THE EIGHT GRIDS: A NEW METHOD TO ENHANCE STUDENTS' SKETCHING SKILLS IN THE SCHOOLS OF ARCHITECTURE

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Abstract

Sketching is one of the required courses for architecture and design students in higher education since it is considered a necessary skill for architects and designers. However, the lack of visualization skills and practice, students were met with difficulties in grasping the complex concepts of this course, concurrent with the teachers' lack of familiarity with the various methods. The aim of this paper is to find a new method that allows students to carry out their sketches by examining the problems faced by first-year undergraduate students at the Faculty of Architecture, Design & Built Environment in BAU, Lebanon. To achieve the research aim, a qualitative research methodology is used among subjects involving 120 first-level architecture students with poor visualization abilities in general and is considered to be the key reason that affects the success of students in sketching. These students were tested before beginning the course, during, and after a year of practicing. Sixty students got the method before they began studying the lesson, while the remaining sixty students studied the course without this method. They were then tested after finishing the course, where the method was found to help students grasp perspective more easily, which was favorably mirrored in the student sketching exercise.

Keywords

Architecture, Architectural School, Innovation, Perspective, Method, Sketching, Visualization.

1. INTRODUCTION

A Sketch is a translation of the appearance of a concept or a character into a comprehensible or useable form. They are often considered as images containing a set of forms describing an entity or thought as a representation, not necessarily including a statement of intention or a program (J.Gibson1979). Whether they are thoughts, perceptions, or feelings, all images express something, and these interactions vary from the real to the abstract. Drawings and sketches are forms of representation in architecture, since they may reflect a mental impression of a setting's visual perception (K.Smith, 2008). Indeed, Most of our knowledge is acquired through pictures (J.Gibson 1979).

In his book "Understanding Architecture Through Drawing", ten architects - who were selected because of their reputation as 'designers', as evidenced by the architectural awards won - were interviewed by Brian Edwards, as they explained their ability to generate ideas in their mind, and then transfer them to paper in sketch form (Brian Edwards, 2008). Admittedly, few architects can verbally express their thoughts, while sketching is the way for them to explore the concept at the beginning of a project, but it can be used also in all phases of the design process, similarly, it is an analytical record after the building is completed.

Drawing may lead to architecture, the architects can "lead" their projects through drawings and sketches, and the line movement can also "lead" the architect's eyes and mind (K.Smith, 2008). The act of drawing encourages interpretation; Richard Wollheim expresses this understanding when he writes: 'to see a drawing as a representation of something is no longer to take it, or to be disposed to take it, for that thing: it is rather to understand that thing by it'(Wollheim, 1974) .

Fig.1: One of Zaha Hadid Sketchbooks
(Source: Luke Hayes)

Fig: 2: Norman Foster Sketchbook1975-2020
(Source: Norman Foster Foundation)

Despite the importance of drawing and sketching in the phases of learning and designing, their use is diminishing because of the rapid development of computer architecture and design software, although they are highly continuous and complementary. Architectural sketching a fundamental tool that architectural students practice within the early stages of architectural school, first-year studio, and this practice develop with further years, as the school of architecture was based on manual practice. Nowadays, digital imaging and design-based software offer the students a less stressful and fast way of production in architecture, thus sketching is transforming into a first-year studio practice that is forgotten in the future. Henceforth, digital skills are passing manual skills. However, it is still required as a common communication tool between students and their teachers. Consequently, thus hand skills remain a powerful tool for designers especially in the early stages of design and digital imaging does not offer such abilities, and thus declination in its practice results in the declination in the design ability.

Therefore, first-year students were selected for evaluation after completing the freehand drawing course. Accordingly, it was found that most of the students understand the rules well, but they have trouble imagining depths and proportions. Since most of the books and references to learn perspective have detailed most of the rules and even mastered in clarifying them (Figure 3). However, they required students to rely on their imagination sometimes, note that most of the users of these books are beginners and their imagination is still weak (M.Fava, 2019). Besides, most have problems in imagining the compositions due to their inability to visualize three-dimensional volumes and have difficulties in understanding the structure of three-dimensional objects from different angles. Although most of the design fundamental teachers master sketching, they are not familiar with all the rules. They rely on their intuition to visualize and pass their techniques on to their students who in turn do not have the experience, which makes starting sketching a great obsession despite its simplicity.
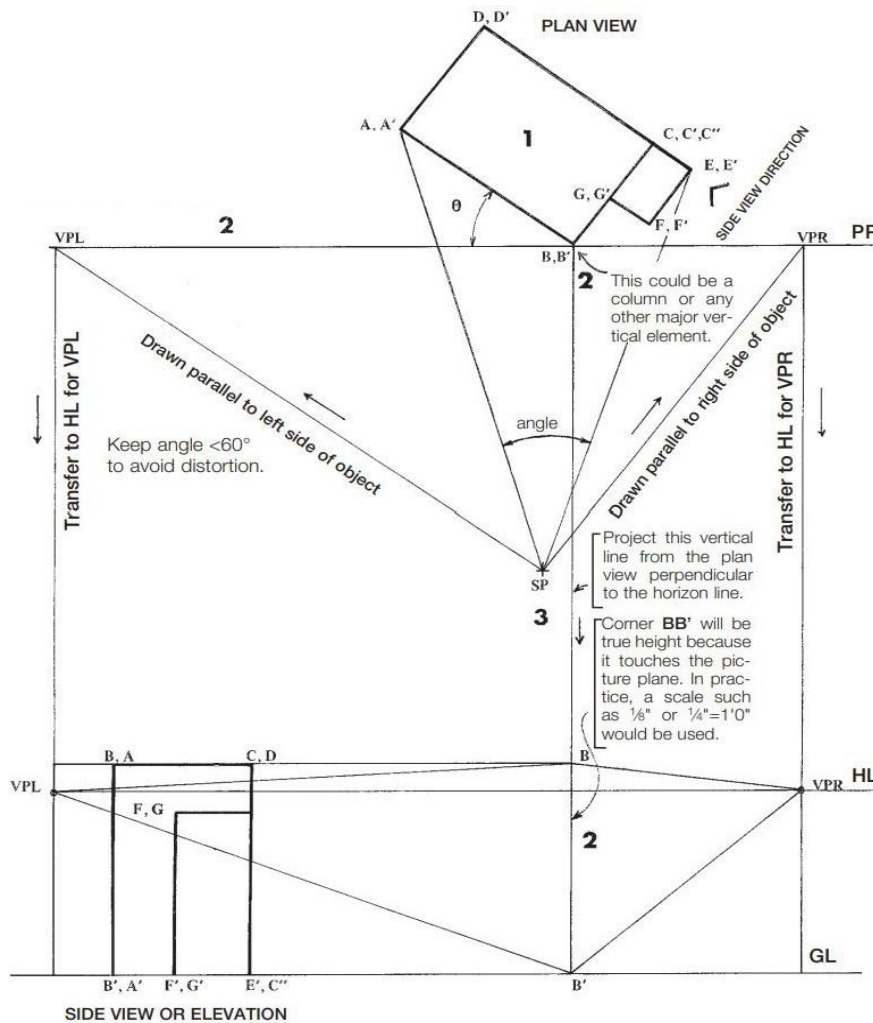
Fig.3: The Office Method, an example of one of the more popular traditional methods (Source: Architectural Drawing, A Visual Compendium of Types and Methods, Rendow Yee)

