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FROM EAST TOWARD WEST

Abstract: *In this paper, I would like to overview what I learned from Europe. I havebeen fascinated by European architecture and cities. I have always thought that architecture and cities were interesting because they all have their own places and histories. Here, while adding later analyses and related matters, my first study on European Plazas and the other studies are focused on.*

Key words: *European Plaza, Architectural Form, Cityscape, Streetscape. History of Architecture*

1. INTRODUCTION

The first time I visited Romania was when I took part in the ICEGD conference at Galati in 2007. Since then, I have been visiting Romania every two years. I have learned a lot from Europe and Romania, in particular.

2. EUROPEAN PLAZA

The first subject of my research, which started in the 1980s, was European plazas. In Europe, there are many aesthetic plazas in the city centers. I was attracted by such urban public spaces which were formed by the architecture surrounding them.

I studied architecture at Tokyo Institute of Technology, in Tokyo, Japan. In the 1980s, I belonged to a Geometry and Graphics research studio. At that time, Geometry and Graphics was taught by architecture and mechanical engineering professors. My mentor was Professor Masahiro Chatani, who was famous for "Origamic Architecture", which uses origami to express architectural forms.

In the 1980s, there were personal computers running on MS-DOS in my research studio. AutoCAD could run on them, but I did not think it was practical yet. At that time, personal computers used to maneuver by self-programming. In my twenties, I was obsessed with computer programming. I started to analyze the characteristics of architectural forms, such as European plazas, using personal computers.

The plazas are not too small or too large. The architecture that surround them is rich in variety, such as the presence of high towers and the continuation of the roofs in rhythmic patterns. Pleasantly surrounded by walls and windows, the plazas are spaces that makes me feel asand windows, the plazas are spaces that makes me feel asif I am in a theater.

Table 1

Form data of two Italian Plazas

Plaza		Firenze Signoria	Siena Campo
Area	**Plan**	9614m^2	11726m^2
	Elavation	9343m^2	10222m^2
	Opennings	2167m^2	1975m^2
Openings	**Ratio**	23,2%	19,3%
	Number	407	634
	Average	5,32%	3,12m^2

Firenze Piazza della Signoria

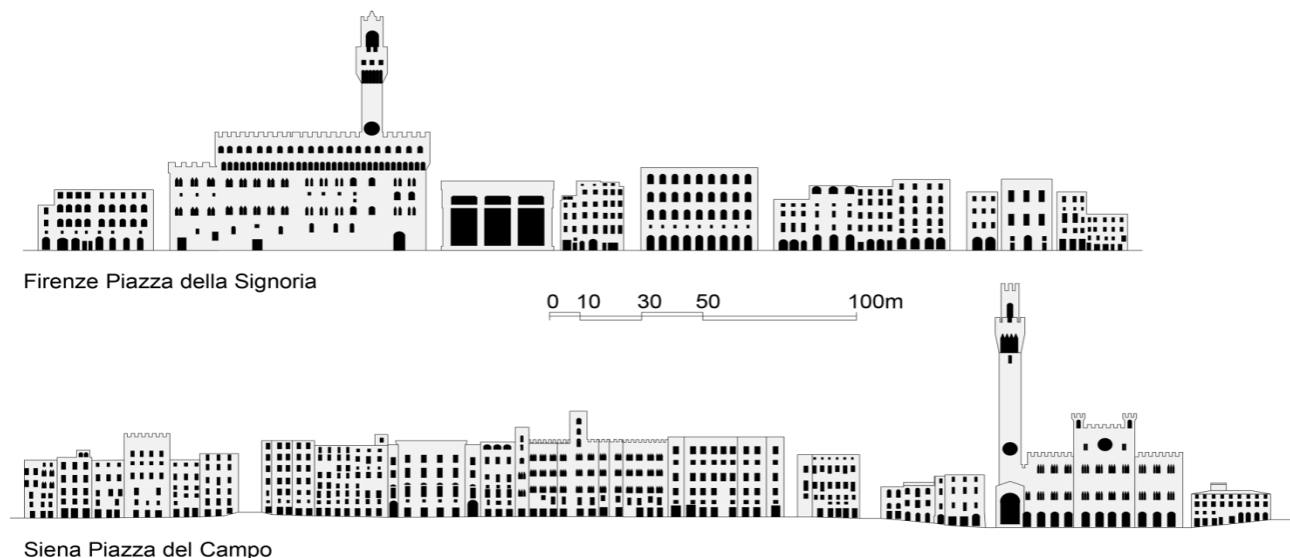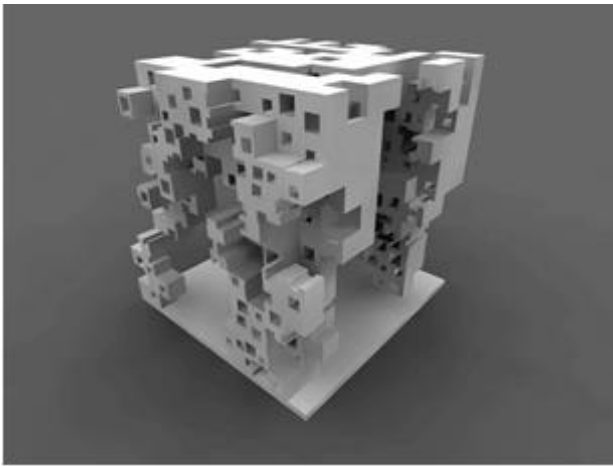0 10   30   50   100m

