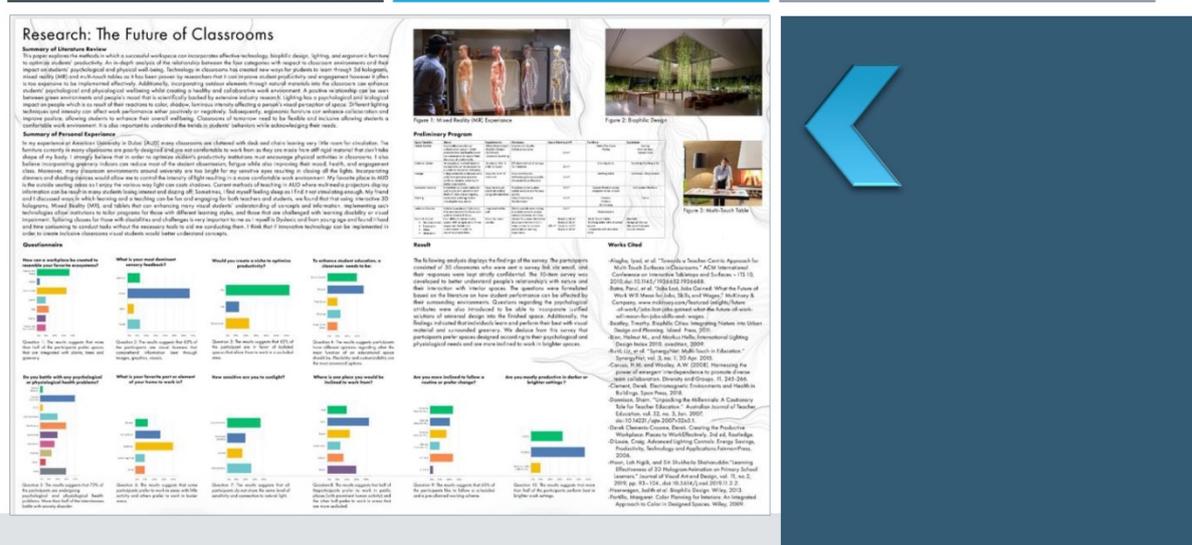
The following are a few examples of students' development based on modular units, including Research and Project phases.

**Figure 1.** CLE Prototype Model with Examples of Modular Schemes

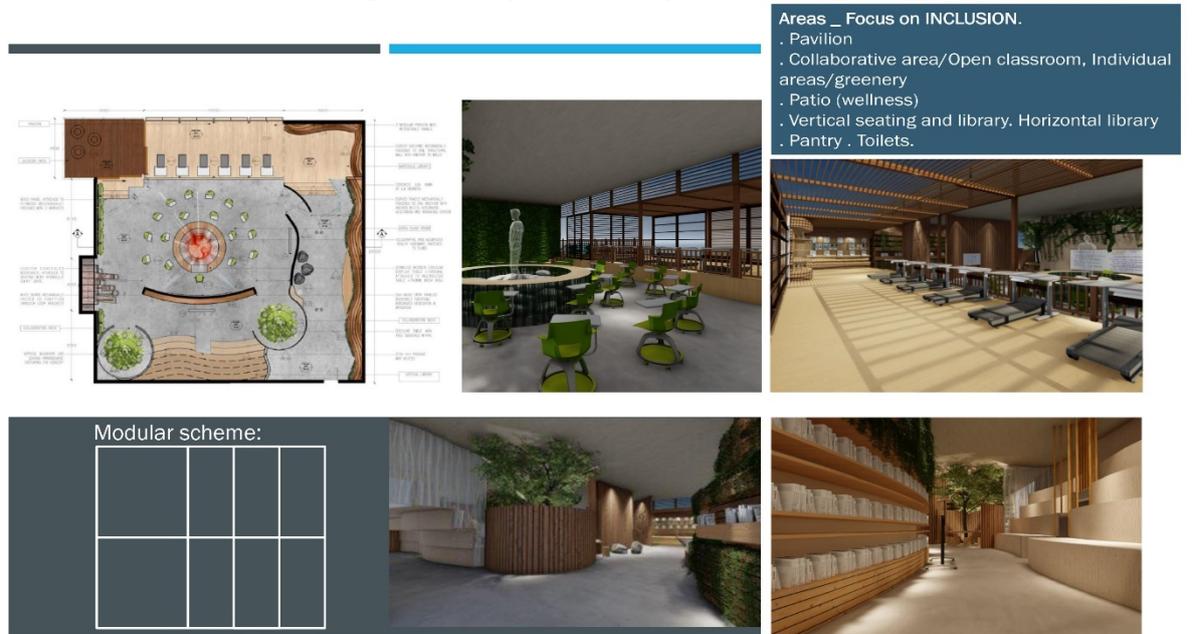


The case study one model focuses on inclusion, effective technology and biophilic design. There is relevance to wellbeing, physical and mental wellness. Areas of the overall space include pavilion, collaborative area or open classroom, individual areas, patio, vertical seating, library, horizontal library.