2. METHODOLOGY

This paper relies on theoretical materials to introduce perspective drawing, types and uses. Also, a questionnaire with around one hundred twenty students from the faculty who registered for the sketching course was conducted - since previous researches claimed that first-year architecture students have low visualization skills - to discover the obstacles they face in a learning perspective. This research aims to facilitate obtaining better proportions while they are drawing through a new method. Subsequently, students will be separated into two groups, the first group consists of sixty students who learned sketching using the proposed method before start its principles, while the other group learned sketching using the conventional method without introducing the proposed one. Finally, the effectiveness of this method is evaluated through a comparison between the two groups
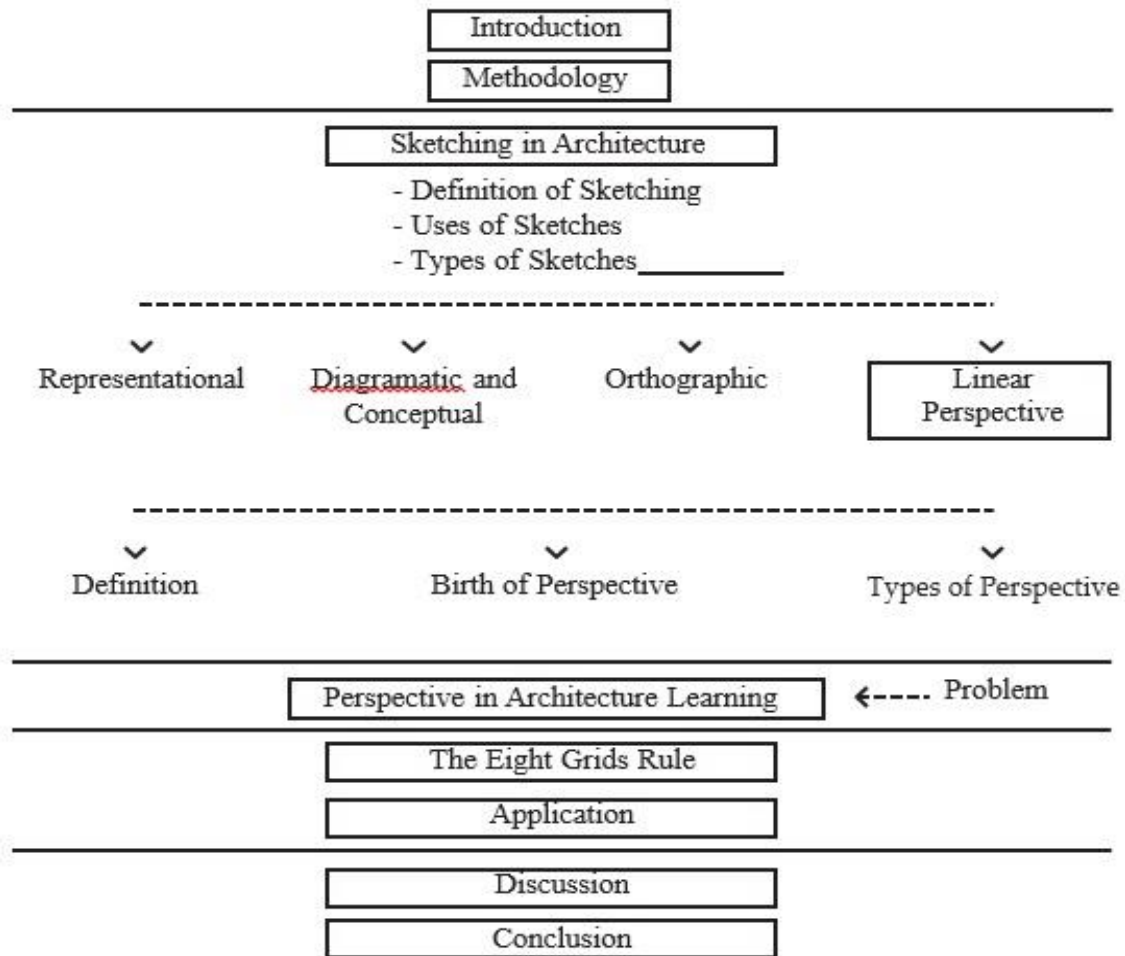
Fig.4: A Diagram that shows the paper structure

3. SKETCHING IN ARCHITECTURE

3.1 Definition of Sketching

In 1681, Baldinucci wrote in Vocabulario Toscano dell ' Arte del Disegno: "Sketch/sketches: whatthe painters call those extremely light strokes of the brush or pencil which they use to outline their concepts without elaborating them to any greater detail; that is what they call sketching…". Squizzi,from squizzare, according to the Italian language, means to run out and pour out forcefully (Oechslin, 1982). According to the Oxford English Dictionary, a sketch is a brief description or outline "to givethe essential facts or points of, without going into details".