Siena Piazza del Campo

Fig. 1 Elevations of Plazas.

Fig. 2 Arrangement of Windows.

For example, Table 1 shows form data of two famous Italian plazas – Piazza della Signoria in Firenze and Piazza del Campo in Siena (Fig. 1).

By my calculation for 43 European plazas in Italy, France, Spain, Germany, etc. [1] (1991), the areas of the elevations were mostly equivalent to the plane area; the average of the opening ratios, i.e., the area of the windows and doors to the walls, was 24%; the average heights of elevations which surround the plazas was 42 meters; the skyline heights, i.e., outline of roofs, was varied with a deviation of 7 meters.

Although the forms of the plazas are various, some characteristics are common and some are different from each other. I consider the variations are more important than the averages. The forms of the plazas have individual characters that can be regarded as faces of cities. I was surprised at the diversity of the forms of the plazas with complicated and attractive forms that are generated by the walls and the openings.

3. COMPOSITION OF ARCHITECTURAL FORMS

The plaza is a space surrounded by not only walls but also surrounded by openings (windows and doors). So that one of the important characteristics of the plazas is the composition of the openings. Besides the opening ratio, I was enthusiastic to analyze their characteristics, such as the randomness of their arrangement, the repeating rhythms, etc.

I consider that analysis and design in architecture have opposite processes; the analysis is decomposition and the design is composition. When some characteristics are elucidated by the analysis, we might be able to utilize them more effectively in design.

At the ICEGD conference in Galati [2] (2007) and Cluj-Napoca [3] (2009), I presented a simple computer program that arranged boxes and windows (Fig.2). In the program, arrangement of the boxes and the windows – shape, size, number, etc. – were controlled; the windows were arranged not to overlap and to have certain distances from the edge of the walls or the adjacent windows.

By now, my students have used this program to design various openings, the opening ratios of the students' works are often around 20%, which is like those of the plazas (Fig.3). I think the opening ratio of the plaza is a magic number of the architectural form.

