Architecture Education in Islamic Architecture
(Analytical Study and Future Visions)

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Abstract

There is no study dedicated to link between architecture education in Islamic architecture and architecture education in contemporary architecture beside that the contemporary architecture design studio is not a guarantee to generate a talent, skilled and qualified architectural designer capable to face the rapid development in architecture and design. To demonstrate these two points this study divided into three main part, The first part is the research introduction which clarify the roots of the research problem and the method of dealing with it. The second part is the theoretical study which form a background about the architectural education in Islamic architecture through demonstrating four points: (1) architecture education institutions in Islamic architecture, (2) teaching methods in architecture education in Islamic architecture, (3) the presentation methods of architectural design in Islamic architecture, (4) the role and the functions of the architect in Islamic architecture eras. The third part is the analytical study, it presented an analysis of educational institutions from Mamluk period, the analysis presented the teaching methods and the educational curriculum in these educational institutions which helped in the preparation process of the architect in Islamic architecture eras. These three parts led the research to suggest a future vision for the architecture education and between all aspects of architectural education in Islamic architecture this vision focused on the transmission of architectural idea between the different eras of Islamic architecture and the research take it as a point of departure in formulating a future vision for the architectural design studio in contemporary architecture.

Keywords: Islamic Architecture, Architecture Education, Design Studio,

1. Research Introduction

Architects as they are conceived according to contemporary definitions were found in Islamic architecture building practices, and this explain the complex building activities and the formal and stylistic innovations which characterize the architecture of the different ages of Islamic architecture.

1.1. Research Problem

From analysing the architecture education in Islamic architecture the research observed:

- There is a connection line linking the various designs of buildings throughout the eras of Islamic architecture and this confirms the existence of a design reference followed by the architects of these eras, and this led to emphasize the existence of a process for preparing the architect and it carried out according to an organized architectural education process.
- There is no study linked between architecture education in Islamic architecture and architecture education in contemporary architecture.
- There is no study demonstrates how to benefits from architecture education in Islamic architecture to be a guide line for improving architecture education in contemporary architecture.

From these observations the research problem formulated as follows: „**How can contemporary architecture benefit from architectural education in Islamic architecture in forming a future vision about the architectural design studio?**"

1.2. Research Hypothesis

The research based on two hypothesise

- The presence of such architectural masterpieces remaining from Islamic architecture is an indication of the presence of a highly competent architect who was prepared and equipped with multiple skills in a highly efficient and organized preparation process and this confirms the existence of highly efficient educational institutions, educational curricula and teaching methods ensure the graduation of this highly qualified architect.
- The traditional studio for teaching architectural design, as the container containing the architectural education system, has no longer kept pace with the rapid development in teaching and learning technology techniques, and this led to a gap between the requirements of the labor market and the final product of the architectural education system, which is the architectural designer

1.3. Research method

In order to demonstrate how contemporary architecture can benenfit from Islamic architecture in the dilemaa of architecture education this study divided into four main parts. The first part is the research introsuction which focused on the research problem and research hypothesise. The second part is the theoretical study which presented four points relatd to the architectural education in Islamic architecture they are: edudcation institutions, teaching methods, teaching architecture design, presentation method and the functions of the architect as a product of the educational system. Then the research gone to the analytical study in which the research analyzed seven of educational institutions from Mamluk period, the analysis presented the different educational institutions in these buildings, also presented the teaching methods and the educational curriculum in these educational institutions which prepared the architect in the Mamluk eras during Islamic architecture eras. In the fourth part the research reached to present a future vision for the architecture education in contemporary architecture, and between all aspects of architectural education in Islamic architecture this vision focused on the methods of transmitting the architectural idea during Islamic architecture eras to base on it in suggesting a design model for the contemporary architectural design studio in general and more precisely a design model for the generating idea zone in the design studio. After these parts the research formulated its main results.

2. Theoretical Study

This section form a background about the architectural education in Islamic architecture through demonstrating four points: (1) architecture education institutions in Islamic architecture, (2) teaching methods in architecture education in Islamic architecture and in more precisely the teaching method of architectural design, (3) the presentation methods of architectural design in Islamic architecture, (4) presenting the role and the functions of the architect in Islamic architecture eras.

2.1 Architectural Education Institutions in Islamic Architecture

The political and economic stability for long times during the different eras of Islamic architecture led the Sultans and Emir to spending generously on educational institutions, scientists and science students beside taking care of the establishment of educational

institutions. The research focuses on the education institutions which prepared the architect as shown in figure (1).
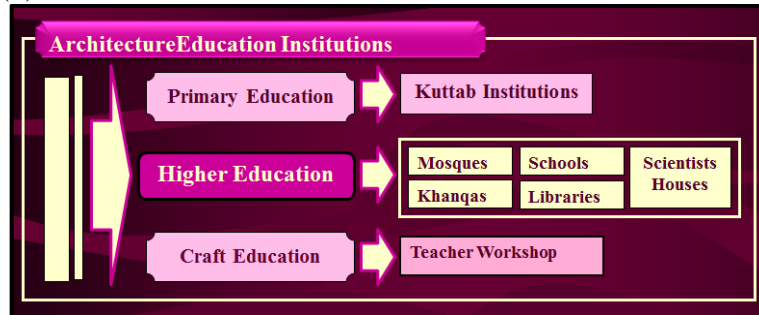

Figure (1): The education institutions in Islamic architecture eras [Authors]

2.1.1 Primary Education Institutions (Kuttabs)

The Sabil-kuttab forms a significant part of the design and now become a distinct feature in Mamluk architecture. Their popularity continued well into the Ottoman period when they frequently appeared in free-standing form, contributing enormously to the character of urban landscape [1]. Regulations for running such education institutions were carefully put down.

2.1.1.1 The Definition of Kuttab

The kuttab is an educational unit specially for teaching orphans the Our'an, together with reading and writing. The children left the kuttab as soon as they memorized the Our'an or reached adolescence and were able to work. The kuttab was provided with a teacher and an assistant ('anf).