As the sketch definition implies, it is often valueless physically, notoriously imprecise, and seen as a means to communicate, or find something, rather than as prized objects in and of themselves (K.Smith, 2008). It takes many physical forms, but its similarities lie in why and how architects use it (K.Smith, 2008). Indeed, the sketch can portray an important mode of comprehension, as MauriceMerleau-Ponty expresses when discussing Klee and Matisse: 'the line no longer imitates the visible; it"renders visible"; it is the blueprint of the genesis of things' (Merleau-Ponty, 1964). The definitionof architectural sketches needs to be extended and viewed as illustrative of their use in the design process.

Sketches are considered catalysts for the mind. They are considered the medium of change, in which the thinking process occurs, to test out variations through the process of "taking shape" in search for the design form (Meisenheimer, 1987). For this reason, this technique is more than a tool for recording, as Kahn says: "There is no value in trying to imitate exactly. Photographs will serve you best of all if that is your aim. We should not imitate when our intention is to create – to improvise

… The capacity to see comes from persistently analyzing our reactions to what we look at, and theirsignificance as far as we are concerned. The more one looks, the more one will come to see." (Kahn,1991).

3.2 Uses of Sketches

Architects frequently use sketches in design to discover, attain knowledge, accompany brainstorming, and find allusions, or associations. Besides, they employ it to communicate with colleagues and themselves, to record a likeness, or a fleeting impression, and to visually test abstract conceptual forms, since most of them interact with people. Bilda and Gero concluded that, in comparison to relying entirely on memory, architects are more effective when using imagery. "From the first 20 minutes of the session to the remaining time in the sessions, the overall cognitive activity in blindfolded condition each time dropped below the overall cognitive activity in sketching condition" (Bilda and Gero, 2005). The sketch becomes the tool that communicates ideas in an office and helps to convey emotional or poetic concepts as well. The architect plays the role of a manipulator of images who can impress his client with the capacity to create an illusion on paper. (K.Smith, 2008). Another study by Masaki Suwa, John Gero, and Terry Purcell at the University of Sydney questions how a designer can "discover unintended visual/ spatial features in sketches". Three types of unexpected findings are classified by these researchers:

- The first: a unique organizational or spatial relationship never before seen in the process.
- The second: an analysis of a texture or form, which is basically a reinterpretation of the original component.
- The third: to "re-perceive an implicit space between depictions" (Suwa et al., 1999).

As Fraser and Henmi suggest, sketches have two lives: the first one is the dialogue with the architect at the time of the actual act of drawing, and the second, during which others view and interact with it. "The influence of drawing then exists independently, acquiring its own voice and its own history through many acts of viewing and interpreting" (Fraser and Henmi, 1994).

3.3 Types of Sketching:

3.3.1 Representational

Drawing from nature is vital to the construction of the hand-eye loop of the brain. The more you sketch, the more you look at the world. Sometimes, before students begin painting, their art does nothave a "right shape;" in other words, it is not in the right proportions. The act of drawing promotes interpretation; Richard Wollheim communicates this understanding when he writes that 'seeing a drawing as a reflection of something is no longer to take it or to be able to take it, for that thing: it ismore to consider the thing by it' (Wollheim, 1974).

3.3.2 Diagrammatic and Conceptual

In the design thinking process, diagrams and conceptual drawings are integral components. They are indeed the tool by which the designer creates, organizes, and formalizes his or her designs with choices. Such sketches help to illustrate and provide the design with a methodological anchor. Conceptual diagrams represent an abstract language that within the architecture environment must be understood and used properly. It is by graphic diagraming that one establishes a design approach and helps to express an interpretation of the basic design concept (Figure 4). Elements like arrows, nodes, lines, and other symbols allow beginners to use visual tools to discuss concepts. Schön understands how the action of sketching is part of developing a certain problem-solving operation. (Schön, 1983). Sketches are used at several stages of the design process, so that these uses can fall into a variety of fields that could be clustered together, such as exploration, collaboration, simulation, documentation, and assessment. In several stages of design, the consistency of the mark is significant, as the individual line creates an association in the architect's mind (K.Smith, 2008).

3.3.3 Orthographic

Scaled plans, elevations, and sections are architectural drawing conventions that allow the depiction of three dimensions on a smaller scale. These multi-view illustrations are the product of orthographic projection and help to represent a three-dimensional form—like a building—in some similar two- dimensional views. The architecture factors related to space, scale, and configuration can be analyzed with these predictions (Figure 6).

