

An Experimental Educational Approach through Teaching the History of Architecture and Heritage for a better Practice in Architectural Design

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Abstract

Many architecture schools do not apply experimental learning in teaching theoretical courses like the history of architecture courses. There is a gap between what the students learn in theoretical courses like architectural styles in history courses and design practices. History classes are taught with a teacher-oriented approach, where students miss active and experimental learning. As a result, in the Egyptian urban setting, we find buildings designed using architectural styles, mostly classical designs, without respecting the technical, aesthetic, and human factors. Furthermore, nowadays, the Egyptian government is very active in constructing the new Administrative Capital of Egypt. The new city is located 45 kilometers East of Cairo, and it is planned to be Egypt's new business and financial center. The new Downtown of the new capital city, or "The new Garden City," is planned to reassemble Khedival Cairo's peculiar value buildings with the renaissance, neo-classic, eclectic, and neo-baroque styles.

As architectural education cannot be separated from current architectural practices, this paper introduces the research project results in the course "History of Architecture-level two." The course was taught in the first semester of the academic year (2018-19) in faculty of Fine arts, Cairo, Helwan University, Egypt. The students were asked to select a heritage building with a peculiar value from the Khedival Cairo, analyze it with the seven principles of design, and propose a design for a building's facades in the new Capital city Downtown.

This paper aims to introduce the results of the students' work, analyzing their designs, and the effect of experimental learning in developing their intellectual skills. The paper includes the results of a designed questioner answered by the students to evaluate the research project and the link between the history of architecture, heritage, and architecture design. The paper shows the importance of applying experimental learning and linking theoretical and practical courses for achieving better architecture practice.

Keywords:

Architectural Education, Experimental learning, Khedival Cairo, Heritage, Classical Styles.

الملخص:

معظم اقسام العمارة لا تطبق التعليم التجريبي في تدريس المواد النظرية مثل مواد تاريخ العمارة، مما يخلق فجوة بين ما يتعلمه الطلاب في المواد النظرية والممارسات التصميمية للمعماري بعد التخرج. حيث يتم في بعض الأحيان تدريس بعض المقررات مثل مقرر تاريخ العمارة من خلال نهج موجه من المعلم قد يفقد الطلاب تجربة التعلم النشط والتجريبي. نتيجة لذلك نجد في البيئة العمرانية المصرية مبانٍ مصممة باستخدام الطرز المعمارية، اغبها من التصاميم الكلاسيكية، دون مراعاة العوامل التقنية والجمالية والبشرية، إلا أن في الوقت الحاضر، الحكومة المصرية نشطة للغاية في بناء العاصمة الإدارية الجديدة لمصر والتي تقع على بعد ٤٥ كيلومتراً شرق القاهرة، ومن المخطط أن تكون المركز التجاري والمالي الجديد لمصر. تم التخطيط لوسط المدينة الجديد في العاصمة الجديدة لتكون "جاردن سيتي الجديدة"، ليمثل وسط المدينة الجديد القاهرة الخديوية ومبانيها ذات القيمة المميزة من طرز النهضة، الكلاسيكية المستحدثة، الانتقائية، و الباروك المستحدث. و نظراً لأنه لا يمكن فصل التعليم المعماري عن الممارسات المعمارية الحالية، تقدم هذه الورقة نتائج بحث تطبيقي قام به الطلاب في المقرر الدراسي "تاريخ العمارة - المستوى الثاني". والذي تم تدريسه في الفصل الدراسي الأول من العام الدراسي (٢٠١٨-٢٠١٩) في كلية الفنون الجميلة بالقاهرة، جامعة حلوان، مصر. طُلب من الطلاب اختيار مبنى تراثي ذي قيمة مميزة من القاهرة الخديوية، وتحليله باستخدام مبادئ التصميم السبعة، واقتراح تصميم لواجهتين لأحد المباني في قلب العاصمة الادارية الجديدة. تهدف هذه الورقة إلى التعريف بنتائج أعمال الطلاب وتحليل تصاميمهم وأثر التعلم التجريبي في تنمية مهاراتهم الفكرية. تتضمن الورقة نتائج استبيان مصمم أجاب عليه الطلاب لتقييم التجربة والربط بين تاريخ العمارة والتراث والتصميم المعماري. يوضح البحث أهمية التعليم التجريبي وربط المقررات النظرية والعملية لتحقيق ممارسة معمارية أفضل.

الكلمات المفتاحية:

التعليم المعماري، التعليم التجريبي، القاهرة الخديوية، التراث، الطرز الكلاسيكية.

1. Introduction**Experimental Learning in Architectural Education and the Gap in Research**

The master-builder who built the magnificent historic building acted as a designer and a builder, sometimes as an artist, a scientist, and an engineer. He combined the design principles with technical, aesthetic, and human factors in professional methods. After the industrial revolution, disciplines appeared within the construction and architecture fields; we can now find architects, landscape designers, and civil engineers who have to work together to produce the building environment (Graham & Geva, 2001). Currently, in the architecture schools, courses are designed separately; theoretical courses miss the experimental part and the link with current architectural challenges and practices. Furthermore, architectural education faces two main challenges: firstly, most architecture schools are still far from creating interdisciplinary design programs that link their academic programs and real practices. Secondly, the curriculum with a static syllabus does not associate the theoretical courses with practice and experimental learning.

