

THE EFFECT OF EXPLORATORY LEARNING METHOD ON THE STUDENTS' ATTENTIONS LEVEL TO THE PERCEPTUAL ASPECTS OF MEASUREMENTS

Ali Rahmanpour Zanjani*

Assistant Professor, Department of Architecture, University of Zanjan, Zanjan, Iran

(*Corresponding author)

Abstract

The present paper is the result of a study that focuses on the training of architecture, on the effect of exploratory learning methods on "increasing the level of students' attention to the effects of tangible measurements of the environment on human minds." According to the results of studies in psychosocial environment, tangible measurements in the environment have a huge variety of effects on the mind. In this regard, the students of architecture should pay attention to it through their plans. The present paper, hereby, initially study learning and reviewing the theories on educational methods. Hereafter, based upon the exploratory learning style, certain educational steps would be defined considering the theories of some prominent professors in basic architecture learning. Subsequently, the success rate of the proposed method of study is evaluated by selecting the two groups of test and control in Zanjan University as well as implementing a proposed educational method and precise review of students' architectonic works. Moreover, the research method is empirical. Both qualitative and quantitative comparisons of designing as well as the psychoanalysis of test and control groups indicate that students who have trained through provided steps were having more appropriate attention to the effects of environment's tangible measurements on the human mind in their design decisions.

Keywords: Teaching; learning; exploratory learning; measurements cognition.

introduction

Considering his years of educational experiences in design studios, the author observed that:

- Students do not have enough attention to both the consequences and different outcomes of the measurements on human mind which is determined during the process of architecture design.

Consequently, the primary question of the study is formed as followed:

- What should we do in instructing architecture so that the student focuses on the mindset of the audience in determining the measurements of the material in the design process, the consequences and the results of the measure?

The purpose of this study is to identify the appropriate design education to facilitate the learning and internalization of concepts that are relevant to the perceptual aspect of dimensions in basic architecture students, which then can be utilized in various architectural and design studios. Hence, an appropriate learning is to be made. Cruickshank et al.(2005), defined the design or curriculum as follows: "The process in which the teacher decides to (1) what to teach, (2) how to teach, (3) how to determine if the students are both successful in learning and satisfied."

LEARNING AND ITS METHODS

Achieving the goals of this study requires answering introductory questions, such as what is learning and what are its affective factors? The subject of this section is addressing the category of learning and learning styles that the outcomes would contribute us to utilize it better.

Learning Definition

Learning is a category; its role is evident all over the life scenes and does not simply refers to learn specific skills or lessons, but is involved in emotional growth, personality development, human development, and essentially in his behavioral development. Learning is an activity that is taken by the learner, and that he himself has direct involvement in the formation of the learner while the teacher's role is merely to bring about the conditions and facilities that facile the learning procedure (Seif, 2015). The learning concept could be defined in various manners: acquisition of knowledge and information, different habits, diverse skills as well as various methods of solving problems. It can also be defined as "learning behaviors and good deeds, and even acting as harmful and unpleasant behaviors" (Seif, 2015). According to behaviorists "if one receives a new response to an incentive that leads to a permanent change in behavior, learning is done" (Lang, 2014). What is learned may not be reflected in apparent behavior. Therefore, "the principles of psychology are reinforced with more function, so that by learning what we learn, we are aware of the result of the behavior and considered a type of internal and external strengthening" (Lang, 2014). Learning is a highly broad field. The most well-known definition of learning is as followed: "Learning is the process of creating a relatively stable change in behavior or behavioral ability that is the result of experience (Seif, 2015). Therefore, the significant features of this definition are:

- Change
- Relatively stable change
- Relatively stable change in behavioral potentiality
- Relatively stable change in behavioral potentiality in result of experience

According to the definition above, learning leads to change; it denotes that followed by gaining a new experience, the living creature, including human, would change from before acquiring the experience to a post state. Whether simple or complex, learning changes the individual. In other words, we are constantly changing owing to gain experience; while, more than any other factor, learning experiences causes the change of people throughout life. Therefore, People who have more opportunities to learn and gain more experiences will change more than those who have less learning opportunities as well as a monotonous life. Learning is a relatively stable change. The truth is, learning is making change; however, this change should be relatively stable to be called as learning. Many of the changes that result from motivational, emotional, fatigue, sensory adaptation, and the like, and are rapidly disappearing, are not among our learning. Learning is a relatively stable change in behavioral potentiality, which indicates that the relatively stable change should be occurred in our behavioral potentiality. Considerably, one acquires the capability of executing various tasks, sometimes this ability will remain hidden for a long time, and the presentation of its effects, in the form of behavioral change, will be delayed for some time (Seif, 2015). The concept of experience in the definition of learning is the interaction between stimuli (external and internal) and learner. Therefore,

reading a book, listening to a speech, a child's stumble, and thinking about an experience could be regarded as experience which may lead to learning. Light and Cox (2009) have defined the experience as: "We define experience, following John Dewey, as a kind of interacting between the person (the learner) and what we define as a learning environment". Consequently, as learner gains an experience, in a way that his behavior changes at the end of the experience, it is stated that learning has taken place.