**Figure 2. Research Phase of Case Study 1**

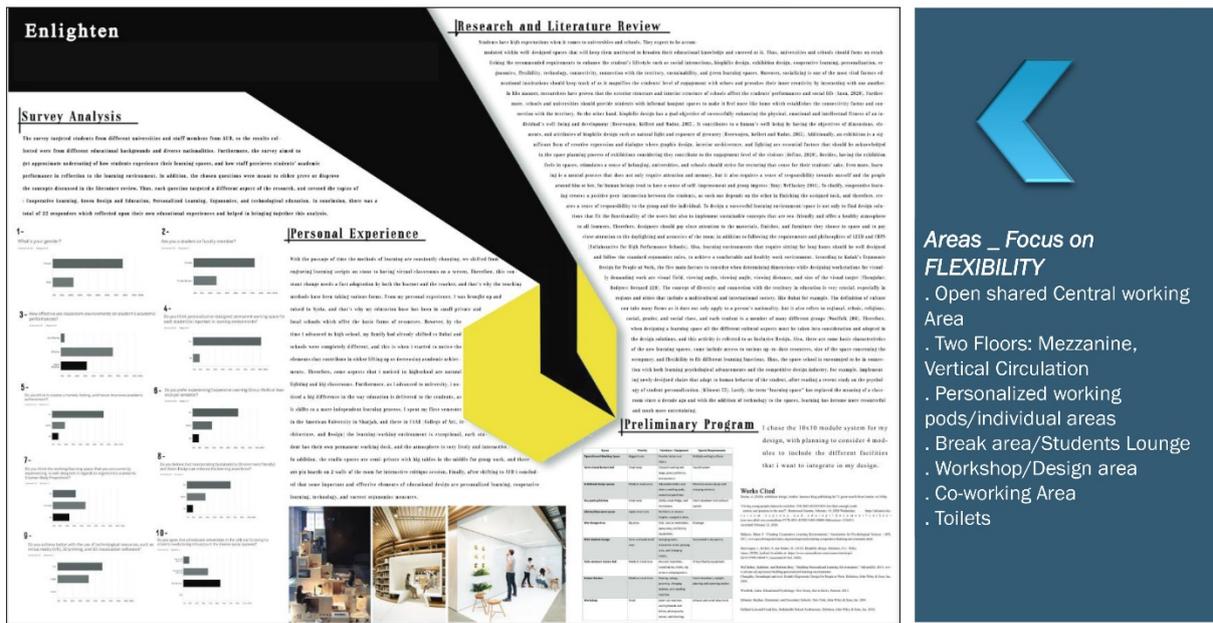


**Figure 3. Project Phase of Case Study 1**



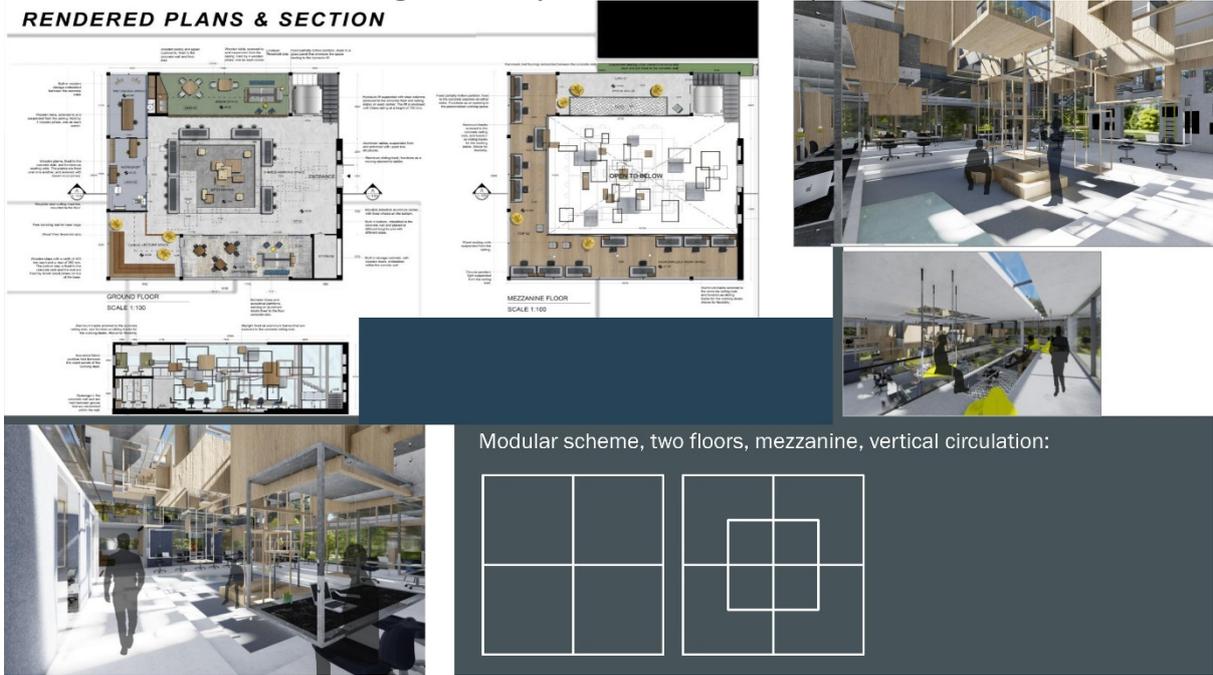
The case study 2 was focused on flexibility as the main trait. The areas that were included were open shared central working area, ground and mezzanine floors with vertical circulation, personalized working pods and individual areas, students lounge, workshop design area and co-working area.

Figure 4. Research Phase of Case Study 2



- Areas \_ Focus on FLEXIBILITY**
- . Open shared Central working Area
  - . Two Floors: Mezzanine, Vertical Circulation
  - . Personalized working pods/individual areas
  - . Break area/Students Lounge
  - . Workshop/Design area
  - . Co-working Area
  - . Toilets

Figure 5. Project Phase Case Study 2



The case study three, model with focus on modularity has included the areas of open shared central exhibit area, open space, personalized working pod and individual areas, break area and student's lounges, outdoor area, and co-working area.