2.1.1.2 The Architecture design of Kuttabs

The kuttab consists of a large arcaded space (riwaq) which includes a niche with a wooden balustrade covered by a wooden projecting roof. Some kuttabs do not include a niche, thus the wooden balustrade is placed align with the facade. The riwaq opens onto the outside through arches which provide suitable amount of lighting in the interior space. The walls of the kuttab include built-in cabinets, for keeping books, closed by wooden leafs inlayed with nacre. The wooden roofs were decorated and painted. In some cases the roof of the kuttab included a wooden lantern decorated with small pieces of stained glass [2].

2.1.1.3 The Types of the Kuttab

The research determined three categories according to it there were six types of Kuttab in Islamic architecture as following in table (1):

Category	Types of Kuttab
The owner	1- Private kuttab: Established by persons to earn money.
	2- Public kuttab: Established by sultans and education was free for orphans in order to please God.
Position in the city	1- Annexed to the educational institutes
	2- Independent building
Position in the building	1- At the corner of the main façade in the building
	2- At the middle of the main facade in the building

Table (1): Types of Kuttab in Islamic architecture [Authors]

2.1.1.4 The Roles of the Kuttab

The Kuttab had two functions: architectural function and urban function

1- The architectural functions were mainly for teaching Quran and primary science,

2- The Urban functions were mainly for as a visual connection element in the city fabric and forming an urban pocket across the streets. For example in Madrasa of Sultan al-Ghuri which

has two architectural compositions straddling the street (the mosque with its minaret on one side and the funerary complex with its Sabil-kuttab on the opposite one), this remarkable layout helped the designer to generate an urban pocket with a highly visual connection districts between the minaret on the mosque and the Sabil-Kuttab on the complex [3].

2.1.1.5 Fenestration system of the Sabil-kuttab

The fenestration system of the sabil contains two or three windows facing the surrounding streets. Islamic architecture always located the Kuttab on the top of the sabil, but the fenestration system of the Kuttab always a wooden balcony with arche [3].

Figure (2): The Sabil-Kuttab form in Islamic architecture, left to right: 1,2,3 Sabil-Kuttab of Sultan Qaytbay, 4- Sabil Abd Al Rahman Katkhuda, 5- Madrasa of Sultan al-Ghuri, 6- Madrasa of Farag ibn Barquq [Authors]

2.1.2   Higher Education Institutions

The research concentrated on three of higher educational institution be widespread during Islamic architecture eras: the mosques, the schools and the libraries or bookcase.

2.1.2.1 The Mosques (Jamie or Masjid)

During the Caliphate, Tulunid abd Fatimid periods the mosque played different functions. Whereby among its functions was education. Scientists and professors of religion and jurisprudents conducted teaching circles inside the mosque as there were no special school buildings [2]. Sultan Salah al-Din al-Ayyubi came from north of Iraq and decline the Fatimid dynasty, and up to the Fatimid period the only educational institution was the mosque. His dynasty was characterized by the establishment of extensive fortification works together with the foundation of Madrassas serving to promote Sunnism, and monasteries; thus a new architectural style was founded in the plan of the mosque. The madrasa became related to the mosque. [2]. the aim of building those educational institutions was to counter the Shiite sect and teach the people the instructions of their religion.

2.1.2.2 The Schools (Madrasas)

With the Ayyubid Sultan Salah al-Din after his conquered Egypt the Madrasa became the second educational institute after the mosque and then it became a complex institution which fulfil both requirements the religious and the educational. This section shades light on the design prototype of the Madrasa buildings during the different eras of Islamic architecture then it presents the design model of the two main architectural components of the Madrasa which the process of teaching hold inside them, the courtyard (Sahn) and the Qibla Iwan.

1) The architecture design of the Madrasa

The following is the development of the design of the madrasa during the Islamic eras.

a- Caliphate period, Tulunid and Fatimid periods

During these periods there were no special school buildings, but there were mosques which played the educational functions beside the religious functions. [2].

b- Ayyubid period

The madrasa appeared within the boundaries of the mosque. Architects started to use the vaulted Iwan instead of the aisles covered by wooden roof. The madrasa/mosque plan was composed of a central open courtyard surrounded by two iwans, one of them in the Qibla direction and the second in the opposite direction, together with students and rectors cells.

Madrasas were dedicated for teaching the four Sunnah mazhabs –each one had its own iwan- or teaching the Prophetic Hadith and other mental science.

c- Mamluk periods:

The research found five types of plans common for the Madrasa buildings in Mamluk eras as follows: [2].

Bahrite Mamluk Period

First Type: Open Court and Four Covered Areas: in which four covered iwans surrounded a central courtyard as in The Mosque of Zahir Baybars

Second Type: Collegiate Mosque Madrasa With Four Iwans: in which the plan includes an open court surrounded by four iwans as in Sultan Qalawun and Sultan Hasan madrasa.

Burgi Mamluk Period

First Type: Small Mosque, in which the mosque included a covered area - durqa'a – in front of the qibla iwan as in Aytmish al-Bagasi Madrasa

Second Type: Mosque With Four Iwans, in which a central court onto which opens four iwans, also there were apartments for the residence of rectors (shaikhs), and students, also in which a Kuttab for teaching young orphans were incorporated together with the mosque, as in Khantqah of al-Zahir Barquq

Third Type: Two Grand Iwans, Two Smaller Iwans, and A Durqa'a, in which four Iwans surrounded the Durqa'a. The two grand iwans are the Qibla iwan and the opposite Iwan, but other two iwans are the two smaller iwans (sadlas), as in Sultan Qaytbay Complex.

d- The Ottoman period:

The Ottoman madrasa developed a lot as the mosque became one of its component after it had been the opposite. The plan of the Ottoman madrasa included a central open court (with a fountain in its middle) surrounded by four covered areas, each including several rooms opening onto an aisle. The madrasa was designed as a suspended mosque incorporating shops in its lower ground floor. In some cases a sabil, kuttab, and apartments for the students and teachers were annexed to the madrasa [2].
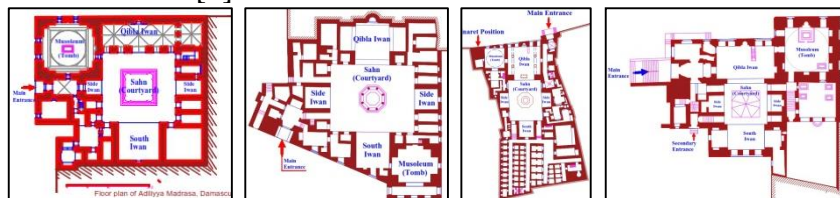

Figure (3): Types of Madrasa plans in Islamic eras: left to right: Adiliyya Madrasa-Damascus, Madrasa of Emir Sarghitmish, Madrasa of al-Zahir Barquq, Sultan Qaytbay Complex [Authors]

2) The design model of the Education Spaces in Madrasa Institutions

Teaching process inside the Madrasa buildings was hold in two main places: the courtyard and the Iwans, the following is the design model of these two architectural education spaces.

a- The Design Model of the Courtyard (Sahn)

Five criteria form the design model of the courtyard in Madrasa buildings, as follows:

1- The courtyard is regular geometric shape (square or rectangle).