Apart from plazas, I also learned a lot from European architecture. I like complicated forms as well as simple ones. I love the Pantheon of Ancient Roman architecture (Fig.4), but I also love the Hagia Sophia of Byzantine architecture (Fig.5).
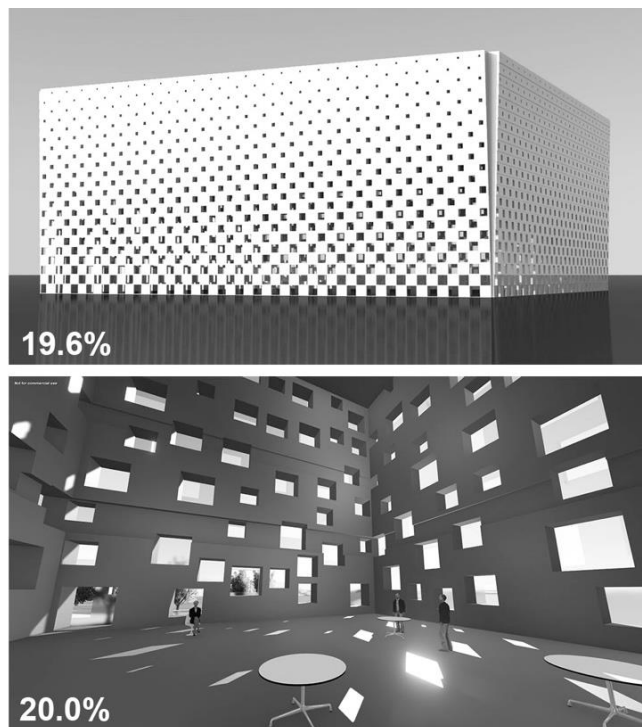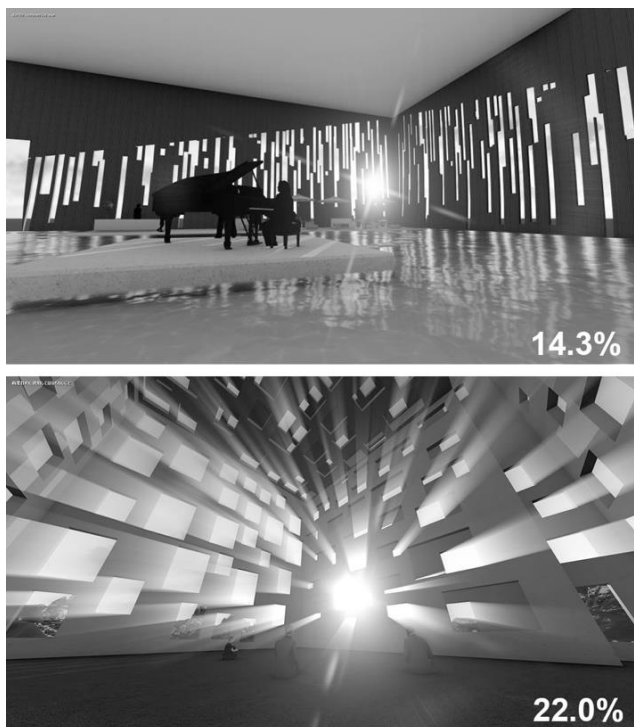

Fig. 3 Students' Works (The number indicate the Opening Ratio).
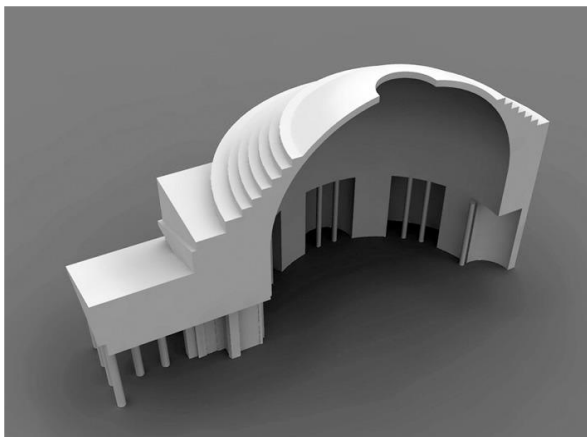
Fig. 4 Pantheon (CG Model).