Learning Primary Styles

A set of educational design patterns is based on the assumption that there are certain behaviors, knowledge, and beliefs that must be learned, and that there are different strategies or training requirements that are more appropriate for one of those purposes, knowledge and beliefs. The second part provides guidance on organizing educational environments that support students in solving problems and gaining insights. This type of model is usually dependent on constructivist approaches to classroom learning, such as problem-based learning (Fetsco & McClure, 2005). These two types of patterns are also referred to as teacher-centered instruction patterns and learner-centered instruction patterns (Eggen & Kauchak, 2001).

Designing Teacher-Centered Instruction: Direct Instruction

O'Donnell et al.(2011) have learned from direct teaching the following definition: "A systematic form of instruction that is used to master students considering knowledge and skills". Muijs and Reynolds (2010) consider direct teaching a form of education in which "the teacher actively moves the content of the course to the students of the whole class". They have included the following features for direct training.

The teacher instructs all the students in an active and direct manner.

The lesson is organized well, lessons objective would be clarified, main subjects is emphasized, and key points are summarized at the end.

At the beginning, the teacher uses pre-organizing lessons.

Low level skills and easy contents are thought fast in order to provide more time for teacher spent on higher level of objectives and thoughts.

The teacher uses pre organizer at the beginning of new lessons.

Designing Learner-Centered Instruction: Indirect Instruction

Learner-centered instruction is an educational axis in which "learners, using teacher's assistant, take responsibility for understanding and comprehension of the materials" (Eggen & Kauchak, 2001); it is also called indirect instruction. According to Fetsco and McClure (2005), indirect education is used by teachers who prefer to get out of the student, for instance, these teachers grant the students with experiences or information and contribute them to make their own conclusions". The difference between the teacher-centered learning design and the learner-learning design focuses on the precise definition of educational objectives and learning objectives, but in design based on constructivist or learner theories, the goals are more general and more basic. Fetsco and McClure (2005) describe the common features or common principles of all learner-centered instruction methods as follows:

General educational goals are used instead of accurate objectives.

Learning materials are used more frequently and various.

It may be determined by the teacher as a learning assignment; however, students are allowed to decide on how to do it themselves.

When the students ask for assists, the teacher plays the role of facilitator or conductor.

Students are given enough time to do learning assignments and treasure its values.

Differences are more recognized and respected.

Democratic aspects and their flexibility are more inclined to teacher-centered instruction (Seif, 2015).

One of the most significant learning methods for learning learners is the learning axis for exploratory learning, which is specifically discussed within the next section.

INSTRUCTION FOR EXPLORATORY LEARNING

In instruction for exploratory learning the teacher does not teach new subjects directly, but obligate them to discover and create science themselves. For example, the teacher who intends to teach problem solving to the students would provide them only with problem description and prepare a condition for them in order to find components of the problem, the relationships between the components, as well as the solution to the problem. Thus, one can define learning for exploratory as follows: "An approach to education through which learners are encouraged to interact with their environment, that is, to explore and manipulate objects, to deal with questions and Disagreements, or conducting experiments; consequently, to reach an understanding of a particular subject" (Ormrod, 2008). Jerome Bruner (2009), one of the main advocates of exploratory learning, has defended his proposed method "We instruct a subject, not to produce little libraries upon that, but to have the students think and observe through the eyes of historians and to participate in knowledge process; Knowing is a process and not a product".

Objectives and Characteristics of the Teaching Method for Exploratory Learning

Instruction for exploratory learning fulfills many goals.

- Having learners to think ahead
- Assist learners to discover how knowledge is gained.
- Boost high-level though skills

According to the teaching methods for exploratory learning:

- The teacher's role is not to transfer knowledge, but to provide the classroom experiences in such a way that the learners discover the knowledge themselves.
- The teacher encourages independent exploration and thinking in learners.
- Learners are not satisfied with the teacher's knowledge, but challenge issues and topics to discover something.
- Learner engagement in learning activities and their interaction with classroom experiences is at a high level.
- Learners engage in higher levels of cognition, analysis, evaluation, and creativity (Seif, 2015).