2- Entering the courtyard can only from the bent corridor which connects from one side with the courtyard and from the other with the entrance.

3- The courtyard placed in the heart of the building to acts as a generator of form, and the whole organization of the building form starts from its centre extending outwards [5], so it controlled the process of "place making" in form generation beside it's role in generating a homogeneous relationship between the urban context and the building compositions.

4- According to space syntax in courtyard models and taking into account the courtyard was the backbone of the religious buildings; the Islamic architecture produced two types of place making relating to the courtyard: the opened and the enclosed.

5- Four iwans surrounded a courtyard was the geometric composition which converted the building composition to a hollow cube and emphasized on the inward design criteria.

Figure (4): The Courtyard Model in Mamluk eras [Authors]

b- The Design Model of the Qibla Iwan (Praying Hall)

There are four criteria form the design model of the Qibla iwan, as follows:

1- The geometric analysis of Qibla iwan reveals that it is a covered hall opened from one side -its entrance wall- on the courtyard. It was proliferated in the Sassanian world but in the Ayubids period the Iwans became a basic component in the design of religious building.

2- Functionally Qibla iwans used for prayer or educational space, but geometrically the entrance wall of it always had one main vertical articulation axis around it a pointed or semi-circular arch growth to form the three dimensional space composition..

3- To serve the religious function (as a prayer hall) and achieving the environmental design criteria the Islamic architecture designer generated three common types of Qibla iwans: a pillared rectangular areas, a vaulted iwans and a square-domed space

4- In Islamic architecture the Qibla iwans always take a square or rectangle shape in its two dimension composition and a cube in its volumetric three dimension composition.

Figure (5): Qibla Iwan form model design in Islamic religious buildings [Authors]

2.1.2.3 The Libraries or Bookcase (Maktabat)

Al-Mu'izz Li Din Allah constructed the first Fatimid library in Egypt [6]. However, the most important event in the history of Fatimid libraries is the establishment of "Dar al-Ilm", which constructed by Al-Hakim bi-Amr Allah (386 A.H.), and the Abbasid constructed "The House of Wisdom" in Baghdad, but the Mamluk libraries were attached to the educational institutions to encourage the self-education and serve the educational activities.

1) Types of libraries in Islamic architecture:

Libraries as educational institutions in Islamic architecture had many types as follows:

a- privet libraries

Each Sultan had his privet library and the Amirs and scientists followed them on establishing their privet library to which they could refer for reading, writing and responding to their opponent. However, some of them used to allow it for all people, especially for scholars and students and those who trusted them, as did the famous scholar Ibn Hajar Al-Asqalati, who allowed his students and scholars to benefit from his privet library [7].

b- Mosque libraries

Since the emergence of Islam, Muslims have taken the mosque as a center for education, and science councils and seminars were held in it. And because books are an essential pillar of the

educational process the libraries of mosques spread in the Islamic world from end to end. For example in the Fatimid era, each mosque had its library as Al-Azhar mosque library and Ibn Tulun mosque library [8].

c- Madrasa libraries

Madrasas during Islamic architecture eras were more like universities. They are institutes or colleges for higher education, and each Madrasa has its own school of thought that it follows, although some of them include four colleges of the four jurisprudences. The Madrassa was supposed to be a center for religious sciences such as hadith, interpretation and others, then the situation soon developed until schools became centers for teaching grammar, language, philosophy, and natural sciences, as well as religious sciences [9].

Each Madrasa has attached a library or bookcase. According to the Mamluk waqf documents, it contains many types of literature in various sciences and arts, which teachers and students refer to in research and investigation, as Al-Qalqashandi said "the library of the Kamiliah Madrasa which were established in the Ayyubid era and continued to perform their functions until the first half of the Bahri Mamluk era".

d- Bimaristan libraries

Bimaristans was like modern medical colleges,, the document of Sultan Qalawun explains that the services of the Bimaristans were not limited to treating patients, but rather went beyond the matter to teaching medicine, and thus the Bimaristans was a place for scientific training and theoretical studies at that time. Libraries in Mamluk eras were attached to Bimaristans to provide the medical literature, such as the Tuluni bimaristan (the first Bimaristans established in Egypt [10] and Al Bimaristan Al Muiyyady.

The finding of medical libraries during Islamic eras emphasizes that there were a specialized libraries for the science of engineering containing literatures concerned with construction and building matters, especially in light of the desire of the sultans to immortalize their names through the establishments of religion/educational constructions.

Beside these four types of libraries there were also four types of libraries were constructed during Islamic architecture eras they are: Zawaya libraries, khanqahs libraries, Mausoleum libraries and dome libraries.

2) The Architecture Design Of Libraries

The library as an important architectural educational institute was used only for preservation but reading, copying and researching was hold on the four Iwans in the Madrasa, so the library was placed in the Qibla iwan or in a middle place in the Madrasa so that its books would be accessible to all beneficiaries of scholars and students studying in all iwans and the Qibla Iwan was close to the students' residences in the Madrasa to makes it easily accessible [7]. The library should have a degree of calm, quietness and distance from noise, allowing readers to concentrate and read. Therefore, the most suitable place for it is the Qibla Iwan, where it is usually raised above the floor of the street and at the same time far from the water humidity and cemeteries.