While the space of the Pantheon is simple and static, the Hagia Sophia seems to have a complex form with consecutive domes. However, the Hagia Sophia has the clear-cut structure of a pendentive dome. Things that look complicated are often based on somewhat simple and clear principles.
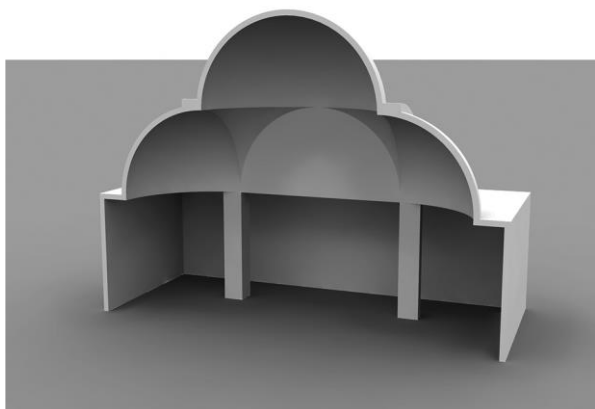
Fig. 5 Hagia Sophia (CG Model).

I like to design diverse forms based on simple principles by using the characteristic of variability. At the ICEGD conference in Timisoara (2013), I presented a design of a shelf using paper tubes with diameters between 50 mm and 750 mm [4] (Fig. 6). The arrangement of the tubes was determined by the computer algorithm, which was the same as that of the arrangement of the boxes or the windows. This circular complex shelf is not easy to use.

However, I like being challenged to store various things in diverse ways. At the Asian Digital Modeling Contest in Tokyo (2017), I applied this algorithm to design a museum composed of various spheres [5] (Fig. 7).
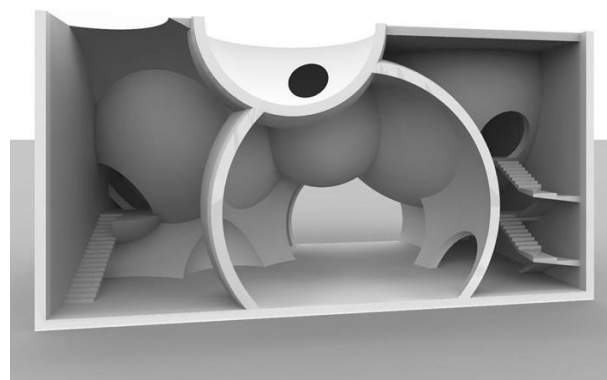
I can say that these works were inspired by the Pantheon and the Hagia Sophia.

4. COMPOSITION OF CITYSCAPES

I consider that the individuality of European cities and architecture is a result of their diversity in their fine balances.


Fig. 6 Paper Tube Furniture.

Fig. 7 Design by Spheres, a Project for Museum.

It is quite interesting to me that the building elevations, which are often lined-up along streets, has an individual design.

In Japanese cities, it is unlikely that building elevations will be tightly lined-up along streets. The arrangements and heights of buildings look cluttered and disorderly. I consider that the distinctive characteristics of Japanese cities lie not in configurations of front elevations, but in 3D configurations, which are comprised of an accumulation of buildings with various plans and heights.

Although there is a certain relationship between the plane areas and the heights, it is not a linear relationship. An important and interesting point of the form generation of Japanese cities is considered to be how to control the variables in building heights.