Some scholars attempted to make interdisciplinary design education between architecture, engineering, and construction sciences. These attempts are discussed through literature, where a design-build studio is adapted to strengthen the relationship between the design and building

teams, i.e., Khan (2019), Irizarry et al. (2010), Graham & Geva (2001), Chinowsky and Robinson (1995). The authors of these works recreate the old master-builder in a modern form merging the construction and design teams by bringing together the students of design and building construction courses to complete a complicated building project and bring the real professional practice to the students.

On the other hand, there is a challenge of the limited use of experimental learning in teaching theoretical courses. Moreover, the link between theoretical and practical architecture courses is still limited. Furthermore, many institutions reduce the number of history courses in their academic programs. Hein & Van Dooren (2019) showed how some educational institutions, like their TU-Delft institution, reduced the history courses and oriented the curriculum towards future-oriented subjects. Hein & Van Dooren argue that architecture students must use what they learn from the history courses and use them in the design practice to reach stable future designs.

Attempts to move from teacher-oriented in teaching history of architecture towards student center approach, by applying multi participative methodology and active learning has been recently taken the attention of many authors, see Dave et al. (2018), Abouelmagd (2016 a) & (2016 b), Cimadomo (2014). In their works, they move from passive learning towards active, cross-disciplinary, creative teaching. Using IT tools and programs, in-class and outdoor activities, and applying analytical tools to help students analyze their work. Cimadomo (2014) has also noted that the shift from the traditional system towards European Credit Transfer System (ECTS) led to the necessity to design the curriculums and re-design the spaces by adding activities that allow self-studying hours, seminars, and students presentations (Cimadomo, 2014).

There is still a gap in research concerning the link between teaching history courses and real practices in the Egyptian context. Young architects are requested to design residential buildings using classical styles as requested by many Egyptian clients. When walking in any Egyptian street, finding a building decorated with classical elements is always possible in all urban centers across the country (see figures 1 and 2). Sometimes with the absence of strict regulations, the client decorates the façade of his apartment with classical elements even if this is far from the design of the rest of the façade (see figure 3).



Figures (1) Adapting classical elements on the facades of buildings of high-class building without applying the design principles, the results produces chaos (Fifth settlement, new Cairo, Egypt), (source: the authors)



Figures (2 and 3) Adapting classical elements on the facades of the middle-class buildings (Marsa Matrouh city, Egypt), (source: the authors)

Unfortunately, the inhabitants want to copy the gated committees' classical styles, which are also a distorted copy of the early 20th century Cairo's classical buildings. Classical styles are presenting the prestigious Egyptian society; therefore, the different social classes want to copy the styles. Nowadays, Egypt's new administrative capital plans to have a residential center as a copy of the Khedival Cairo with its neo-classic, eclectic, and neo-baroque styles. As a result, many questions raised how we can prepare our students to face the real challenges and requests of the housing and construction market? Moreover, can teaching history courses be oriented to support real practices? Furthermore, what will limit this course not to overlap the (Design studio) practical course?

A New Administrative Capital City for Egypt

The construction of the new Capital cities, the fall, and cities' flourishing has always been in progress through history for different political, religious, and socioeconomic reasons. For example, Amarna, the religious capital of Akhenaten in ancient Egypt, was constructed around 1347 BC, which was used to spread Akhenaten's one God new religion (Amarna, 2020). Constantinople named after the empire Constantine, constructed during the Roman empire in 330 AD, which become later the capital of (Byzantine Empire) the eastern Roman empire, and Bagdad, which was constructed by the victorious Abbasid in 762 AD, the capital city of the Islamic world for more than three-century (Petersen, 2011). Furthermore, Washington DC was built in 1790 AD as the United States of America's capital city by the American constitution (Sondermen, 2020). In all these different examples, the master-builders, architects, and planners of these cities adopted previous civilizations' architectural designs and styles. They milted them with the needs, traditional construction methods, and building materials of the new Capital city sites. The milting process took time, and the original styles' transformation led mostly to a foundation of magnificent buildings. In Constantinople, for instance, the classical orders were adopted, but constructors and master builders fast adapted the use of domes, pendentives,

marbles, and mosaics. Aya Sofia is a significant example of Byzantine architecture's greatness, with its classical base but with the high dome, half domes, pendentives, marble, and Mosaic. In Washington, DC. The neo-classical style was adapted as other post-British settlements to present its political power as the great Romans. The US. Capitol and the White House are designed with the neo-classical style, presenting two of the world's most potent political buildings.

In the 20th and 21st centuries, the construction of the new capital cities around the world continued. Other reasons were added, creating a neutral regional geographical location, allowing inland growth, crowding old capital cities. For example: In 1960, Brasília, the new capital of Brazil; in 1913, Canberra, the new capital of Australia, and in 1960 Islamabad, the capital city of Pakistan. These three capital cities were created in a central location, allowing better governance. In the 21st century, the newest announced new capital cities are Indonesia and Egypt's new capital city. However, the new administrative capital is not the first attempt to create an Egyptian capital city.