3.3.4 Perspective (or Linear Perspective)

The most accurate, lifelike views of the built world and the urban landscape are created through perspective sketches viewed from a fixed vantage point. Preliminary perspective drawings or sketches demonstrate form, size, color, light, shape, shadow, and spatial order. Presentation perspective concept sketches take on a much more precise aspect as a result of these and associated materials (Figure 7).
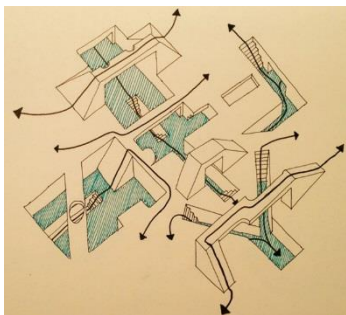

Fig.5: An example Architectural Diagram sketch
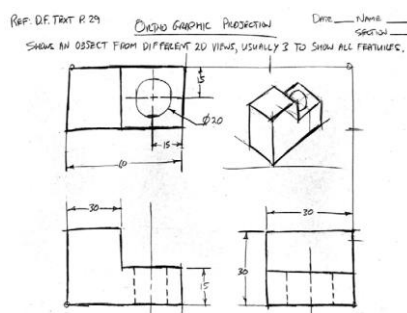
(Source: weburbanist.com)

Fig.6: An example orthographic sketch

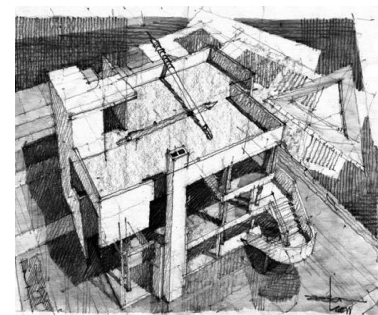(Source: orthographicprojections.weebly.com)

Fig.7: An example Perspective sketch

(Source: Andrei Zoster)

4. PERSPECTIVE

4.1 Definition of Perspective

Perspective is about creating an illusion of space on a horizontal plane, and the art of portraying three-dimensional structures on a two-dimensional plane. It aims to reconstruct the space and volumeoptical illusion by depicting them as we see them from a fixed location while looking at them. The lines that parallel intersect in perspective to a vanishing point in the illustration.

4.2 Birth of Perspective

It was invented in Florence at the beginning of the Quattrocento, at a time when some artists decided to render images more in line with human vision. The goal of the Renaissance artists was to produce art that would respect dimensions and closely represent reality, such as the creation of a linear perspective. While it is backed by limited evidence, it is held that efforts to establish a method of perspective started around the fifth century B.C.

In ancient Greece, as part of an interest in illusionism associated with dramatic scenery. However, even though Hellenistic artists could create the impression of complexity in their work, there is little indication that they grasped the mathematically rigorous rules that regulate proper representation. Besides, it was the first century B.C. display various forms of projection. While they break the rigid laws of one-point perspective, they also show a pragmatic awareness that lines intersect at any point on the picture plane parallel to the line of sight of the spectator, something that would not possibly have occurred through chance or calculation of the naked eye. It was only through the Italian architect Filippo Brunelleschi, who illustrated his values, and the writings of Leon Battista   Alberti, who wrote about the perspective and proposed a perspective construction, who, in addition to some artists before the Renaissance, such as Giotto, attempted to use perspective in their paintings. Since the

studies of Brunelleschi and Alberti, almost every artist in Florence and Italy attempted to depict three-dimensional objects in their drawings using a geometric perspective. From Donatello, Masolino, and Paolo Uccello to Perugino and the great High Renaissance masters, Leonardo, Raphael, and even Piero Della Francesca, who, in his Della Pittura in 1470, wrote about this artistic technique (De Prospectiva Pingendi). Della Francesca coated things in every region of the picture surface and used several illustrated figures to describe the mathematical principles while Alberti's experiments were limited to presenting a general basis for perspective (useum.org).

Since painters did not often work in close collaboration with each other, development was relatively erratic. In turn, medieval art was a reflection of the reality that was religious, rather than human. By canonical practice, the prominence of the figures was set such that the most important figure in the painting was the largest and that all other figures were represented decreasing in size regardless of their place within the pictorial space, comparable in principle to Egyptian art. (www.essentialvermeer. com).

4.3 Types of Perspective

4.3.1 The Linear Perspective

In areas where long rectangular surfaces begin near the spectator and recede into the distance, suchas long, straight paths, linear perspectives are most acutely observed. The basic experience is that, inthe distance, the parallel lines appear to come together. Lines that obey the laws of linear perspective,and each has a line grammar, represent the edges of surfaces. The use of the grid of perspective is crucial to nailing down the linear perspective definition.

a- One-point Perspective: It's a type of linear perspective that uses a single key vanishing point. Ina one-point perspective, only one part of a three-dimensional subject appears to be receding from theVPs. It's also the "lines" that run in the direction you're looking at.

b- Two-Point Perspective: It is a type of linear perspective that uses two major vanishing points, mostly used in architectural drawings.

c- Three-Point Perspective (Bird's-Eye, Eye-Level, and Worm's-Eye Views): The three-point perspective is the most complex method of perspective painting. The three-point perspective uses three sets of orthogonal lines and three vanishing points to draw a single object.

4.3.2 The Paraline Perspective

Culturally, the Western visual scheme is skewed towards a linear viewpoint. To other cultures and at other moments, praline the drawing was more "correct" than that using linear perspective. When objects are small compared to our field of view, their edges and surfaces appear to maintain their proportions. The level to which the edges disappear is so limited that our understanding of their balance in length and angle can easily be more significant than their conformity to the linear perspective. Lines that obey the laws of paralytic drawing conventions are represented by the edges of surfaces. The edges of parallel surfaces remain parallel and preserve direct relationships of measurement with each other and the represented thing. Verticals remain vertical and, at defined angles, the other axes slope.

4.3.3 The Orthographic Perspective

The orthographic perception is less suitable to our eyes and needs knowledge with its conventions to be able to interpret it. It represents a single entity with several sketches, and it involves the ability to arrange the drawings in your head. Things are observed from an orthographic point of view because their surfaces are relatively smooth and we are standing right in front of and facing them. When we step away from an object, our perception correlates more closely to an orthographic drawing. The edges of the surface are represented by lines that obey the principles of orthographic drawing. Parallel edges remain parallel and preserve clear defined connections with one another and the thing being represented. Verticals remain vertical, horizontals remain horizontal, and a point is depicted on the depth axis.