Figure 6. Research Phase Case Study 3

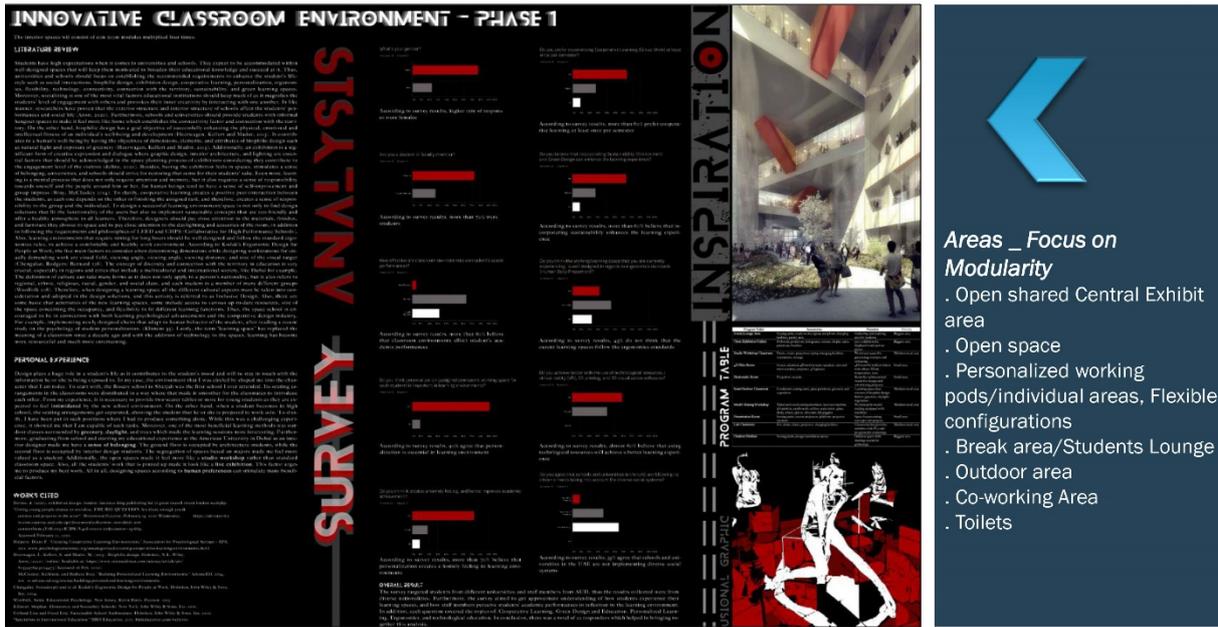
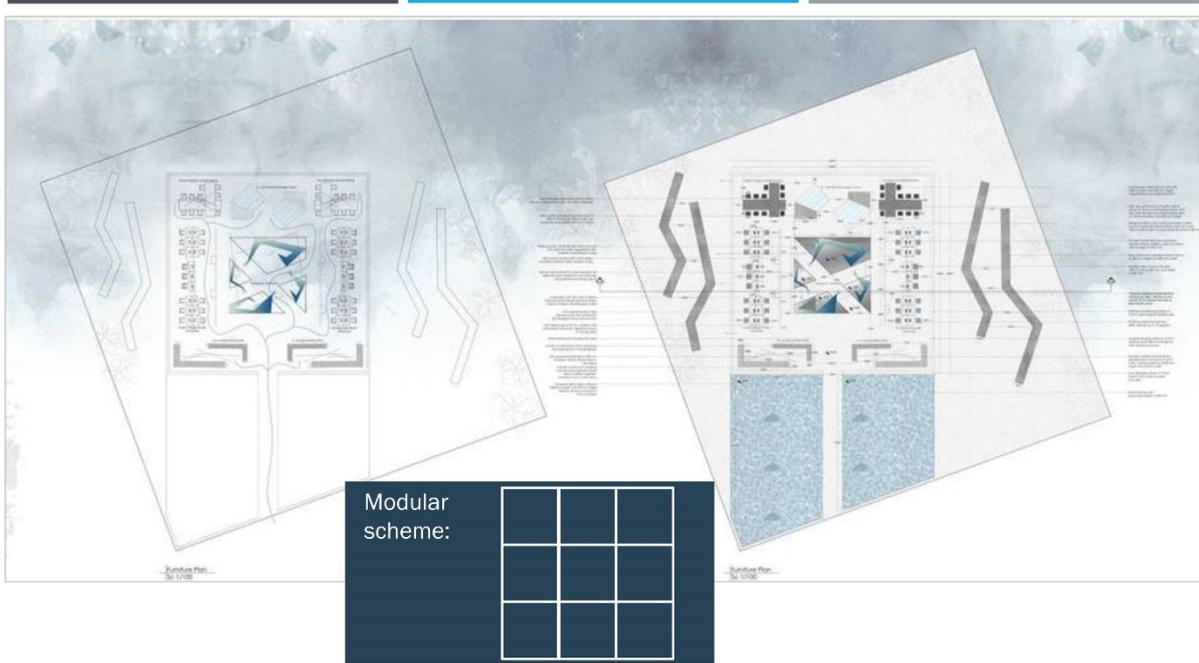


Figure 7. Project Phase Case Study 3



The case study four. model with focus on meditation and senses, introduced elements of meditation and worship spaces. Other areas were the garden, exhibit area, open space, sensorial area, collective studio area, individual areas, break area and student’s lounge.