In Egypt, Cairo has been the capital city of Egypt since 969 AD. The great extension happened in 1886, when Khedive Ismail, the founder of modern Cairo, wanted to reproduce Paris on the Nile by creating a new modern Capital against the medieval one. In Khedival Cairo, what we see nowadays is the result of early 20th century constructions, as many urban transformations took place during the first two decades of the life of khedival Cairo. Nevertheless, the broad boulevards' foundation and adaptation of the European classical style buildings took place for more than 70 years. The eclectic style and neo-Islamic styles were the results of combining different styles together, in the latter style the Islamic elements with classical architecture. There are iconic Buildings like the Railway station constructed in 1932, Bank Misr constructed in 1920, the Arabic music institution constructed in 1923. Furthermore, many European architects like Mario Rossi and Antonio Lasciac have massively worked in the creation of the Khedival Cairo (BECAMI, 2020 & Volait, 2020). Egyptian cities lived a belle epoque period with neighborhood reassemble European cities, furthermore the eclectic style combined the beauty of the classic designs with Islamic elements, a combination that distinguished many architectures in Egypt (see figures 4 and 5).



Figure (4), Tiring building with neo-baroque style(source: the authors)



, Figure (5) building with neo-classical style and arcades to the, Attaba, Cairo (source: the authors)

Attempts to move governmental buildings to a new city started with the Egyptian President Sadat, who founded Sadat city at the end of the 1970s and planned to move the central administration from Cairo there. However, his sudden death stopped all these plans. Nowadays, Egypt found a new administrative capital for Egypt; the prominent Egyptian project started in 2015. The heart of the new administrative capital is a district (R5) or residential district five, "the new Garden city." The district in June 2020 has been 60% completed. The designers are reassembling the peculiar value buildings of khedival Cairo and the famous garden city district in old Cairo (see figure 6). In 2018, when the creation of (R5) was announced, the authors of this paper found it essential to connect what is happening in Egypt's housing market with what the students study in the history course they learn. Especially that attempts to reassembling the classical designs in the new city of (new Cairo) showed failures, and examples found in the Egyptian streets are distorted.



Figure (6), The current situation in some of the R5 clusters in November 2020 (source: the authors)

2. Research Questions

Can the architecture students through history course analyze the aesthetic values and the design principles of the architectural styles towards reproducing them within the current urban context? Moreover, to what extent is it essential for educators and the students to develop a theoretical course with an experimental learning approach that provides a practical and intermediate level between critical thinking, analysis, and design?

3. Research Aims

This research paper aims to analyze and evaluate the students' work in the history course, which applied an experimental learning approach to link the aesthetic and technical values of the architectural historical styles and the current practice in the Egyptian architecture field.

- This includes analyzing students' designs of the facades of some selected buildings in the district (R5) in Egypt's new administrative capital.
- Evaluate the experimental learning approach and its success in developing the students' intellectual skills and abilities to inspire designs from peculiar value buildings from Khedival Cairo by using the seven design principles.
- Evaluate the assigned research project, which links the history of architecture, heritage, and architecture design through a designed questionnaire answered by the students to figure out the assignment's strengths and weaknesses.

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4. Methodology and Case study Selection

The paper uses an analytical approach to analyze the students' work during the academic year (2018-2019) in the course history of architecture- level two. This course taught the history and architecture styles from early Christianity, medieval architecture, renaissance, baroque and rococo, industrial revolutions, and architecture movements in the 18th century and early 19th century. The course includes assignments of these styles on the belle époque Egyptian buildings. The students form teams; each contains 12-15 students. Each group was asked to choose a heritage building of khedival Cairo, analyze the style, the ratios, and the design of the facades using the seven principles of designs (balance, contrast, emphasis, movement, pattern, rhythm, and unity). After the analysis, each group needs to choose a floor plan of the given clusters' buildings in the residential district five (R5), in the new administrative capital. According to this plan, they need to propose a design for two of the building facades (entrance facade and garden facade) and analyze its style and the application of the design principles. As this course is not based on studio-design nature and is a theoretical course, the students were given the new designs' plans. They were requested to suggest designs for the new facades with the flexibility to change the openings' location. The grades' rubric was based on the analysis process and critical thinking to re-use the style's features within the seven principles of the design framework.

The selected building of Khedival Cairo must inspire the design. The group needs to compare the original design and its innovative new design within the seven design principles. The students were given typical floor plans for two buildings in each cluster, and they were let free to determine the locations of the windows and terraces to fit the chosen style. The students were

also asked to determine the number of floors from 5-8 floors according to the reference building without floor height constraints.

The total research project duration was three weeks, and each group corrected their projects individually two times, one for the analysis and another time for the proposed facades' designs. The students already study (architectural composition and design fundamentals, 1 and 2) in the first two years of the study in the architecture department at fine arts, where they study the design principles. Nevertheless, the research project discussed in this paper is the first attempt for the students to link the principles with historical styles as an analytical method and apply them in a new design. Therefore, the students received a lecture to introduce them to the seven principles of designs and apply them in the analysis and the design process. The lectures also explained Khedival Cairo's boundaries and various heritage buildings there; the R5 selected plots. Moreover, the course gave references for the announced design proposals of R5 buildings. The reference books (i.e., *Discovering Downtown Cairo*, edit by Vittoria Capresi and Barbara Pampe, and *Khedivial Cairo* by Soheir Hawas) that the students can use to collect data, drawings, and pieces of information.