Educational Stages for Exploratory Learning

1) Pre-teaching arrangements

Designing exploratory learning include as following:

- Determining purpose: The teacher determines who wants to emphasize what their subjective and cognitive skills are in their learners and what results they can achieve.
- Selecting puzzling situation: It describes a situation in which learners are getting into an unstable mood and have led into curiosity. This curiosity will be a motivating factor for learners to explore. Arnheim (2014) describes puzzling situation as "A situation that deals with cause and effect relationships and delivers questions as "why?" and "What will happen next?".

2) Teaching instruction

After determining lesson's objectives as well as selecting a puzzling situation, the teacher initiates teaching. In this regard, he is capable of acting as below:

- Preparing learners and exploring exploratory methods: Teachers should command learners to what to do during the course. Moreover, He should prepare the students for activities.
- Providing the puzzling situation: During the exploratory learning process, the teacher provides learners with the puzzling situation. Arnheim (2014) stated that it is best for the teacher to do this in a way to draws the students' attention.
- Gathering data or experiments: At this stage, the learners collect the information they need in order to answer the question(s) and conduct the experiment either objectively or subjectively.
- Hypothesis and explanation: Once the students compile the necessary data and data and carry out the necessary tests on the phenomenon concerned, it is time to provide a description and make a hypothesis.
- Analyzing the explorations process: The purpose of exploring the process of analysis is that the learners carry out activities with the teacher's contribution that will lead to analyze their jaw processes. In this regard, the teacher can ask the students to return to their thoughts and realize at the same time they were thinking about the answer to the puzzle or the problem.

3) Post-teaching proceedings

Post-teaching proceedings, in the teaching method for exploratory learning, other educational methods include evaluating learners' activities and outcomes and providing some kind of feedback to them.

EMPIRICAL TEST

Considering the educational theories, learning is a consistent alteration in behavior which is developed by learning or experiment. How to design these behaviors in architecture students, as well as the kind of decisions they make during their design at design studios and their professional designs. Undoubtedly, choosing the right learning method during the course of education is very important in this way. Accordingly, the exploratory learning method is provided as a proper approach for architecture students learning by referring to experts' notions which have been published by the author (Zanjani, 2017).

Designing the Faculty of Architecture Courtyard

The students were asked to design a space called the yard of the Faculty of Architecture in the open space on the northern side of the university building the university architecture.

The profound purpose of the exercise:

1) Learning the measurements effects on mind:

- Duration: 2 weeks
- Entry gate: The impact of interspace on the feeling of confinement or emancipation

The effect of distance on solidarity:

- The vacuum can be considered a place of space whose spatial attributes are not controlled by objects around it, as two objects encounter an intermediate space and evolve each other as well.
- The enormous dimensions of an empty space and disparate proportions and the disturbance of the size of its perimeter structures cause the loss of confinement and lack of perceptual support from the observer.
- The more the distance between two structures increases, the lesser and punier the space between them would be. On the contrary, the shorter the distance is, the denser the spacious space would be. In between the two structures, the observer would feel the condensation as well as the lack of density

Description of the instruction design

1) Stage One: Pre-teaching Actions

- Determining objectives: In order to ensure that the conditions of the two groups are identical, in the direction of orientation, there is no explicit explanation regarding the purpose of the exercise. The explanation is that in the previous semester and in the lesson of understanding and expressing the environment in relation to the effect of dimensions on the mind for both experimental and control groups in the form of a plot practice was addressed.
- Selecting the puzzling situation: Students from both groups attended the first meeting at the site and visited the different sections of the site for an hour. Facing students without introducing the site and its specific conditions and creating questions in their minds about how to design on this great site, it was difficult to recognize the students themselves.

The Description that the chosen site was made up of two parts:

- Part One: The adjacent section of the faculty building was 3 meters high. (16 meters in 40 meters)
- Part Two: The second part in the code zero (40 meters in 50 meters).

The site lacks any privacy to the surrounding land, and this greatly increased the size of the site in the minds of the students. Meanwhile, in order to touch the size of the site, students were asked to measure the size of the site from the beginning to the end. After this stage, the two groups were separated and went to separate studios to continue their education.

2) Stage Two: Teaching for Learning

Prepare learners and explain exploratory methods: At this stage, the student at Atelier tried to persuade students to express their concerns and questions, and to write the questions in the student's own language in plain language. (Formation and Creation of Questions) Part of the concerns and questions in this section are as follows:

- The site was completely felt relaxed.
- The site did not have a clear border. Do we need to identify it? If needed how?
- The depth makes difficulty on the site. How should we deal with designing it?
- Both length and width of the site is huge. How should we deal with it?
- The sunshine and the wind were annoying on the site. (2 PM, April 15th) How could we deal with it?