**Figure 8. Research Phase Case Study 4**



- Areas \_ Focus on Meditation and Senses**
- . Garden, Exhibit Area
  - . Open space
  - . Sensorial Area
  - . Meditation, Spiritual Area.
  - . Collective Studio Area .
  - . Pods/individual areas, Flexible configurations
  - . Break area/Students Lounge
  - . Toilets

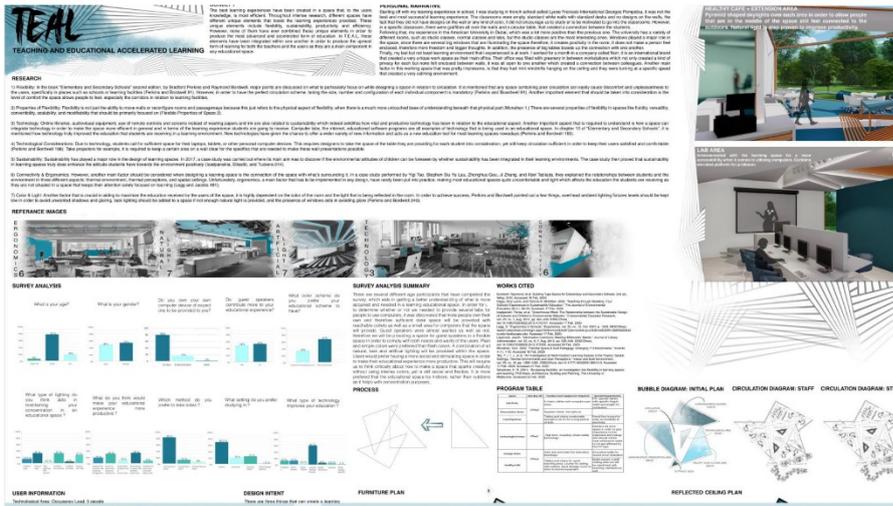
**Figure 9. Project Phase Case Study 4**