5. PERSPECTIVE IN ARCHITECTURAL SKETCHING LEARNING

Sketching is known to be a significant starting point for the conceptual phase we call 'design' (B. Edwards, 2008) which has two purposes for the artist – it helps him or her to capture and evaluate actual examples, and the sketch offers a forum for checking the presence of an imaginary object, which may enhance the level of understanding of the dynamics of modern architecture. (K.Smith, 2008). It has a social component, as Edward Robbins notes. It unites its tangible manifestation with the architect, who creates cultural objects and works as a social educator (Robbins, 1994). In general,architects use experience and visual comparison as a relational strategy to convert and edit existing photos in their focus (B. Edwards, 2008).

For too long, sketching and freehand drawing have been used as a point of entry into painting, as opposed to the basic point of departure for design (B. Edwards, 2008), but we need to distinguish between sketching in architecture and art colleges. While the concepts of perspective are important in both cases, their influence in architecture is stronger, because sketching is a technique that enables the visual environment to be understood. Most studies have found that issues with students studying architectural sketching occur due to a lack of visualization abilities, where students have trouble visualizing the images provided to them (Lee and Widad 2004, National Science Foundation 2006).

This, too, is apparent in the role of perspective in architectural sketches, and the perception of its values is clearly expressed in the sketch proportion of transparency, regardless of consistency. Aswe mentioned, its function is to communicate, think, and organize. Nevertheless, when electronic applications interfere with teaching curricula, it gets more complicated and complex to clarify the concepts of viewpoints relative to the collection of BIM programs. This involves designing new guidelines that can help speed up the process of sketch learning. Professionals must then simplify these concepts by developing new laws that incorporate and explain more complicated ones. Only because a student is given drawing training doesn't mean they're going to be inspired to sketch (Jorge G. Cham and Maria C. Yang, 2005). Our age has seen a great leap in computer technologies, but thefoundations of education curricula are unchanged, like learning perspectives that improve students' abilities to imagine correctly.

Additionally, most teachers, while being beginners, rely on the imagination of students to envision.In some interviews with teachers from various institutions in Lebanon such as Beirut Arab University,Notre Dame University, Lebanese University, and Lebanese American University, it has been discovered that they do not know all the values and focus on their experiment and skills, which almostreflects adversely on teaching because most students are newcomers, those who do not have staminaand use computer programs to save effort.

In recent times, a bunch of books has emerged to demonstrate the foundations of perspective in- depth as well as fascinating illustrations of different shapes. In addition to the videos that composea sequence, it offers insight examples for beginners from the early stages through to the practice of shape. But the questionnaire (Figure 8) that was conducted on the students at Beirut Arab Universityshowed that there is still a missing link, which depends on people's ability to imagine, in which mostpeople are falling, particularly in the transition from 2D to 3D.

Question 1	Did you study in a private or government school?	78 %	22 %	Group 1 and 2
Question 2	Did you have art courses in your high-school's weekly schedule?	20 %	0 %	Group 1 and 2
Question 3	Did you learn how to analyse proportions and three-dimensional volumes?	65 %	35 %	Group 1 and 2

Question 4 — What was the biggest problem you faced in sketching? — Group 1 and 2

Proportion	85 %	Shading	93 %	Depth	95 %

Question 5 — How much did the sketching course provide help? (From 1-5) — Group 1 and 2

5	20 %	4	30 %	3	35 %	2	15 %	1	0 %

Question 6 — How much did the new rule course provide help? (From 1-5) — Group 2

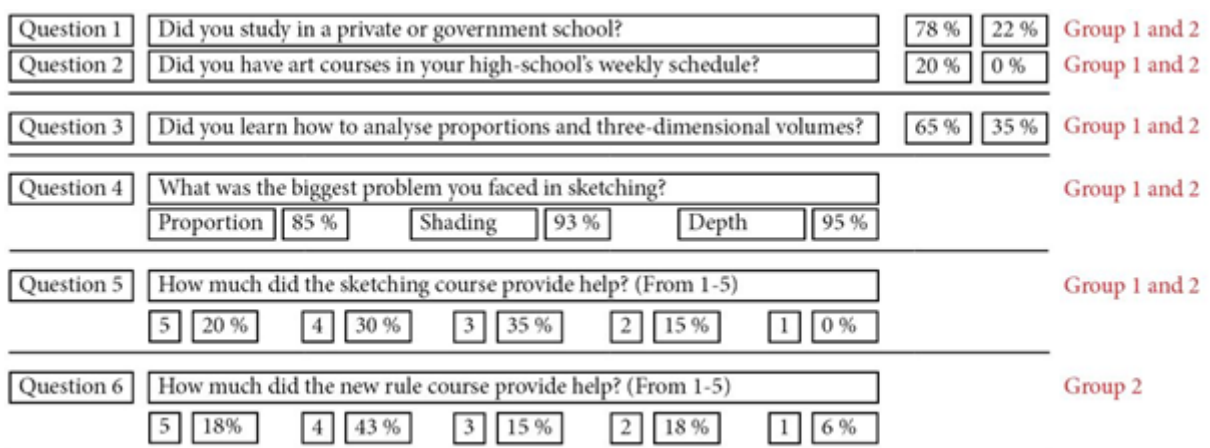| 5	18%	4	43 %	3	15 %	2	18%	1	6 %

Fig.8: A Diagram that shows the questionnaire's results

6. THE EIGHT GRIDES METHOD

According to Marunic and Glazar (2014), visualization skills refers to the ability to understand three- dimensional objects from two-dimensional images. In architectural sketching, there are many teaching and learning tools that have been introduced with the integration of various techniques such as the virtual environment. However, these available tools still cannot supply all problems mentioned above and which are mostly the same as studies by previous researchers who studied regarding the problems that exist among students learning engineering drawing (Lee and Widad, 2004; Nincareanet al., 2013; Tsutsumi, 2004). Although the fundamentals of perspective drawing seem to be rather straight to the point, the possibilities of how you can apply perspective in your art are vast. Perspective is nearly synonymous with perception.

