Experiential Learning Theory as a Teaching Method in Climate Smart Architecture and Urban Design

Moohammed Wasim Yahia*
Housing Development & Management, Lund University

***Abstract*—This study focuses on the experiential learning theory as an important teaching method for architecture and urban design students at architecture Dept., Lund University. By applying Kolb' s model - in a course so called Climate Smart Architecture and Urban Design - , the diverse learning styles of all learners are incorporated and a step by step course design framework enables studio and seminar design instructors to guide learners through each phase of the learning cycle. The developed course will contribute to better teaching and learning and will also enhance the pedagogical discussion within the dept. of Architecture and Built Environment, Lund University.**

***Index Terms*— Experiential learning theory, teaching methods, architecture, urban design.**

I. Introduction

In architecture and urban design education, the curriculum should be structured to facilitate and advance student learning. The architecture curriculum is in general composed of fundamental courses that develop design knowledge, technology based courses that develop scientific formation of urban design and architecture as well as artistic based courses for strengthening architectural expression. Therefore the design courses, form the most crucial part in urban and architecture design education. The design studio where the design courses are conducted is an environment that is different to a traditional classroom from pedagogical, sociological and ideological points of view [1]. Most of the recent studies on architectural design education and the design studio are based on computer-aided design or distant learning [2]. Therefore, the well organized syllabus should reflect an effective course design outlining pedagogical strategies and learning processes. In this regard, considering the Experiential Learning Theory [3], [4] as a learning process in the course syllabus can contribute to better student learning in architecture and urban design education.

II. Experiential Learning Theory

The philosophy of experiential learning focuses on experience as the most important tool for learning. The premise of experiential learning is that individuals create knowledge through the transformation of their lived experiences into existing cognitive frameworks, thus causing individuals to change the way they think and behave [3]. According to the experiential learning theory, learning is "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" [3], [4].

John Dewey – an American philosopher in education – was the most famous proponent of "hands-on learning", and one of the first to formally define and advocate experiential education. In his classic book, Experience and Education, first published in 1938, he considered the experience as a key component of the educational process, and assumes that there is one permanent frame of reference which is the organic connection between education and personal experience [5]. Dewey's model of experiential learning consists of a logical sequence which involves perceiving a problem, followed by the formation of a hypothesis to find a solution. This will be followed by experimentation to test the hypothesis, and finally giving reflective consideration to the consequences for society. Dewey believed that the meaning of a given experience is the result of the interaction between what the learner brings to the given situation and what happens there. For Dewey, continuity and interaction are the two fundamental criteria for determining the quality of experience and its implications for education. The learner then should be able to connect aspects of the new experience to what he/she already knows.

Kolb's experiential learning theory works on two levels: a four stage cycle of learning and four separate learning styles. Kolb's style theory is typically represented by a four stage learning cycle in which the learner touches all the bases [3], [4] (see Figure 1).

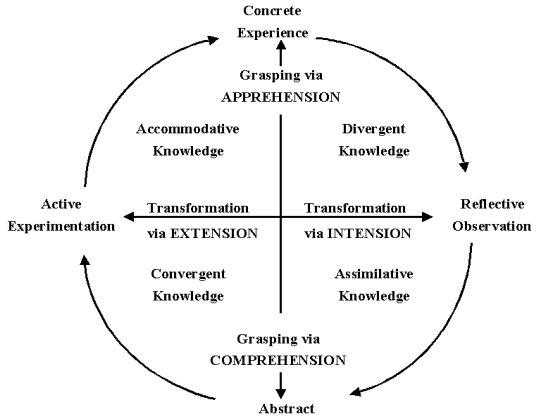

Fig. 1. *Structural dimension underlying the process of experiential learning and the resulting basic knowledge forms.*

- Concrete Experience (a new experience of situation is encountered, or a reinterpretation of existing experience);

*Moohammed Wasim Yahia (PhD, Architect) is with the division of Housing Development & Management, Dept. of Architecture and Built Environment, Lund University, SE-22100, Lund, Sweden. E-mail: moohammed_wasim.yahia@hdm.lth.se.

- Reflective Observation of the new experience (of particular importance is any inconsistency between experience and understanding);
- Abstract Conceptualization (Reflection gives rise to a new idea, or a modification of an existing abstract concept);
- Active Experimentation (the learner applies them to the world around them to see results).