The 3D configuration of the cityscapes could be represented when the buildings were categorized into
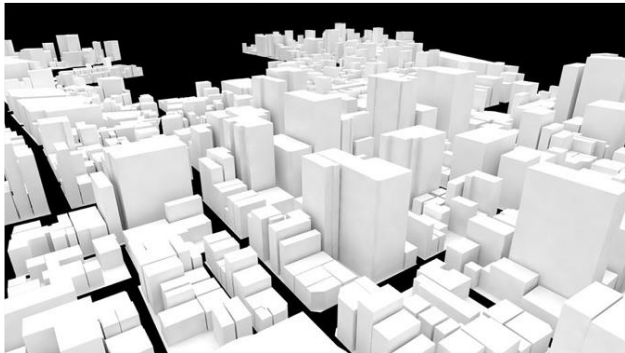
three groups of the small, medium, and large scales based on their plane areas, with average heights and deviations of the building height are given for each group.
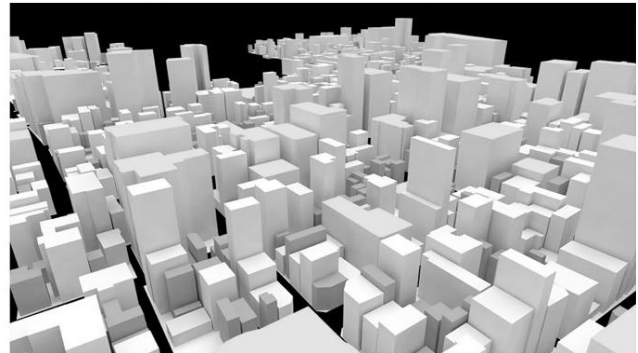

Fig. 8 Automatic Generation of Cityscapes in Asakusa, Tokyo (Left: Actual Heights, Right: Generated Heights).

5. PEDESTRIAN DECK AS PLAZA

Inside the cluttered Japanese cities, there are no public spaces like European plazas, which are surrounded by building elevations. However, in recent years, I noticed that the pedestrian decks built in front of the railway stations may possibly play the role of plazas.

As the railway network is highly developed in Tokyo and some major cities in Japan, spaces for pedestrians around railway stations have become significant. The pedestrian deck is an elevated pedestrian bridge that is constructed to redevelop the surroundings of railway stations. Although it is not a structure designed as a plaza, I presented a study on the similarities and the differences between the plazas and the pedestrian decks at the ICEGD conference in Brasov [7] (2015) (Fig. 9).

The forms of the plazas are mostly areal. However, most of the pedestrian decks have linear forms (Fig. 10).
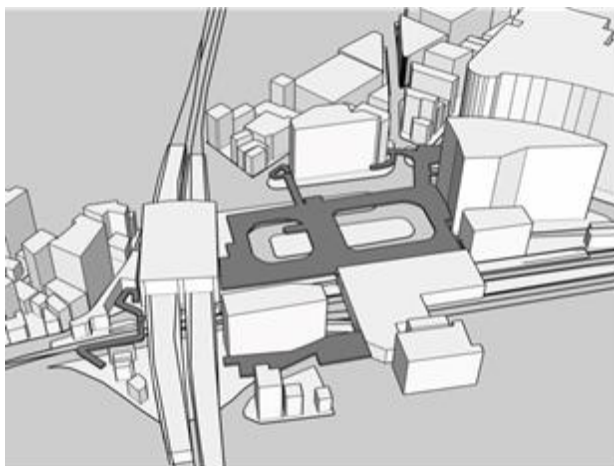
Fig. 9 Pedestrian Deck at Mizonokuchi, Kawasaki.

The areal and the linear forms are distinguished by calculating the ratio of circumference and area; in figures of the same area, the circumference is the shortest in a circle, and it becomes longer in a linear form. However, as the pedestrian deck may surround void spaces and sometimes have concave shapes, they have some aspects of areal forms.
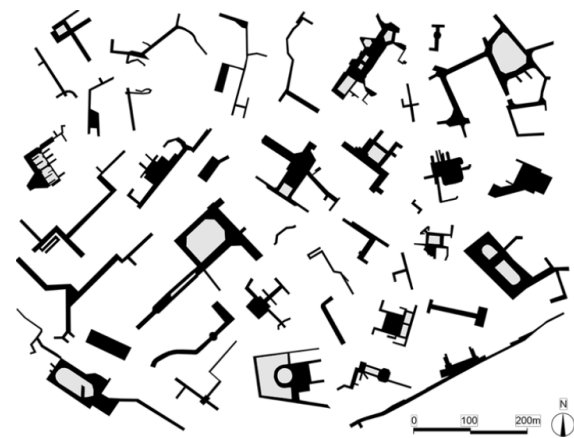
Fig. 10 Plane forms of Pedestrian Decks.