This proposed method that was devised depends on reducing all the complexity in the stage of learning to draw perspective in a way that transmits accurate proportions, thus forming a starting point for learning the more complex principles of this science. A scene can have a limitless number of vanishing points. but this method starts with a vanishing point in the middle which is considered as a vantage point, a place from which a scene is viewed. This method is applicable just in the case of a one-point perspective. It requires you to start by drawing eight squares, as shown in the figure below.

The eight squares play the role of the projection surface, where point C will be obtained, which represents a projection of point C ', and also point B is the projection of point B'. Thus, a single-point linear perspective of a square with its correct depth can be obtained, which forms the basis for starting drawing or sketching a cube and proceeding to learn more complex principles. In the following figure, we show the flexibility to apply this rule in various types of drawing and sketches (Figure 9).
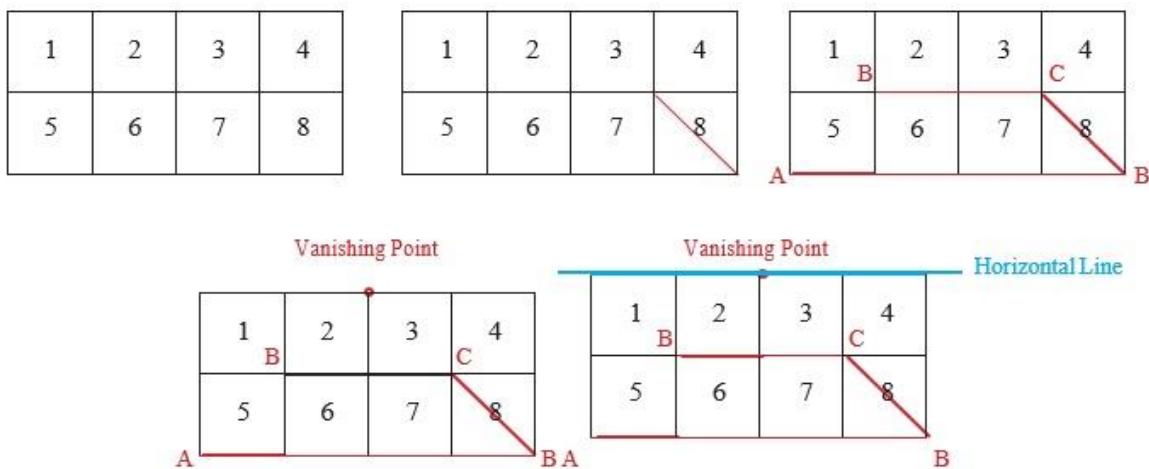

Fig.9: The steps of creating perspective according to the proposed method
(Source: The Author)

6.1 The Advantages of the Eight Grids Method

- By sketching eight squares, students will obtain the horizon line, vanishing point, and a true square plane without any use of their visualization abilities, making it easier to work and apply furthermore complicated principles of perspective, especially for beginners.
- This method itself is the stage of transition from two-dimensional sketching to a three-dimensional one (Figure 10).
- The square is considered as the important element in this method, which is employed as the first application in most books that teach perspective. Therefore, this forms a common base between this new method and the materials of the book.
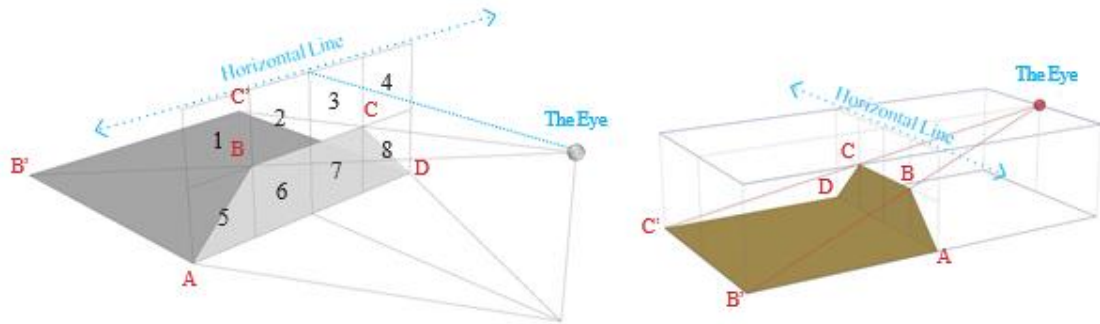
Fig.10: A diagram representing the projection through a rule in 3Dfrom 2 angles (Source: The Author)