III. Experiential Learning in Teaching Architecture and Urban Design

Many studies tried to investigate the correlation of students learning styles with their performance in architecture and urban design studio [6], [7]. Henry Sanoff [8] concluded that the *concrete* experiences or "field-experience approach to education" are valuable means for design learners to work with complementing the *abstract*. This approach promotes" *the use of non-formal, out of class experiences as the core of the learning process*". As a way to integrate theory and practice in design education, Sanoff calls for "*action-research*" method as an integrated process starting with students direct experience followed by data collection and observation about that experience, followed by data analyses and conclusions that "*are fed back for reflection and modification*". Sanoff's action-research approach fits well with the Kolb's Cycle as well as the ways by which professionals in their real world practices go about designing buildings and urban places.

IV. Deepening the Experiential Learning Theory in the Course Climate Smart Architecture and Urban Design

The course deals with the relationship between the built environment and climate issues. The aim of the course is to give students the possibility to explore how an adequate design of buildings and groups of buildings can minimize negative impact on the climate. It also aims at supporting students' learning on how the built environment in different climates is affected by the microclimate, vegetation, orientation etc. Moreover the aim is to highlight the impact of people's attitude and behavior towards climate and energy issues. The course is eligible for architectural students of years four and five. It is also opened to students of landscape architecture, urban design and industrial design. The total number of the students varies from year to year. The latest three years, the course had about 30 students (international and Swedish). The course activities are divided into architectural and urban design project of a new development, study visits, practical exercises (on-site and in the computer lab, reading the course literature, theoretical lectures and design tutorials (as group work).

Although the principle of experiential learning theory in the mentioned course is existed, the application of this theory in practice is not always as planned (especially in terms of the first study visit and the outdoor exercise). For example, in the first visit to the site which is generally windy, it is expected that activity will provide a unique experience for the students to perceive the location from different aspects, and the microclimate is one of the key aspects in the course. However, when we do the visit together with the students, the weather is not always as we prefer to be. In other words, we prefer the site to be windy (about 5 m/s or higher) so that the students can experience the climate problems at the site. Therefore, the success of the aim of this visit will always be depended on the weather.

In order to guarantee that the students experience the right situation, the experiential learning theory can be included in the course syllabus and further applied as the following:

1. Climate chambers

The thermal environment laboratory (at Dept. of Design Science, LTH) has two climate chambers: a warm chamber (height × width × length: 2400×2360×3200mm) and a cold chamber(2400×2360×2400mm). The chambers were constructed and taken into use at the end of 2003. The chambers can be programmed in advance to change the temperatures according to experiment needs. The warm chamber can be adjusted from +5 to +60 °C and temperature standard deviation (SD) from set value is less than ±0.2 °C. The relative humidity in this chamber can be adjusted from 10 to 95 % depending on temperature and humidity SD from set value is less than ±5 %. The cold chamber can be adjusted from –53 to +20 °C and temperature SD from set value is less than ±0.4 °C.

The idea is to program the climate chambers in advance to represent different climate types such as temperate, cold, warm humid, hot dry, etc. This will provide students with good experience in different climate types that will be given throughout the lectures. Every group is supposed to visit the chamber for 2-3 minutes in a certain weather condition. After the theoretical lecture, a second visit is expected to be done in another weather condition. This process can be repeated 3-4 times during the course day (which is always the whole day in Fridays). During every visit, the students will face a new experience that will be reflected and analyzed during the theoretical lecture by running a short discussion with the teacher. Afterwards, the application of this experience will be used in other course activities such as climate exercises and design studio. The whole process is shown in Figure 2.

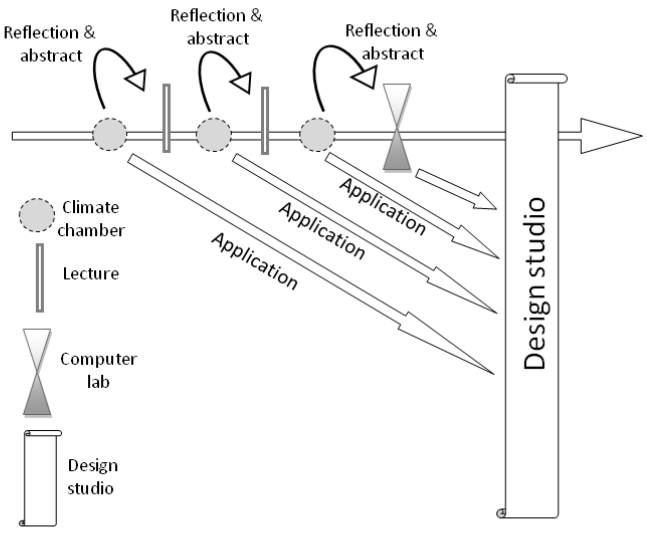

Fig. 2. *The design of climate chamber's experience as an application of experiential learning theory*