Moreover, this paper shows a designed questionnaire where each group leader was asked after completing the course in April 2019. The questionnaire was designed and distributed with Google forms. The leader of each group answered it after discussing the questions with the group members. The questionnaire was divided into three parts:

- Questions concerning the building choice from khedival Cairo.
- Questions concerning their new designs in the new capital city.
- Questions concerning their feedback about the importance of the project.

There were ten questions; all of them were open questions in which the students were asked to give explanations for their choices. 19 group leader out of the 22 answered the questionnaire.

The Seven Design Principles

The design principles are the tools to plan, analyze, and organize any artwork, including any architecture's form and spaces. Francis d. K. Ching has concluded the importance of the principles in his classical book "Architecture Form, Space and Order" he said:

"The form and scape of any building should acknowledge the hierarchy inherited in the functions they accommodate, the users they serve, the purpose or meaning they convey, and the scope or context they address.Order without diversity can result in monotony or boredom, and diversity without order can produce chaos" (Ching 1996, 320).

Unfortunately, nowadays, chaos and monotony in Egyptian architecture result from missing the diversity and order when applying design principles, examples presented under section 1.1 shows that. It was necessary to link what we teach for the styles in a theoretical base with real practices. Make our classical heritage visible to the students through their visits to Downtown and Khedival Cairo. Furthermore, let the students search and find references for the buildings' architectural drawings, analyze them, and reproduce what they learned in a new building.

Residential District 5 in The New Capital (R5)

Residential district five (R5) zone is an integrated residential project stretching over an area of 985 Feddans within the new administrative capital (see figures 7 & 8), divided into four neighborhoods: 19th-century western architecture, modern architecture, villas, and art deco style towers, as well as a neighborhood predominantly earmarked for commercial and administrative use (Engineering Consultant Group (ECG, 2018).



Figure (7) and (8), The district located in the new capital (source: modified from Google Maps & Urban Development Consortium UDC+5 report-2018”)

The project concept is the revival of the khedival Cairo with its remarkable architecture and urban design by designing the buildings with different styles inspired by khedival Cairo styles such as art deco, baroque, new classic, eclectic. In June 2020, the completion reached 60% of the whole construction process (MHUUC, 2020). The district was a great option to apply the assignment, the designs were not out when the students started their project, but the district's concept matched the assignment's aims.

Khedival Cairo Selection

As explained, the groups were asked to select one building from the khedival Cairo region to be analysed and to base their new designs in the new capital. In total, 17 buildings were chosen (see figure 9); each group chooses one building as shown in the following map, except for the following building which was chosen by more than a group: Tiring building, number three on the map, was chosen by two groups, Shawarby Basha Building, three groups chose number four on the map, 4 Talaat Harb st. Two groups chose number eight on the map, and finally, Behler building number two on the map was chosen by two groups. All the selected buildings are in the Khedival Cairo Zone (A).

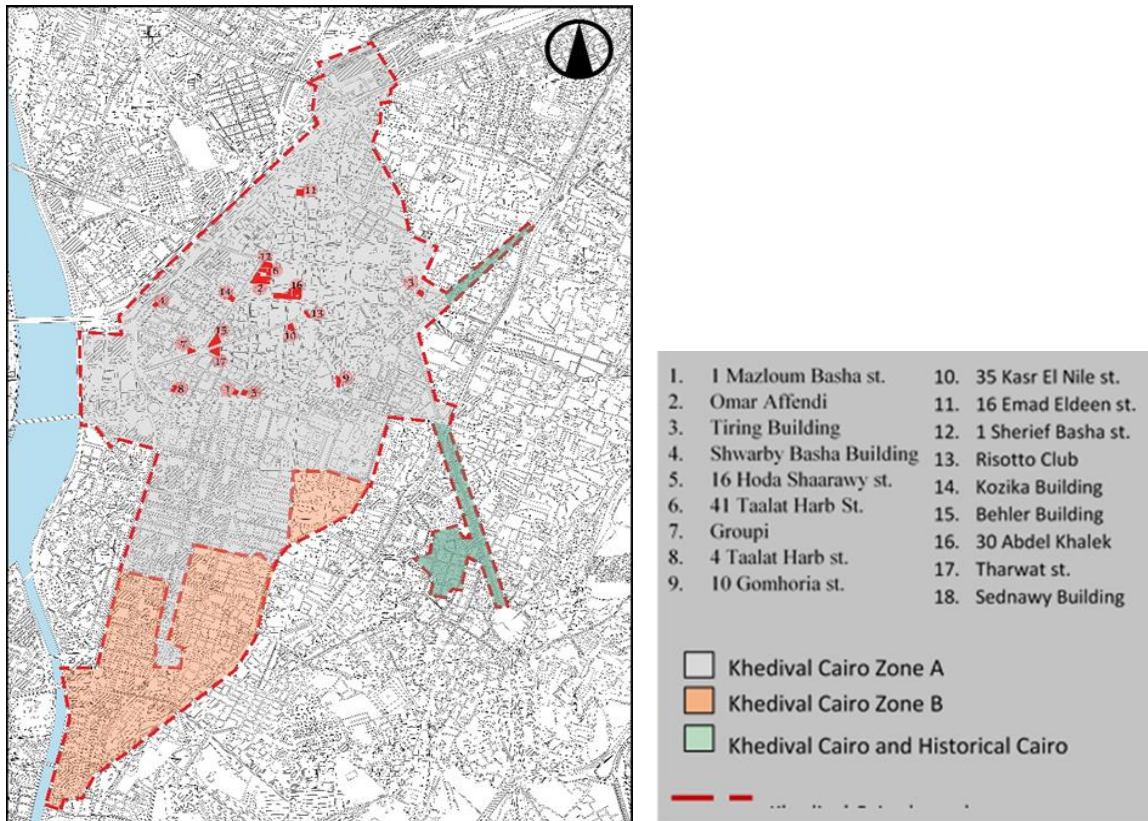


Figure (9) the location of the original buildings within Khedival Cairo boundaries, (source: the authors)