6.2 The Disadvantages of the Eight Grids Rule

- The method applies to one-point linear perspective, but not to the other types mentioned above.
- This method depends on the square, so this square should be taken as the basis for the Sketch/ drawing.
- When this method is taught, some of the perspective principles education must be reorganized either according to it, so that the student does not get confused or offend these foundations even though they are completely interconnected.
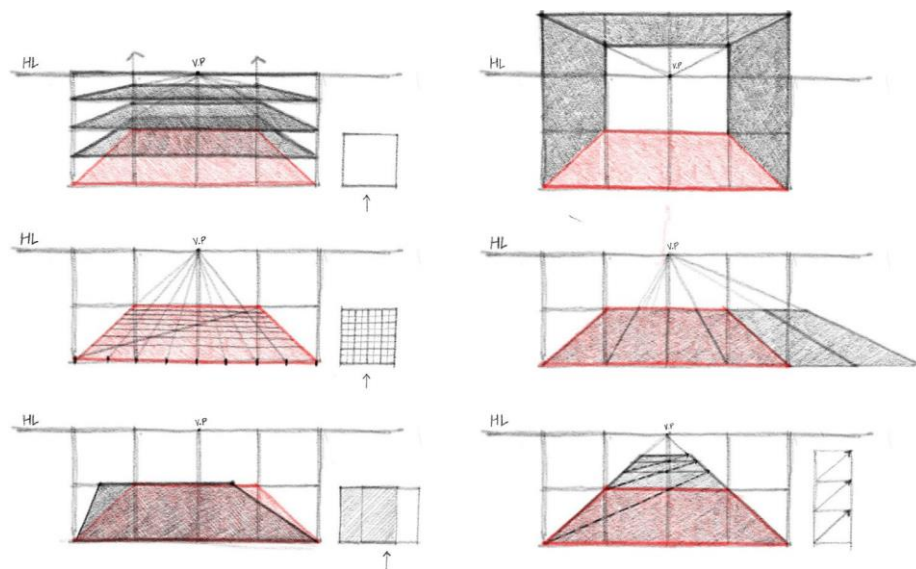

Fig.11: Examples of different uses of the rule (Source: The Author)

7. ANALYSIS

During the first semester, the principles of perspective sketching were given to students, as they submitted a sketch weekly, resulting in a remarkable improvement in their sketch qualities. In parallel,they were presenting different sketches in order to learn about the techniques of architectural rendering during a whole year (two semesters), as they had to use the principles they learned in the first one. The projects were evaluated three times, the first was at the beginning of the first semester in order toevaluate their level. The second was at the end of the semester when students have

finished learningthe principles of perspective, this evaluation shows the difference between the sketch quality before and after the course. Finally, the third and last was at the end of the year, that is, after a semester of practice.
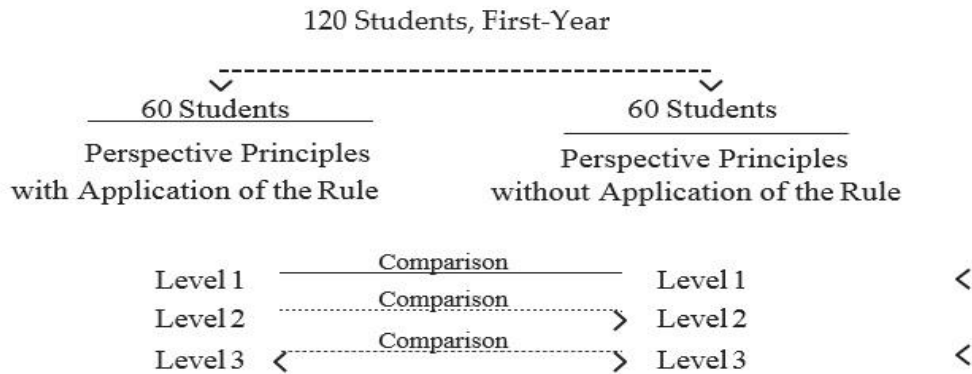

Fig.12: The Evaluation method of the rule
(Source: The Author)

This paper focuses on the impact of this new method on the development of student's abilities. They are divided into two groups, each group contains sixty students who are divided into three levels, the first level is those who were practicing drawing and sketching permanently, and the second one is for those who practiced drawing intermittently without knowing the principles of perspective, and the last level is the students who did not practice ever. Therefore, the comparison is also divided into three parts, comparing the first level of the two groups together, as well as for the second and third levels. The necessity to develop students' visualization skills is a must due to the lack of visualization skills among first-year architecture students.

For the first level in group 1, students who did not apply the method of eight grids showed a good understanding of the perspective principles, due to their permanent practice of sketching, model making, and painting as hobbies. They ran into many problems as they sought solutions through books and videos, which led them to discover many principles and foundations in learning drawing. For the first level in the group 2, students who applied the method showed very good results, the new method helped them review their drawings and evaluate their proportions. Their constant practice made them more familiar with perspective, yet they were critical of their sketches and drawings, especially in terms of proportions and depths. This convergence in the level is due to the importance of permanent practice, which developed the students' senses, so they became able to feel proportions and depth.

For the second level in group 1, students who did not apply the method of eight grids, an important development has been noticed in the understanding of perspective principles, which was well reflected in the quality of their sketches and drawings. However, most of these students continued to use the grammar they learned literally, while others showed greater sophistication by trying to sketch from slightly different angles. For the second level in group 2, students who applied the method showed faster development and the understanding of the principle of single-point perspective was omnipresent, and this encouraged them to sketch much more complex compositions, except that the result was similar to that of the first group. So, it becomes clear that the method helped students understand the one-point perspective faster, Which was reflected obviously on the provision of learning time, and led to a better investment of time in developing the students' abilities through delving into more difficult exercises.

The third level showed a great difference between the first and second groups, which proved that the method helped beginners more than those who practiced sketching partially or permanently. According to group 1, students who did not apply the method of eight grids, a slight development was observed in their abilities, therefore the proportions and depths did not witness the remarkable development. According to the questionnaire, the students of this level expressed their concerns in

sketching the main lines and imagining the correct depths and proportions to start (These problems usually occur when students are given unusual shapes of solids). As this problem appears at the first stage of sketching, it immediately causes boredom and failure. As for the students who learned the method, they started to draw flexibly. Although the quality was not very good, the drawing was clear and this is the goal. As for the quality, the practice is the only guarantor capable of developing it. For them, the problem of capturing the right proportion and depth was not present, as the method played the role of the necessary impetus to start. However, it should be mentioned that a large number of third-level students from the second group relied heavily on this method due to their limited use of sketching.