Attention Stage: Experience space, touch positions and sensory recording: In order to achieve the goal of training and increase attention with intention and purpose, 6 different open spaces were selected among buildings of Zanjan University, the most important difference being in their overall and partial dimensions.

Distinctions:

- Different proportions in length and width
- Enjoying a clarified or unspecified size in general dimensions
- Having various degrees of constraints
- Small and large pieces

Similarities:

- Genders on the floor and the facades
- Colors on the floor and the facade
- Furniture and green space

Gathering data – Reminding stage: Initially we went to one of the places along with the students, and there was a description of how to view and access information and how to record the information. For example, in considering length and width sizes, they were asked to measure sizes by walking or to its height and proportions in approximate point of view.

Then, the students were asked to gather data on the manner of answering questions and previous concerns in two groups by accumulating in open spaces of technical school. In the interest of students to all the tangible and unimaginable factors in the space, students were told to record and record their observations within three parts.

- Physical form: What are the elements of the selected open space?
- Behavioral form: What do people do in that place?
- Emotional form: What kind of feelings would be initiated in that place?

Hypothesis and Description: Special emphasis was put on students to make observations with judgments, and this judgment should be presented in booklets to the classroom through the sentences as a cause and effect relationship. In other words, students must be specifically looking for both the elements and factors of the space architecture that has created a certain quality of space (including a particular sense) in space. For instance, some of the conducted theories of the two groups of students are as followed:

Group One

- The ratio of height to width causes a feeling of suffocating.
- The vast space has caused enthusiasm.
- The altitude difference caused the lack of integrity in space.
- The deficiency of specific border has caused ownership's uncertainty.
- High ceiling of the entrance has made it attractive.

Group Two

- The height of the building (about 40 meters) has led to the location of the site.

- The presence of long columns in the facade of the building. It has become attractive and interesting.
- Due to the presence of tall walls and low width, there is no possibility of space immersion.
- Enclosing the walls makes you feel uneasy.

Analyze the exploring process: At this stage, which was conducted at the studio, we tried to study every six spaces in a period of students. To be precise, all students expressed their observations and judgments and hypotheses in the previous section, and the items were written on the board and finally were concluded in the form of joint concepts. What was interesting to the instructor was the unparalleled participation of students during several hours of class in expressing their own judgments and talking about other students' comments.

3) Stage Three: Post-teaching proceeding

Recouping and Evaluation stage: As cited in introduction in order to provide a fleeting evaluation, the students were asked to participate in designing in two groups of test and control. Problem solving terms:

Design challenge in both large and small size: As mentioned, the site was composed of two parts:

- Part I: The adjacent section of the faculty building was 3 meters high. (16 meters in 40 meters)
- Part II: the second part in the code zero (40 meters in 50 meters)

The decision was to initially design students in two parts and proceed in the first part only to the garden pit.

Minimize the external restrictions: In order to be interested in the subject, as well as to reduce the limitations, no other demands from students were asked, and all the components of the environment were put on the student's choice.

Design problem solving was performed in three sections (for both test and control groups):

Questionnaire: The students were asked to answer these questions:

- What were your priorities in the design of the yard of the Faculty of Architecture? Express your solutions.
- If you are to create a cozy and intimate atmosphere (to sit down) in this part of the yard, state your architectural response in a few sentences.
- Discuss the reason for choosing the sizes of the spaces that form your yard.

Required plans for designing (plan, site sections, and perspective): Students prepared and presented 2 shots 50 in 70 to the class and each participated in discussions on them.

In the form of a fictional design: After completing the student design throughout the entire site (large size) and completing the presentations, students were asked to complete their design in the form of a fictional design at the deep part of the site (small size) and mention the differences.

Comparing the Test and Control Group

In this section, we tried to focus on the results to ensure that students were explicitly and directly referring to the dimensions for creating their own design qualities and answering questions from the questionnaire. Meanwhile, in order to increase the confidence and also to

prevent the possibility of the impact of the author's side-by-side look, the students' responses to the two faculty members of the University of Zanjan will also be taken into consideration and their views will be taken in this qualitative comparison.

1) Study and comparison of written texts and questionnaires included in the design of students in two groups of test and evidence

According to the fact that the questions were formed of three types of priorities, in this section, the level of students attention were measured and examined.

Table 1. Statistical comparison of questionnaires by each question

Questions	Test Students	Group	Control Group Students
Attention to sizes in shaping their design priorities (public valve)	7		1
Using sizes to create a cozy and intimate place (the sense of the window)	5		2
Pointing to the qualities created in mind in shaping the sizes (the size window)	9		4

Statistical Study: After the examination of the questionnaire, for more precise comparison, data were categorized both statistically and quantitatively in Tables 1 and Table 2. It has been tried to study the students' attention level on one or every questions in Table 2. Comparing the two statistical tables above shows the test group students are more specified in comparison with the epidemic attention.