5. Students' Work

The students were introduced to two different clusters in the residential district 5 (R5), wherein each cluster they have two options for typical floor plans (see table 1). They were asked to choose the nearest floor plan to match their selected reference from Khedival Cairo. These four plans were given to grant the students some flexibility as some buildings' designs can be applied to basic shapes plans and others need the plan to have angles and focal points that affect the façade design.

Cluster A		Cluster B	

Table (1), The selected clusters and floor plans, source: modified from (ECG,2018)

The students started by analysing the selected Khedival Cairo building and highlighting balance, contrast, emphasis, movement, pattern, rhythm, and unity. This analysis was necessary for the students. It helped them determine how to apply these principles in the new design and reapply items of the style without distorting the original design ratios. Students used graphics and illustrations to show their analysis, and it helped compare the old and new designs. The following step was to analyse the building style and highlighting the style features such as colours, ornaments, columns, and openings design (see figure 10 & 11).

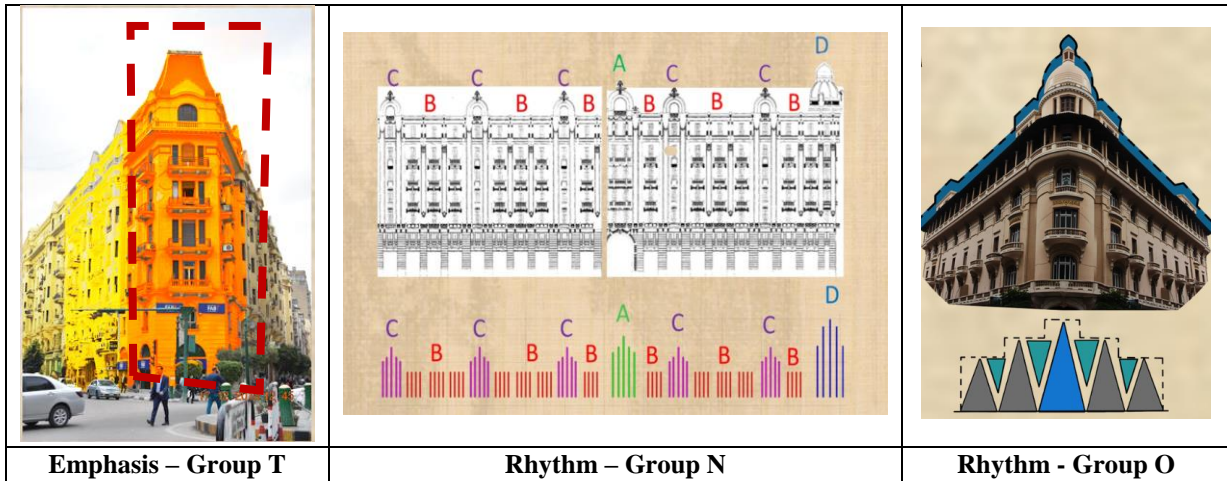
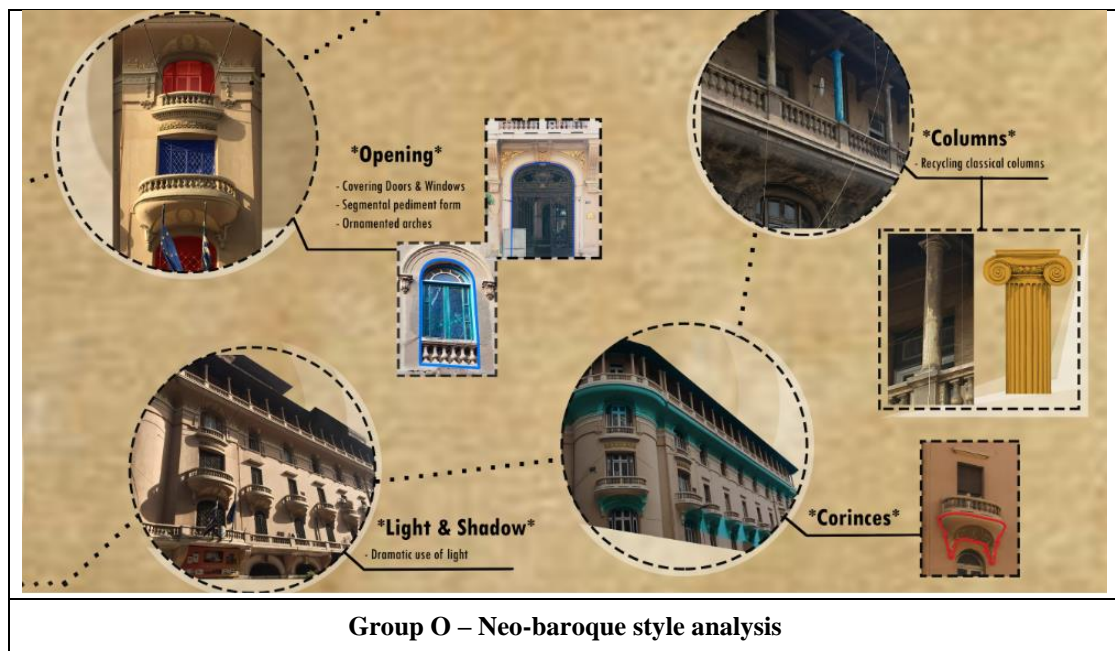