This comparison showed that students of the second and third levels are the most benefit from the method because the ability to visualize is considered their weakest, so this method has played the role of the driving force to go into learning to draw perspective. As for the first-level students, its impact on their work was less than noticed, and this was due to their constant practice of drawing and sketching, which gave them the ability to visualize depth and proportion almost correctly.
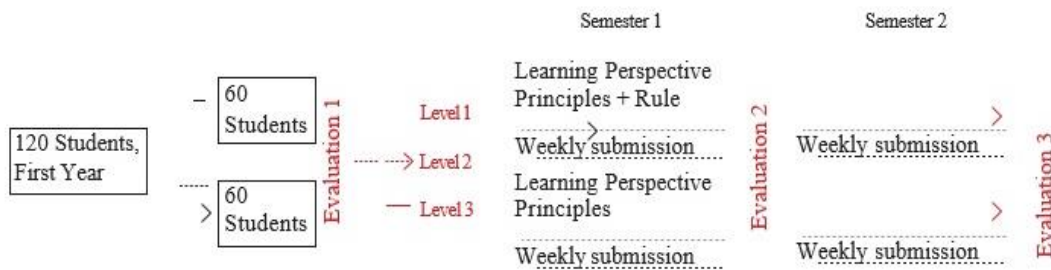

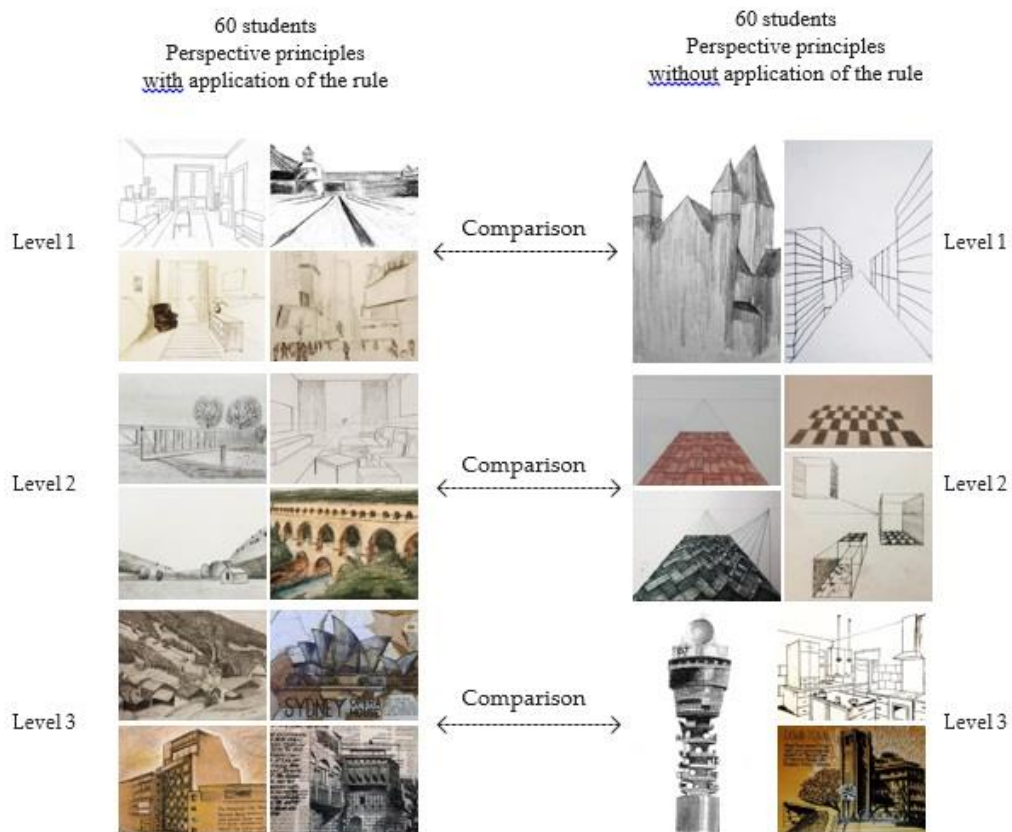Fig.13: The Evaluation Process (Source: The Author)

Fig. 14: Examples of the students' drawings (Source: The Author)

8. CONCLUSION

Many architecture undergraduates in Lebanon are provided with education in architectural sketching, but it is less common to use it during the design process. In this research, sketching importance is only considered in the role of the design process, as it is a contentious tool that should be considered as an official language in architecture institutions, but the problem is not its presence in the program of universities but its teaching, and its continuous use. So, it may become an official language in architecture and design. Fortunately, the problem does not lie in the educational programs, as the principles of perspective and sketching have a particular course in all architectural schools' programs in Lebanon, while it lies in the method of teaching and innovation.

This research recommends:

− The assistants who are responsible for teaching advanced courses should have visual abilities, a good understanding of the rules and methods of perspective, proportions, depths, and the ability to innovate in order to simplify information and bring it closer to the minds of novice students.

− Sketching in architectural design is not merely the ability to draw something accurately or realistically as in drafting, but the ability to represent and generate architectural clear and readable design solutions. Therefore, unless the students understand the basics of perspective, they will be unable to reproduce sketches with correct proportions and with well appropriate techniques, which causes them to abandon this technique especially during the availability of BIM and other software that help them visualize their design without the effort that develops their abilities.

− The common problems faced by students which are visualizing the three-dimensional objects can be overcome by the use of the new rule that helps them to start to discover and practice with good proportions, and make them more satisfied with the results. As it proved that the use of digital software such as BIM, could be utilized in order to develop the students' ability in visualization. In conclusion, it is hoped that the findings of this study can be a guideline as an effort to improve the quality of teaching and student achievement in perspective sketching.

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