The library is an indispensable educational tool in any educational institution, as it is a place for research and study, helping the student to get out of the circle of relying on what he hears and receives from his teachers to a broader from which he obtains a deeper, more accurate and diverse culture in the various branches of human knowledge.
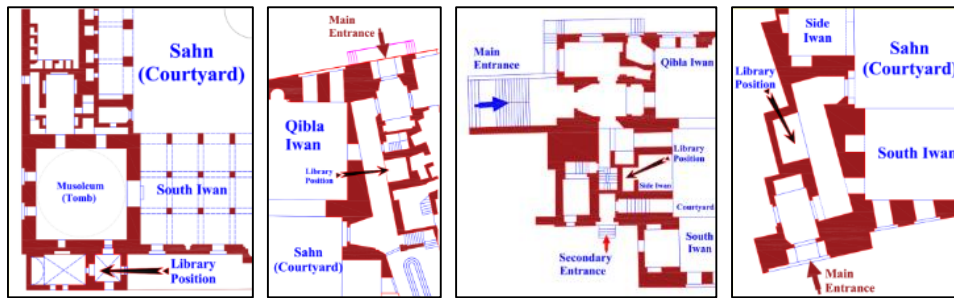
Figure (6): The position of library in Islamic architecture: left to right- Khãnqah of al-Nasir Farag Ibn Barquq, Al-Ashraf Barsbay Complex, Qaytbay Complex, Abd al-Ghani al-Fakhri Mosque [Authors].

2.1.3   Crafts Education Institutions

This section presents two of craft education institution due to their role in the building design and cinstruction process, they are: Khanqahs and Crafts' oral training institutions

2.1.3.1 Khanqahs

Khanqah was a monastery or hostel for Sufis or dervishes [11].

1) The Architecture Design Of Khanqas

The architectural design of the khanqah is divided into three types: the khanqah/mosque, the khanqah/Madrasa and the khanqah/dome [12].

The khanqah/mosque: it contains an open or covered courtyard surrounded by Riwaq from all or some sides, and the Qibla Riwaq is the largest, and the Sufi cells are located behind the Qibla, and it may include one or two floors or up to four floors as in Khanqah of Barquq and Khanqah of Shaiekhu al-Umari.

The Khanqah/Madrasa: the style of the Madrasa was birthed since the Ayyubid era, its layout suited the performance of teaching the ritual of prayer as an academic institutes in addition to being a role for Sufis. This style completely agreed with the Khanqah buildings, especially since these Khanaqawat had become since the Mamluk era,.

In The Khanqah/Madrasa the location of the Sufis cells had four positions:
- surrounded the four Iwans in the ground floor as in Baybars al-Jashinkiri khanqah
- located behind one or more Iwans, as in al-Barqouqiyyah al-Gamalia khanqah,
- separated from the Iwans by a large courtyard other than the courtyard of the school, as Al-Analiyah khanqah in the Mamluk cemetries,
- located on the underground below the school, as in Abu Bakr Muzher khanqah

One of the most important criteria of khanqah design was that it must be far from the outside roads in order to gain calm. It consisted of rooms designed in parallel rows called "rabat" or "rabt" and it always had no openings.

2) Types of Education in Khanqahs

Education in the Khanaqah was divided into two types: Sufi education to study the science of Sufism/spiritual sciences, and free education to learn mental sciences such as language, fundamentals of religion and craft sciences [13].

From the foregoing, the research emphasized that students (whether they were building craftsmen or engineers) who derived their education inside the khanqah were influenced by Sufi thought and its sciences, and this influenced and appeared on the design process. This is the secret which explain to us why the designer during Islamic architecture eras attempted always to reflect religion beliefs in the design of different buildings.
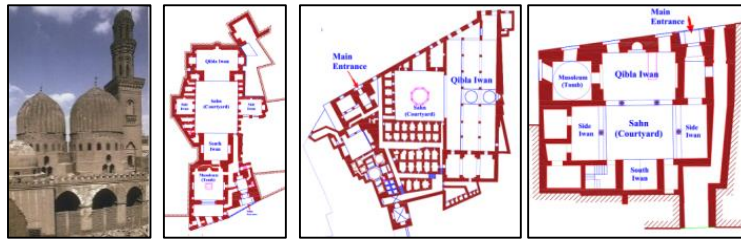
Figure (7): The design of Khanqahs in Islamic architecture, left to right: Amir Ahmed al-Mihmandar Khanqah, Khanqah of Emir Sanar al-Jawli, Khanqah of Sultan Baybars al-Jashankir, Khanqah of Emir Shaykhu al-Umari. (1,3,4 [Authors], 2 [14])

2.1.3.2 Crafts Oral Training Institutions

These institutions depended on the direct transmission of information between the teacher and the student through the direct fraction between them on meeting.

1) Book Market (Suq al-Kutub)

It is a large market in which books were offered for sale. Scientists have taken it as a council for them to frequent and hold seminars and discussions. The booksellers were not only merchants, but also writers, and they aimed through that trade attracting scientists to them. Scientists, craftsmen and students found inside these markets all books about the design of buildings and geometry sciences

2) Scientific Councils (Magalis al-'Ulam')

Science councils rely on debates or presentation of some aspects of any branches of sciences, it is a meeting between the scientist for discussion, consultation and presentation of new aspects of knowledge in a science. These councils had a cultural impact on all classes of students and artisans.

3) Homes of Scientists (Manazil al-'Ulama')

Scientists' homes are considered important educational institutions for architectural education in Islamic architecture because of what it includes of direct contact between the student and his teacher and the direct transmission of experiences between generations. In addition to the preoccupation of scientists with their own professions in addition to teaching

2.2 Teaching Methods In Architectural Education In Islamic Architecture

To understand the architectural education system in Islamic architecture, this section presents the teaching methods in different institutions of architecture education

2.2.1   Teaching Method in the Crafts-Educational Institutions

Crafts in Islamic architecture was educated through a system of apprenticeship and a clear evidence for that is what al-Maqrizi's (845 A.H., 1442 A.D) had seen during his visiting to the papers market (suq al-warraqin) he saw several young boys worked under the instructions of each craft master (Mu'allim) [6], also the contemporary historian S'aid 'Ãshur confirmed that apprenticeship is the main system which based on it all Guild's (niqabat) in the Mamluk period, and inside this system there was a person his profession was helping the master in supervising the apprentices of the craft and his title was "arif" [30].