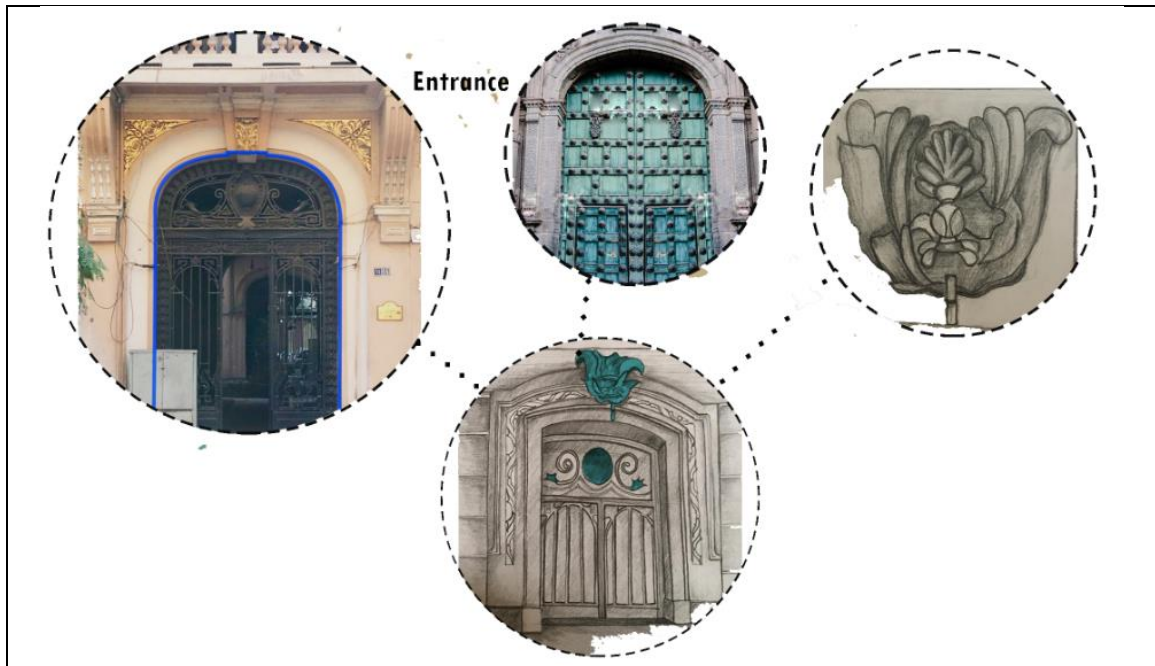
Figure (10)– Students analysis using the design principles



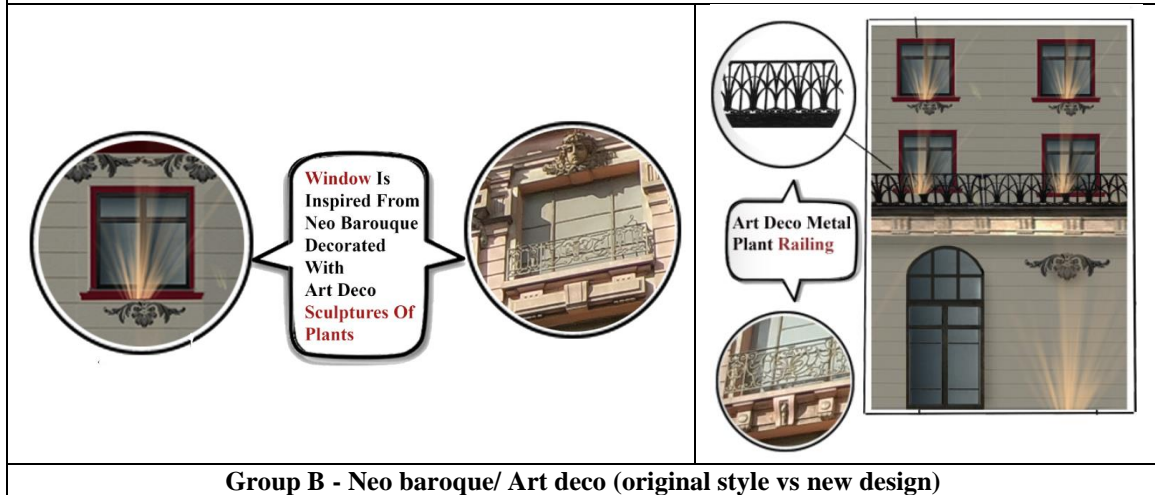
Group O – Neo-baroque style analysis

Figure 11 – Students style analysis

The second part of the project was how to apply the analysis and produce a new innovative design. The students need to follow the same sequence in presenting their designs, using the design principles, applying the style features, building material they used, and using new technology (see figure 12) and table 2 for the new designs compared to the original buildings.