Although most of the buildings around the pedestrian decks do not face the circumferences and have certain distances from the circumferences, there is a sense of the surroundings. Also, since the pedestrian decks are spaces that float in the air, a sense of domain that is similar to that of the plazas is present.

When we observe peoples on the pedestrian decks, we can see various activities, such as meeting, performing, resting. The pedestrian decks also connect the railway stations with the pedestrian-preferred streets in the surroundings to form long walking spaces. For me, the Japanese pedestrian decks are public spaces that are somewhat like the European plazas.

6. COMPOSITION OF TOWNSCAPES

It is said that one of the significant characteristics of European streets is the D/H ratio, i.e., the ratio of the height of the building elevation facing the street to the street width. Ashihara (1979) pointed out that, "In the Medieval Italian cities, the streets are narrow, and the D/H ratios are around 0.5" [8].

According to my calculation of the D/H ratio of 35 streets around the famous four plazas in Italy – Piazza dellaSignoria in Firenze, Piazza del Campo in Siena,

Fig. 11 A Small Plaza in Kuromon-cho.

Piazza del Duomo in Pistoia, Piazza deiFrutti& Elbe in Padova –, the average D/H ratio for 223 elevations was 0.39 [9] (1993).

I mentioned at the ICEGD conference in Brasov (2015) that the streets surrounding the European plazas have various visual aspects that reflect the existence of the plazas. For example, the plazas are seen at the end of the streets or the plazas are beyond the winding narrow streets.

In traditional Japanese cities, building elevations seldom separate private and public spaces. As a contrast to modern commercial areas where the buildings are lined up, in residential areas, the walls of buildings are often set back from streets; there are many eaves and verandas on the walls; the forms of the roofs are complicated; the boundaries of streets are often fences; many private items overflow into the streets. The boundary between private properties and public spaces is often ambiguous. Thus, it is not easy to calculate the D/H ratio.

In the Japanese history, public places where people gather have often been inside fences or in open spaces next to particular facilities. Jinnai (1985) pointed out that in Edo (Tokyo in the 17th- 19th centuries), "many of the places where the entertainment such as plays was enjoyed by the public were on the premises of the shrines, in front of gates, or at around bridges." [10].

I calculated the D/H ratios and some other characteristics of various residential streets in the world by using an image processing method [11] (1995). Compared to Europe, Japanese streets have larger D/H ratios; the distance at which walls are setback from streets is distinctive and the spaces are cluttered. The characteristics of contemporary Japanese streets differ from traditional streets. There is spatial diversity in the streets of the world, so the cityscapes are interesting.

At the last ICEGD conference in Constanta (2017), I introduced a case in which I designed a small plaza in a typical Japanese residential area [12] (Fig. 11). In this district, there used to be traditional cityscape with black fences, but by now, it is disappearing. While making full use of the traditional cityscape, I tried to insert a little European-style space. However, I am not confident that I can call it a plaza.

7. HISTORY OF ARCHITECTURE

The oldest history book in the Japanese language was written in the 8th century. As there were no letters prior to that in Japan, the architecture of Ancient Japan has not been described at all. Since Japanese historical architecture was made of woods, all of the architecture before the 8th century has disappeared. Thus, European history is important for us. Regarding architecture, there are many things we should learn especially from European Ancient and Medieval architecture.

As Japan is far away from Europe, for Japanese students, it is not easy to visit Europe and see the historical architecture with their own eyes. Nowadays, it is easy for me to visit Europe, but it was hard in my school days.