At the higher rank of the craft there was a supervisor or the chief of the craft, and title was "the Sheikh" [15], he must be superior and outstanding in the craft industry science, This kind of teaching was based on training and acquisition of craft skills and this type of teaching equal to the practical training for architects. The teaching method comes in three stages according to the progress of the craftsman inside the craft society, as follows:

➢ Boy Stage (Saby)

The student select the craft which he wanted to learn then starting the training stage, in which his name is "Saby". The progress of the boy must be assessed by his teacher during the training period which may be continued in some crafts to more than seven years [16]. At the end of the training period the boy enter an exam hold by the craft Sheikh to check the suitability of the boy to pass or not, and the pass of this exam for the boy in the craft community was as a permission to him to go up to the next education stage.

➤ Manufacturer Stage (Ariyf or Sani')

The professionalism in the craft's rules is the main criteria by which the teacher evaluate the students in this stage, this stage extend to 3-5 years and before the end of this period the student was not allowed to leave his teacher and this to guarantee the improvement of the manufacturer's skills [16], In this stage the teacher assigned a contract with his students, this contract oblige the teacher to provide accommodation and food beside paying amount of money to his students.

➤ Instructor Stage (Muaalim or Austaa)

One of the main requirements not only for practices the craft but also the transition to that stage was obtaining permission or a license (Igazah) [15]. Obtaining the permission (Igazah) from the craft Sheikh must be obtained by the person in order to be allowed to practise the craft in the society.

One of the most criteria of architecture education in Islamic architecture was the continuity of learning between the educational systems, and this was to improve the skills and the professionalism in the society of the craft. This system of transition allowed to student to continue studying in the higher-educational institutions after they finished the craft education stages. One of these scholars them was the famous Mamluk Mamluk engineer Abu al-Wafa al-Buzgani, he continued to learn geometry science in Iraq after he finished the craft education and became a craftsman [17]. One of the greatest benefits that accrued to architecture from this permission of transition between different educational systems was the contribution on writing of books which link between the different sciences. For example, Abu al-Wafa al-Buzgani wrote a book to explain the role of geometry in the building craft, he name this book "On the geometry needed by craftsman"

2.2.2   Teaching Method in the Higher-Educational Institutions

Teaching in the higher-educational institutions depended on the oral teaching in which the information transmitted from the teacher to students through the face-to-face meeting in circles (halaqah or dars), in which students sat in a circle around him and he sit facing the Qibla direction. Ibn-Battutah stated in his book **[*Tuḥfat al-Nudhdhar fi Ghara'ib al-Amsar wa 'Aja'ib al-Asfar*]** that the lesson was divided into three parts: [18]: starting with the beginning in which the teacher read a part from the Quran, then the middle which was the main part of the lesson but the evaluation of students by the teacher comes at the end of the lesson at the third part, and if there was any misunderstanding from the students there was a teacher's assistant (mu'id), his role was repeat the lesson again.

It is important to mention that services of the Madrasa were not limited to the students there but it provided its services to the public as the access service to the books and collectables in the library [19]. In comparison Madrasa in Islamic architecture equal to universities in contemporary architecture and the endowments system was the allowed system to ensure students to continue and concentrate on learning [20].
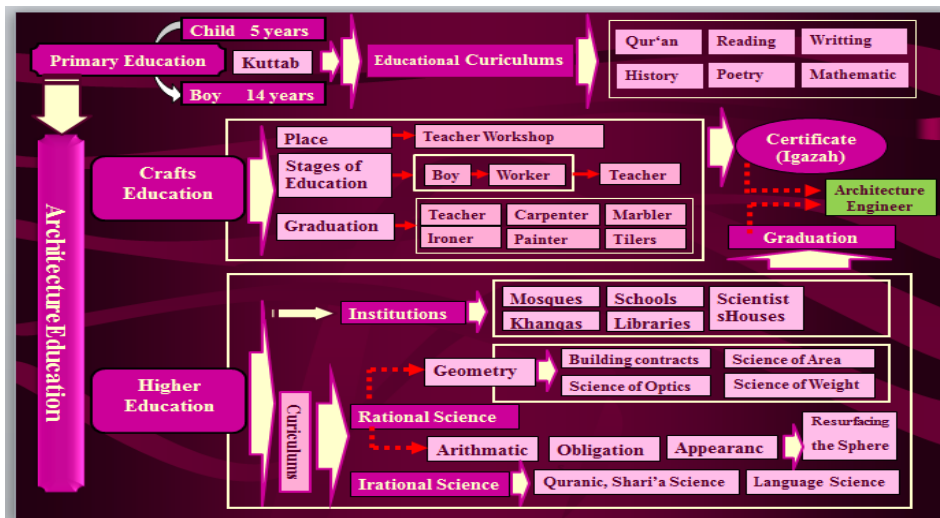
Figure (8): The position of architecture education in the educational system in Islamic eras [Authors]

2.3 Teaching Architecture Design In Archiecture Education In Islamic Architecture

To make a deep understanding of the process of preparing the architect in Islamic architecture eras this section started with explaining the building process in Islamic eras, then demonstrated the design method of buildings and finally specifies the criteria of teaching architecture design in Islamic architecture eras.

2.3.1 The Building Process In Islamic Eras

Abd al-Latif al-Baghdadi whose inquirer and researcher, lived in Egypt between 1190 and 1206 during the Mamluk period, mentioned in his book "al-Ifada wa itibar fi alumur al-mushahada wa alhawadith al-muayana bi-ard Misr" (Benefit and Lessons from Things Observed and Events Examined in the Land of Egypt) the following:

> And if they wanted to build a house, the owner bring an engineer/architect (Mimari and Banaa) and delegated the work to him, so the architect goes to the site of the building (empty hill of soil) and divides it in his mind according to the owner requirements, then the architect goes to a part of the site and starting construction process until construction is complete and the owner can benefit from this part alone and inhabits, then the architect goes to another part, and continues like this until the whole is completed with the perfection of the parts, without defects or corrections [21].