The concept may be developed based on different geometries as well, still following the modular structure. The following are a few examples. The case study five is a model with a focus on circular centralized space organization, which allows flexible use, technology incorporation, with natural lighting and circular space organization. The focal point of the space is on the central element dividing the area in functional spaces through rays. The areas included are studio, workshop, library, graphic and photography space, meditation and spiritual area, individual areas, students lounge.



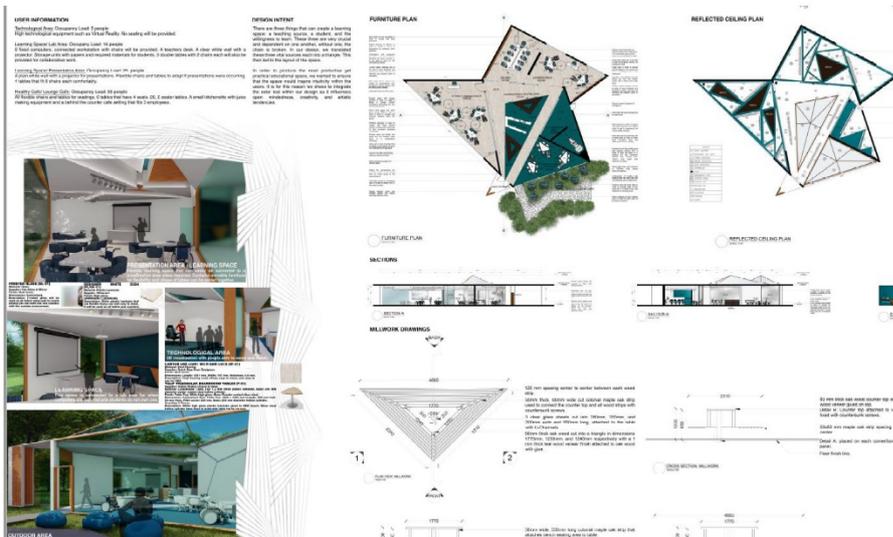
Figure 12. Research Phase Case Study 6



**Areas of Focus**

- Presentation Area
- Studio Learning Space
- Technological Area
- Outdoor Area.
- Eating Area.
- Connection of outside and inside

Figure 13. Project Phase Case Study 6



Modular scheme:

## **Conclusion**

Higher education learning spaces have been developing for many years. They started as basic traditional one room schoolhouse spaces and evolved into innovative spaces that can accommodate a variety of users and their needs with the use of technology and flexible furniture. The rigidity of the traditional classroom with the rows of table and chairs still exists and is still needed but gives way to the new shape and layouts that respond to the requirements of the curriculum, faculty, and students. The trends of technology incorporation and inclusiveness, student centered collaboration spaces all work together to create a successful learning environment. Modularity of the spaces can accommodate all those needs.

The learning environment plays a vital role in the experience of the students as it tends to either enhance or decrease the learning process. Major factors affect the learning experience such as how flexible the space is in terms of the rooms' shape and furniture in relation to non-flexible spaces with fixed furniture. Additionally, the lighting levels, temperature and humidity directly influence the comfort of the users of the spaces. Ergonomic factors affect also the physical comfort of the students. Technology goes hand in hand with the layout of the space since informal classrooms offer a better way of processing information than the traditional classrooms. Lastly, exterior environment is as important as the indoor classrooms for both students and faculty. The creative learning environment prototype seeks to accommodate these requirements and provide excellent experience for faculty and learners. It is also suitable for distance learning: digital space allows this form of learning while the physical place is easily adaptable to safety and social distance norms.

In conclusion, learning modes and spaces, virtual and physical, are changing. The recent COVID19 pandemic has accelerated the shift to digital learning opportunities in parallel to physical learning experience. The demand for alternative learning opportunities is growing, redefining the learning spaces.

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