Table 2. Statistical comparison of questionnaires

The level of students attention to the cognitive effects of measurements in design

	Test Group (12 people)		Control Group (11 people)	
Responding three questions	1	8%	1	9%
Responding two questions	8	68%	2	18%
Responding one question	2	16%	1	9%

2) Content study: The description of using measurements to provide qualities
In this section, there were efforts to specify the measurements valve based upon the student's perceptual quality (Table 3).

3) The Content Result of the Students Responses
Considering the above circumstances, it can be indicated:

- Restricting sizes (proportions as well as various constraints) was on the priorities of most of the students in order to form specific subjective qualities (enthusiasm, cozy and intimate, privatization, and companion) for teaching purpose.

- Using specific measures for developing subjective effects include (picturesque, preventing monotony, sense of glory) was mentioned by some students (Thematic expansion of teaching purpose).

Table 3. Students usage of measurements to create qualities

Subjective Quality	How to Reach the Subjective Quality of the Size Valve
Enthusiasm	Length and width appropriate proportion
Cozy and Intimate	Developing vast space
Privatization	Small pergola
Lack of Monotony	Lowness of a part of site
Create Privacy and Restriction	Low width routs
Creating Privacy	Chairs closeness
Picturesque	Use ceilings with proper height
The prospect and invitation	Avoid large pergola
Discussion environment	Place the element with altitude difference
Creating Sense of Glory	Using various measures
Companion	1.2 height obstacles
Defining Entry	Moving trees toward each other
Proportion	The space between chairs

3) The Content Result of the Students Responses

Considering the above circumstances, it can be indicated:

- Restricting sizes (proportions as well as various constraints) was on the priorities of most of the students in order to form specific subjective qualities (enthusiasm, cozy and intimate, privatization, and companion) for teaching purpose.
- Using specific measures for developing subjective effects include (picturesque, preventing monotony, sense of glory) was mentioned by some students (Thematic expansion of teaching purpose).

CONCLUSION

Following the damage identification (underestimating the perceived effects of dimensions on the mind in formulating and deciding on the dimensions in designing the students of the architecture of the University of Zanjan) and referring to the views of the professors with the experience of the base of the two major universities in architecture Analysis and comparison showed that all faculty members emphasize student-centered learning, learner-centered learning, and in this regard, exploratory education method is regarded as the appropriate method. Accordingly, the author examined the cited theory by defining educational steps on experiments and empirical test in Zanjan University. Considering the fact that multiple interferer factors, including students' personality differences and abilities as well as the determining presence of educational and environmental factors; according to the comparison

of statistical and content results, the instruction design, which is consistent with the results in the test group has been successful in a concise perspective. Consequently, the exploratory learning method has a desirable effect on the students' learning level.

References

- Arnheim, R. (2014) *Art and visual perception: A psychology of the creative eye*. 3th. USA: University of California Press.
- Bruner, J. S. (2009). *The process of education*. 5th ed. Harvard University Press.
- Cruikshank, D. R., Jenkins, D. B., Metcalf, K. K. (2005) *The act of teaching*. 2th ed. McGraw-Hill Companies.
- Eggen, P., Kauchak, D. (2001) *Educational Psychology*. 2th ed. Windows on Classrooms.
- Fetsco, T., McClure, J. (2005) *Educational psychology: An integrated approach to classroom decisions*. Allyn & Bacon.
- Lang, J. (2014) *The creation of architectural theory, the role of behavioral science in environmental design*. 1th ed. Iran: Tehran University publication.
- Light, G., Calkins, S., & Cox, R. (2009) *Learning and teaching in higher education: The reflective professional*. 7th ed. Sage publication.
- Muijs, D., Reynolds, D. (2010) *Effective teaching. Evidence and practice*. 2th ed. Sage.
- O'Donnell, A. M., Reeve, J., Smith, J. K. (2011) *Educational psychology, Reflection for action*. 2th ed. John Wiley & Sons.
- Ormrod, J. E. (2008) *Educational psychology: Developing learners* (6th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.
- Seif, A. A. (2015) *Modern educational psychology*. 3th ed. Iran: Psychology of learning and education publication.
- Zanjani, A. R. (2017) An Inquiry into Teaching the Perceptual Effects of the Measures to the Students of Architecture. *Journal of History Culture and Art Research*, 6(3), pp. 999-1016.