The research shade light on three aspects of the building process he described, these aspects demonstrates the historical evolution of teaching architecture design.

- The sharing of knowledge between the architect/designer and the builder done a representation tool as drawings or verbally communication to explain the spaces relative relationships and its numerical dimensions

- The integration between sciences was an important criteria in the process of preparing the architect, the clear example for this was the overlap between the process of designing and constructing the building, because some of design decisions may be changed or removed according to the site conditions during the construction process.
- Nasser Rabbat in his investigation "Design without Representation in Medieval Egypt" about the previous description of Abd al-Latif al-Baghdadi of building process, he mentioned "This remark of course bolsters the singularity of the mental visualization as it confirms its validity in practice" [22], the research argue with him because The apparent efficacy of the method of the sequential execution of the structure's components in which they can be completed and used autonomously as the rest of the building is still under construction, and still without a represented overall plan, and the building completed as planned and the alignment of its different components achieved without mistake emphasizes the existence of the architectural drawings which played the role of guideline in the construction process beside the mental visualization.

2.3.2   The Design Method of Buildings in Islamic Architecture Eras

From Abd al-Latif al-Baghdadi description of building process, the research reached to formulate the design method steps and the sciences which the architect must learned to hold each step in the building design process, as follows:

The Design Method Steps	Science
1- **The mental imagination**: this is a suggestion step of the design idea of the plan according to the owner requirements	land Measuring, Arithmetic
2- **The process of site analysis**: in this step the designer connects between site conditions and the design idea.	Astronomy and orientation
3- **Modifying the design according to the site conditions**: this is a modification step of the design to suit the geometric shape of the building layout or reorienting some spaces in accordance with the direction of the Qiblah.	Astronomy, Geometry
4- **Starting the constructions process**: in this step the designer checks the validity of the design to the building site.	Science of Area and Appearance
5- **Modifying the design**: the modification of the design in this step done according to the new design decisions which appears during the construction process.	Astronomy Geometry
6- **Completing the building construction** and the building design at the same time.	Arithmatic, land Measuring

Table (2): The relation between the building design method and kinds of sciences required [Authors]

2.3.3   The criteria of teaching architecture design during Islamic eras

Teaching architecture design mainly depended on four criteria
- The integration between architecture design and all sciences: all sciences the student learned were organized to support learning architecture design, as geometry, astronomy and mathematics.
- Connecting between the teaching method of architecture design and the requirements of the society: teaching architecture design mainly aimed to produce innovative, creative and holistic architects who are sensitive to the needs of the society, and have the ability to make the architectural design of buildings reflects the life its community.

- Self-evaluation was an effective teaching methods in developing students problem-solving skills, and it based on a continuous dialogue between the designer and himself until he reaches full satisfaction with the final design which meets the owner requirements, as the requirements of Sultan Hassan in his Madrasa to be composed of mosque, madrasa, teaching rooms, library and accommodations for teachers and students.
- Practical training is an integral part of architectural professional qualification and there is no separation between it and the theoretical education, so that during Islamic eras many architects after finishing the craft education transferred to the higher education institutions, this explain why many architects during Islamic eras had his own profession such as carpenters or ironer.

2.4 Presentation Methods of Architectural Designs In Islamic architecture

Hassan Abd El Wahab in his investigation "Engineering Drawing for Islamic Architecture" presented an important question about the role of drawings in design and constructing buildings in different Islamic eras as follows: "Are those harmonic and balanced masterpieces of buildings constructed according to drawings prepared for them? And were those varied architectural details constructed according to a drawings prepared for them and under the supervision of engineers?", he reached the answer as follows: the answer is "yes. Engineers supervised the buildings and made general and detailed drawings for them" [23]. The research determined four methods of presentation used in Islamic architecture to present the design of building as follows:

2.4.1   Architectural Drawings (Drawing on papers)

Creswell in his investigation "Early Muslim Architecture" stated that "…From Egypt, we have a few written references from various periods but no material evidence until the nineteenth century of monuments being represented by drawings for their patrons before construction" [24], but Nasser Rabat in his investigation "Design without Representation in Medieval Egypt" emphasized that representing a monument before constructing it was a process known throughout the medieval Islamic world [22].

Islamic drawings had arrived at high levels of complexity. Proof for this claim is found within the drawings of both Tashkent and Topkapi scrolls, in which techniques for representing complex spatial features as scaled two-dimensional projections and the use of conventions to clarify spatial relationships within the drawings had not been seen before. What is puzzling, however, is why such innovations in representational and graphic techniques did not result in elevating the role of their Authorss, who were supposedly skilled designers. [25]. Islamic architects designed their buildings in accordance to the teachings of Islam beside the highly sophisticated branches of sciences they had achieved and theories of design they had formed, and the examination of architectural monuments reveals their builders' methods which starting with the design units and move on to the design of the whole plan and devising the three-dimensional composition from its plan
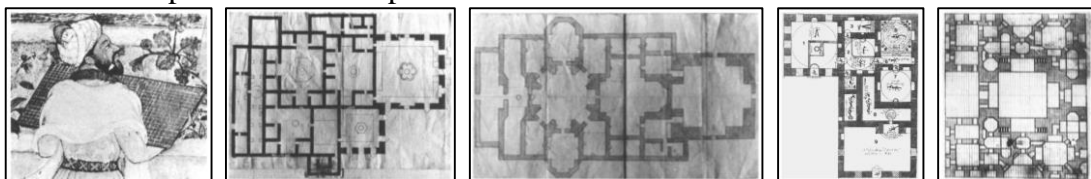

Figure (9): Architectural drawing on papers from early Islamic eras [31]

2.4.2   Drawing on Skin or Stone

Many historical references and manuscripts contain a lot of news showing that architectural drawings were done on skin or stone. What al-Maqrizi mentions is that when Emir Ahmed Ibn Tulun began building his mosque in al-Qata'i in 263A>H / 876A.D, his engineer wrote to him saying, "I will build it for you as you like and you choose without any pillars except for the Qibla pillars, and I photograph it so that you can see it directly" then the Emir ordered to bring the skins to the architect to start drawing the mosque for him [6].