Over the last few years, I have surveyed architecture and cities depicted in movies with students. Since various forms of architecture often appears in movies, I think that surveying of architecture and cities depicted in movies is an interesting way to learn about architecture.

On the other hand, I oversee Geometry and Graphics classes. In the past, Descriptive Geometry, which deals with hand-drawings, was essential. Nowadays, the importance of hand-drawings has shrunk and the use of computers is spreading. When my students create various CG (computer graphic) models in my classes, which require them to use CG software, such as SketchUp, Rhinoceros, Grasshopper, etc., they are often inspired by the forms of European historical architecture.
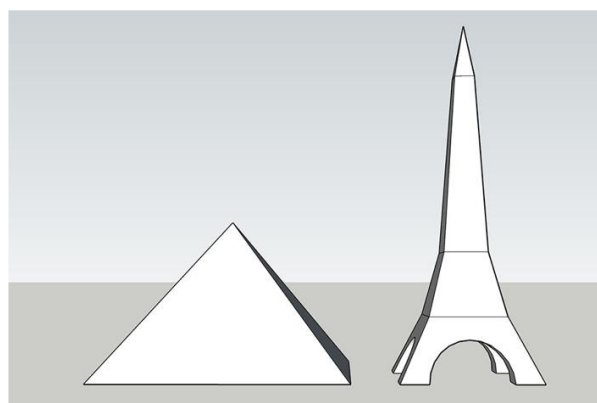
Fig. 12 Example models (Pyramid and Eiffel Tower).

Looking at Ancient Egyptian architecture, such as the Great Pyramids, we can confirm their largeness and massiveness. Even in modern times, the outer form of architecture with largeness and massiveness is the major characteristics (Fig. 12). The ancient Greek architecture which was composed of elements such as foundations, pillars, walls, pediments, etc., was the beginning of architecture as we know it today (Fig. 13). In Ancient Rome, attractive interior spaces such as those of the Pantheon are appeared (Fig. 14). The brilliant light that penetrate the architecture of Medieval Romanesque is impressive. The style that goes up towards the sky of splendid Gothic architecture has also had a great influence on contemporary architecture.
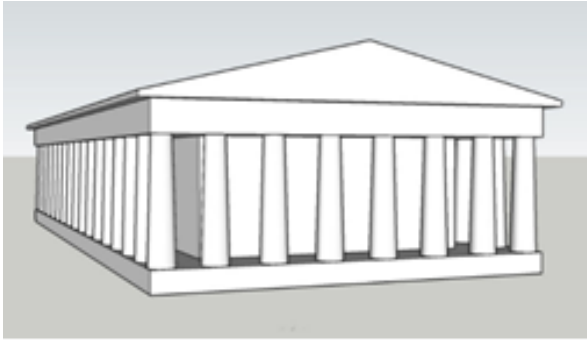
Fig. 13 1ʳᵈ Year Student's Work (Pantheon).

Fig. 14 3ʳᵈ Year Student's Work (Pantheon).

I consider that what is important for students is not how to use computers but what to do with computers. I think creating European architectural forms with various characteristics, such as largeness, massiveness, a composition of elements, internal spaces, light, and so on, is an essential study.

8. CONCLUSION

In this paper, I mentioned what I learned from the spatial composition of the West. I consider that architecture and cities around the world are interesting because they all have their own places and histories.

Other than the cities in Romania, where the ICEGD conferences are held in every two years, I have visited some cities in Romania, such as Sibiu, Sighisoara, and Arad. I have found many beautiful plazas and streets in Romania. However, there are many cities that I have not visited, yet. To me, Romania is another Europe, a little different from Italy, France, Spain, and all the other places I visited in my younger days. Romania has expanded my interests in Europe.

I am glad that I could come to Romania. And, I am grateful to all the organizers and the participants of the ICEGD conferences.

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