2. Mini exercise:

The idea of the mini exercise is to let the students to be exposed to a certain outdoor environment for a short while. Throughout the lecture and when there is a strong wind

outdoors, the students will be asked to go out (near the building) for about 5 minutes. They will be free to choose where to stand (either in a windy spot or in a calm spot). Throughout this exercise, the students will also be asked to report (on a piece of paper) how they feel regarding their outdoor thermal comfort, i.e., very cold, cold, slightly cool, comfortable, slightly warm , hot, very hot. This event will give the students the opportunity to have new experience about outdoor thermal comfort and how to perceive it. When they come in again to the lecture hall after five minutes, the teacher will run a short discussion using some examples from the student answers (that they reported on a piece of paper). The teacher then will help the students to analyze and reflect what happened outdoors. The teacher will also show the variations between the students answers and conclude that the thermal comfort can vary from one person to another even if they stood at the same spot.

This experience can easily be repeated throughout the course when there is also solar radiation. The aim then is to experience the role of thermal comfort both under the sun and under the shade. Afterwards, the application of the experience will be used in other course activities such as other climate exercises and in design studio.

It is important to mention that the students (before the activities) will be informed about the aim of these two activities and will have full instructions on how to behave throughout the process.

V. Inspirational opinions

Throughout the course, I managed to talk to some students about the ideas of climate chambers and mini exercise. Among 28 students, only 3 students gave their opinions. Although the total number of the sample is not enough to analyze, the opinions give an indicator about the proposed idea.

The three opinions supported the idea. They feel that the idea is good and can give further understanding regarding the course materials. The first student said that " *by being in the climate chamber, I can feel different climate parameters. In addition, the mini exercise will let feel my own thermal comfort. It is interesting!*". The second student argued that " *It is better to experience the climate chamber and the mini exercise before the theoretical lecture, it makes me more confident to understand the information that will be given in the lecture afterwards!*". The third student mentioned that " *I like this idea. For me, I prefer to get all information in the course based on practical examples i.e., being always outdoors and try new things. Some students fall asleep in the lecture, maybe because the theoretical materials are sometimes boring. It is also amazing for me to feel the cold and hot climates in the same day!*".

VI. Final remarks

By applying Kolb' s theory to the course, the diverse learning styles of all learners are incorporated and a step by step course design framework enables studio and seminar design instructors to guide learners through each phase of the learning cycle. Additionally, the model further demonstrates how assessment of each type of knowledge and learning is embedded in the learning processes.

In addition to differences in learning styles, design education should also recognize students "prior knowledge" and experiences as well as cultural backgrounds in order to promote deep transformative learning. By an insider understanding of the students problems from their perspectives, accepting individualistic differences of ideas and learning styles, and helping to develop them, the alternative tutoring attitude will be further democratic with better shared power in class.

Design educators should become democratic facilitators who offer design guidance to help students to consciously construct their own learning experiences and assist them to manage and plan for their studio work as well as future design career. Therefore, during the two proposed activates, the teacher has to provide clear plan on how to walk through the experiments. Moreover, the teacher has to provide a continuous assist throughout the experiments as well as after the experiments on how to clearly do reflection and analyses in the design studio.

VII. Future work

Next year, I will try to apply the two proposed activities (climate chambers and mini exercise). I have already talked to the course leader at Architecture Dept., LTH, and he was very interested. It is of course hard to guarantee that it will work perfectly from the first time. However, it will be very useful to deepen the application of experiential learning theory in our course. In addition, I will try to make formative evaluation directly after these two activates in order to have information on what, how much and how well students learn from these activates.

After the experiment and in order to disseminate knowledge and have feedback, I will organize a seminar at Architecture Dept., LTH, for the teachers in different course at the Dept. In this seminar, a critical review will be considered and different opinions from the teachers will be presented and deeply discussed.

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