2.4.3   Drawing on Land

Laying out buildings in full scale on site ground was sometimes used instead of making drawings to display large projects with clarity, and this is inferred by what was mentioned that the Caliph Abu Jaafar al-Mansur, when he asked to build the city of Baghdad in 141AH / 758AD, commissioned the engineers to show him its design, so the engineers with ashes, cotton seeds, and naphtha specified the boarder of the plan on the ground and then the caliph visited the site and walked between its streets and squares, and he agreed the planning and order to starting construction [23].

Another example of drawing on land was done by Hassan al-Sayad al-Muhandis when Sultan al-Ghuri asked him in the year 916AH / 1510AD to show him a drawing of the city of Alexandria, so he chose a vacant land in al-Matariyya area and outlined the city of Alexandria with gypsum with its towers, doors, walls and Minarets, then he invited the Sultan to view it on the drawing, so the Sultan came down from the castle on the day of Wednesday 19 Rajab 916AH and saw the drawing and liked it. [23].

2.4.4   Three-dimensional Models and Perspective

Architect in Islamic eras not only illustrating his architectural works by drawing but also he made three-dimensional models for them. Thus, gifts to kings and caliphs were models of palaces and mosques. For example Emir of Khurasan Yaqoub bin al-Layth sent a gift to the caliph al-Mu'tamid it was a model of a large mosque with two silver arcades [23].

Model were not only for buildings but also for the cities, for example Ibn Battuta mentioned that The Caliph Abu Anan, had ordered to make a model representing Tarek mountain with its fortress, walls, towers, doors, and mosques. Ibn Battuta mentioned his observation of the accuracy and perfection of this model by saying: "It was a surprise model that the craftsmen done with high perfection, its value is known only to the one who saw the mountain and saw the example" [23].

2.5 The Architect As A Product Of Educational System In Islamic Architecture

This section shade light on the architect as a final product of architecture education from two points (1) his role in the design process and construction and (2) his functions in Islamic eras.

2.5.1   The Role Of Architect In The Design Process Of Building And Construction

There was no word in Islamic architecture presents the meaning of "designer" or "architect" as it is understood in contemporary architecture, but there was word "mimar" which appeared in Mamluk architecture in the sense of "mason" to mean "architect"

In the building crafts, there seems to have been no single word in the Mamluk period to encompass as we understand them today. The term mi'mar, used today in most Islamic languages to mean "architect," appears in the Mamluk sources only in the sense of "mason".

There were four famous terms in building craft during Islamic architecture eras they ere are mu'alim, mi'mar, muhandis, and shad, these terms refere to specific skills as photographer (musawwir), painter (nuqqash), tiler (muzammik), while some appear to be generic, such as mu'alim and sani' [26].

There are eight persons participate in the design of Madrasa buildings as follows: Patrons (Sultan), Architects (mi 'maran). Enginers or Geometrician (muhandisin), Mathematican (hesabii), Astronomers (falakii), Builders (banayyan), Craftsmen (sanaii), Master (ustadan). While the desire to erect buildings as free-standing monuments may not have been the decision of architects and can more appropriately be connected with the patron's desire to emphasize monumentality as a symbol of his sovereignty, this trend in Mamnluk architecture resulted in concentrated attention on the design of exterior features of buildings [27].

From the documents and manuscripts there was evidences that the architect in the Mamluk era had won many titles and positions, for example they called the engineer the title of the teacher, as he was sometimes called the title of the architect: which was used with two meanings, one of which is the builder or the engineer, and the other is the one who supervised the building construction. He also found the title of Shad al-Amair, which Taghri Bardi defined as: the headmaster of the royal buildings [28].

2.5.2 The Functions of Architects in Islamic Eras/Society/Architecture

Al-Qalqashandi (one of the scholars of the Mamluk era) mentioned in his encyclopedia "Subh Al-Asha" a definition of the architectural engineer as the one who undertakes the design of buildings and supervises the workers in charge of them, and he says: "He is the one who undertakes the arrangement and estimation of buildings, and judges the masters of their industry." [10].

The research determined six functions for the architect in Islamic eras, they were:
1- Previewing the old buildings, and making a validity report for them
2- Modifying the design of existing buildings.
3- Restoration and reparation of the monuments, and controlling the builders in repairing the destroyed walls of castles, forts, wells, and roads due to their danger [19].
4- Maintenance and preservation of buildings:

The engineer maintains the existing buildings according to the desire of the builder. The Mamluk endowment documents included many examples of the appointment of the architect to take care of the endowment from the architectural point of view, as was found in the document of Sultan al-Ghuri who mentioned some of the architect's tasks, such as inspecting building conditions, identifying existing defects and how to treat them, saying in that:

"Of that, four hundred dirhams are spent on two men, engineers who are familiar with buildings, are skilled in their manufacture, and cut off their excessive defects. They are determined by the overseer "Nadher" of this endowment in the architectural function. They inspect its buildings and list what the building needs in terms of materials, builders, and other things that are necessary for it, and they stand on tightening and demolishing, and building" [29].

5- Supervision of the construction process of the buildings

The endowment document of Sultan Qaytbay specified the day on which the architect must be in the site to carry out his duties of supervision, and it stated that:

"It is given to a man, who is a builder of the aforementioned endowments, who attends the day of the building architecture (architecture here means the construction of the building) in the aforementioned endowment to pledge and urge

the craftsmen to work, and prevent them from idleness, beside that executing what is required to work perfectly" [29].

6- Determine the cost of projects and make the construction assay

The Sultans used to entrust one of the architects with estimating the costs of projects before starting the construction process. An example of making assay before the start of the construction process is Al-Ikhshid's commissioning of the engineer Salih bin Nafi' to draw up a planning project for Al-Mukhtar's garden and a palace for him on the island of Al-Rawdah, and he carried out what he commanded him to do and presented it to him, Al-Ikhshid was surprised and asked him about its assay, he said it was thirty thousand Dinars, Al-Ikhshid asked for a reduction in its value, and he was Authorsized to construct it [6].

3. Analytical Study

This section presents an analysis of seven educational institutions from Mamluk period, the analysis presents the different educational institutions in these buildings, also presents the teaching methods and the educational curriculum in these educational institutions which helped in the preparation process of the architect in the Mamluk eras particularly and in Islamic architecture eras in general.