Group O – Neo-baroque (original and style inspiration entrance vs new entrance design below)



Group B - Neo baroque/ Art deco (original style vs new design)

Figure 12 – New design style analysis











	
Group X – Behler Building	
	
Group B – Omar Affendi	

Table (2) Students’ new designs compared to the original buildings

The students followed a given guide to design their poster to unify all the groups' presentation style. The instruction was to design a vertical poster with the following dimensions 100*140 cm, the upper part for the reference building analysis, and the lower part for the new design and the comparison between the two buildings. The following group added another part to their design by proposing the interior design and furniture design using the building style (see table 3).

			
Comode	Shelf	Comode	Bed
The furniture details with Art Deco elements (Group R)			
			
The suggested design of the dining room with Art Deco elements (Group R)			

Poster Design guide	
Group R poster	

Table (3) the Poster design and an example for an extra design for furniture and interior architecture

6. Questionnaire Analysis

The questionnaire was divided into three parts: questions concerning students' choices from khedival Cairo buildings, questions concerning their new designs in the new capital, questions concerning their feedback about the importance of the project.

It had ten questions; all of them were open questions in which the students were asked to give explanations for their choices.

The students of the course were divided into 22 groups, and each contains 12-15 student; the groups were named with alphabetic charters (i.e., group (A), group (B)), the leader of each group was asked to fill the questionnaire based on the whole group opinion about the project. Only 19 groups out of the 22 answered the questionnaire.

Questions Concerning Students' Choices From Khedival Cairo Buildings

In this set of questions, the students were allowed to choose more than one answer. The students were asked about the criteria for choosing the reference building from khedival Cairo, and 16 groups chose the building design as the main reason (see figure 13).

Some students explained other reasons, for example:

“The building contains more than one of the seven principles of the design; also, these principles are mixed differently, making the group eager to choose the building” Group R leader.

The answers show that the building's visual effect was more effective when choosing the building than any other reason.

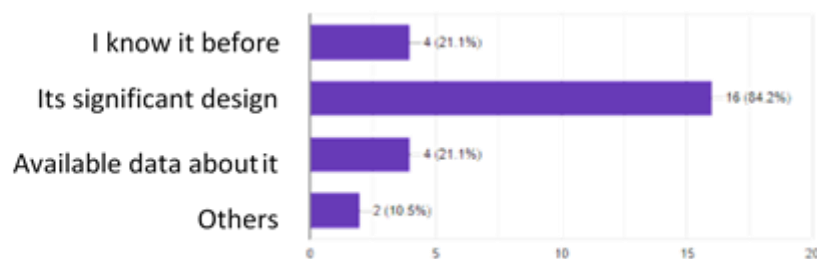


Figure (13), the reason for students' choices from khedival Cairo buildings

The students were asked if using the seven design principles helped them in the analysis of the buildings. 16 group answered with yes, and only three answered with somehow (see figure 14). Following are some explanation quotes from the group leaders who answered with yes:

“The analytical principles helped us in understanding the style and its' components, especially the elevations of the building,” Group R leader,

“These principles were our guidelines in understanding the building” Group G leader.

Furthermore, three groups answered with somehow, explained their answers that it was not only the principle but also the site visit, and the ornaments:

“The analysis did not depend only on the design principles but also analyzing the ornaments of the building affected our point of view” Group U leader.

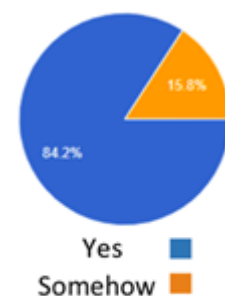


Figure (14)

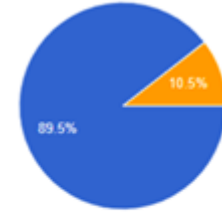
It was clear from the answers the importance of using the design principles as an analytical method. The students at this age need a base to understand the aesthetics and the styles of the buildings.

Questions Concerning Their New Designs In (R5)

The students were asked if the design principles were practical and useful in the new facades' design process at the (R5). 17 groups out of 19 answered with yes, (see figure 15). Following are some explanation quoted from the group leaders who answered with yes:

"We adapted the principles as we found in the original building and tried to re-use them differently in the new design," Group M leader.

"The principles were our key to start and quickly inspire the new design," Group J leader.



Yes
Somehow
Figure (15)

Three groups answered somehow; the leaders explained the answers by implementing the principles in the new designs' design process. The answers show that using this tool in the new design was very important, but there was also a need for extra help in implementing the principles.

The students were asked about their approach to the new design. 12 groups said that mixing between classic orders with new building material and building technology was their approach (see figure 16); following are quotations from group leaders:

"to make the new design cope with our lifestyle and not to be odd" Group J leader.

"for two reasons, first to be different from other groups who will just copy the styles. The second reason is to create sustainability out of the old style, by adding some new solutions in the elevation related to new technology" Group X leader.

Furthermore, seven groups said that copying classic orders without any variations was their approach; students' explanations and answers show a need for design criteria to help them put a concept for their design after completing the analysis.

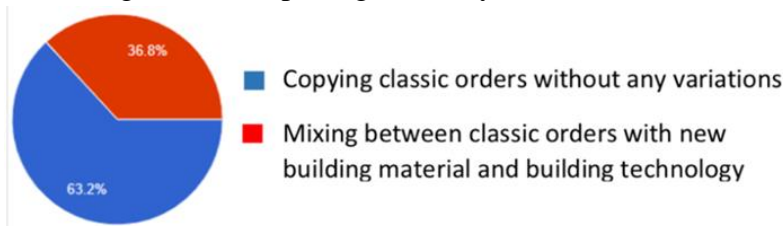


Figure 16

Questions Concerning Students' Feedback About the Importance of the Assigned Project.

The students were asked if the project helped them to understand the relationship between the history of architecture and architectural design. 15 group answered with yes, and five groups with somehow (see figure 17). Explanations for those who



Yes
Somehow
Figure (17)

preferred more flexibility with the conditions.

One group leader said: “We were asked to apply the style on a predesigned plan that put many constraints on the design process and think it would have been more creative if we designed the plans as well” Group X leader.

The students were asked if the project increased their awareness about the heritage architecture in Khedival Cairo. 17 group answered with yes (see figure 18); following are quotes that explain their answers:

“The building seemed to be more valuable after our analysis and knowing its history, even if some of the building aesthetics values seemed to disappear” Group U leader.

“ We learned a lot from the characteristics of the building and the analyses of its styles,” Group L leader.

Only two groups answered somehow, and they explained that the research project mainly helped them understand the mix between the different styles in Khedival Cairo.

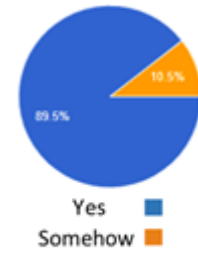


Figure (18)

The students were asked if the project increase their awareness about the technical, aesthetics, and human factors problems of the classical style used in new Cairo and other Egyptian cities. 15 groups answered with yes (see figure 19), explaining their answers

“The architecture in new Cairo and 6th October city shows that many Egyptian architects are not aware of the style design principles and how to use it. Education should develop a deeper understanding of the styles” Group R leader.

“Inspiration from these styles is an art which cannot band or re-used” Group H leader.

Three groups answered with no, explaining their answers. “Unfortunately, we did not recognize the problem in the new cities,” Group L leader and one group answered somehow.

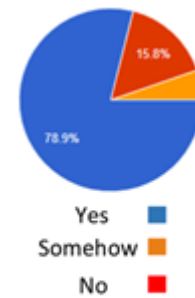


Figure (19)

The students were asked about their intention to implement design principles in their future designs (see figure 20); 15 groups answered yes. “These design principles are essential to achieve ascetics in design” Group M leader.

“Because as we learned, these principles were the tool of the leading architects, so we will follow their methodology” Group X leader.

Four groups answered somehow, explaining their answers, "we think developing design criteria will be better" Group H leader.

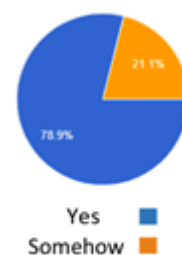


Figure (20)

6 Discussion

The students' work and the designed questionnaire showed the importance and urgent need to orient the theoretical courses, especially the history courses, towards experimental learning. There is a gap between what the students learn and what they intend to apply when they graduate, especially in a country like Egypt. A massive urban development is combined with a vibrant history with all the different heritage and layers of architectural styles and great civilization. Although the studio design courses are the practical form of teaching that trains the

students to design and prepare them for the market and real-life practices, this cannot be achieved without the other courses' support. The research project discussed in this paper had successfully developed the students' intellectual skills, critical and analytical thinking.

It raised their awareness of the 19th and early 20th-century belle époque classical heritage and their technical, aesthetic, and human factors. In this intermediate stage of their undergraduate study, it was also essential to start analyzing and developing the ability to adapt and re-use the styles' features with the design principles. They also realized the technical and design problems in the examples they see in the Egyptian urban context does not follow the design principles.

On the other hand, the correction and follow-up with the students before the final submission was challenging for both the students and tutors; 22 groups were given two follow-ups in three weeks with the only one-course lecturer and one teaching assistant. Although extra time outside the class was given to the corrections, there was a need for more time and extra staff members. The questionnaire proved the need for more time and collaboration with architecture design and building construction to develop more in-depth assignments with extra staff and time. There was also a need to add another part to this research project includes analyses for buildings adapting classical styles that do not respect the design principles for realizing their design problems.

7 Conclusion

This research paper highlighted the importance of experimental learning by linking the theoretical and practical study through the analysis process, using guides and references to help students propose functional designs.

Egypt's current architecture and urban context are affected by the late 19th and early 20th centuries belle époque heritage. Unfortunately, in most cases, it is copied without considering the technical, aesthetic, and human factors. Examples found in new cities ring the bell on the importance of training the students to analyze rather than copying without a deep understanding of the design principles and values. Therefore, it is crucial to give students flexible guidelines with some constraints for the requested design to be adapted to what they will face in their career life. The history classes must change from teacher-oriented education towards a student's center approach by applying active experimental learning to overcome the gap between the market and architecture education. Assignments that reflect the real-life practice needs, must be developed, and the link between the courses must be developed as well. Theoretical courses must also play a better role in developing students' intellectual skills and critical thinking. Furthermore, raise the students' awareness of their heritage and their role in creating an aesthetic visual image for Egyptian architecture.

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