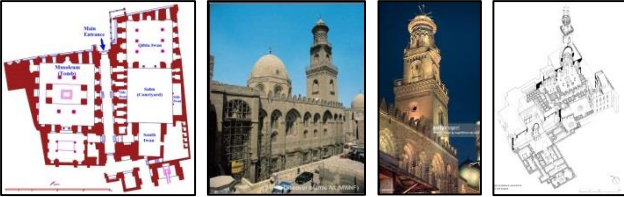### 3.1 Sultan Qalawun Complex (1285/684 AH)

Names of Educational Institution	* Madrasa of Sultan Qalawun, * Sultan Qalawun Complex. * Madrasa-Mausoleum and Maristan of Sultan Qalawun	
Era	Bahri Mamluk	
Building Types	Complex (Educational, Health Care, Religious)	
Location	Al-Muiz Street, Cairo, Egypt.	
Building Functions	Mosque, Madrasa, Mausoleum, Hospital,	
Educational Institutions	Primary Education	-----
	Craft Education	Medicine craft
	Higher Education	School, Mosque, Library
Teaching Methods	Craft Education	Training on skills of the craft
	Higher Education	Oral teaching
Educational Curriculum	Primary Education	Qur'an, Reading, Writing
	Craft Education	Medicine, Geometry
	Higher Education	- Jurisprudence, Quran interpretation. - Geometry (Science of Area and Optics), Arithmatic, Obligations.
The Design of the Building		

Table (3): The analysis of The Complex of Sultan Qalawun [Authors]

3.2 Sultan Hassan Complex (1362/764 AH)

Names of Educational Institution	* Madrasa of Sultan Hassan, * Mosque-Madrasa of Sultan al-Nasir Hasan, * Mosque of Sultan Hasan, * Madrasa and Friday Mosque of Sultan Hasan.	
Era	Bahri Mamluk	
Building Types	Complex (Religious, Funerary, Educational)	
Location	Al-Qala Street - Cairo	
Building Functions	Madrasa, Mausoleum, Mosque.	
Educational Institutions	Primary Education	Kuttab
	Craft Education	Teacher Workshop
	Higher Education	Mosques, Schools, Khanqas, Libraries, ScientistsHouses
Teaching Methods	Craft Education	Training on skills of the craft
	Higher Education	Oral teaching
Educational Curriculum	Primary Education	Quran, Reading, Mathematic, Writting.
	Craft Education	Medicine, Geometry, Cosmology,
	Higher Education	- Jurisprudence (Fiqh), Quranic interpretation, Quranic recitation. - Geometry (Science of Weight, Area and Optics), Arithmatic, Obligations.
The Design of the Building		

Table (4): The analysis of The Complex of Sultan Hassan [Authors]

3.3 Umm al-Sultan Shaban Madrasa (1368-9 A.D.).

Names of Educational Institution	* Madrasa of Umm al-Sultan Sha'ban, * Mosque and Madrasa of Umm al Sultan Sha'ban	
Era	Bahri Mamluk	
Building Types	Complex (Funerary and Education)	
Location	Bab al-Wazier Street, Cairo, Egypt	
Building Functions	Madrasa, Mausoleum, Sabil.	
Educational Institutions	Primary Education	Kuttab
	Craft Education	Teacher Workshop
	Higher Education	Mosques, Schools, Khanqas.
Teaching Methods	Craft Education	Training on skills of the craft
	Higher Education	Oral teaching
Educational Curriculum	Primary Education	Quran, Reading, Mathematic.
	Craft Education	Geometry, Cosmology
	Higher Education	- Jurisprudence (Fiqh), Quranic interpretation, Prophetic traditions, - Geometry, Arithmatic, Appearance

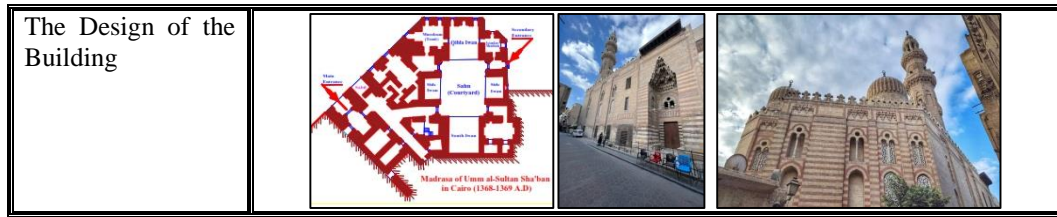| The Design of the Building	

Table (5): The analysis of The Madrasa of Umm al-Sultan Shaban [Authors]
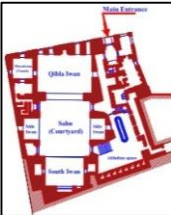
3.4 El-Ashraf Barsbay Madrasa (1425/829 AH)

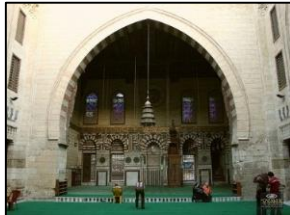| Names of Educational Institution	* Madrasa of Sultan El-Ashraf Barsbay. * Al-Ashrafiya * Sultan al-Ashraf Barsbay, Mosque/Madrasa/Khanqah..	
Era	Circassian Mamluk	
Building Types	Complex (Religious, Educational and Funerary)	
Location	Al-Muiz Street, Cairo, Egypt	
Building Functions	Mosque, Madrasa, Sabil, Mausoleum.	
Educational Institutions	Primary Education	Kuttab
	Craft Education	Teacher Workshop
	Higher Education	Mosques, Schools, Khanqas, Libraries
Teaching Methods	Craft Education	Training on skills of the craft
	Higher Education	Oral teaching
Educational Curriculum	Primary Education	Quran, Reading, Writting, History
	Craft Education	Medicine, Geometry, Cosmology
	Higher Education	- Jurisprudence (Fiqh), Quranic interpretation, Prophetic traditions. - Geometry (Science of Optics, Science of Area), Obligations, Appearance
The Design of the Building		

Table (6): The analysis of The Madrasa of Sultan al-Ashraf Barsbay [Authors]

3.5 Sultan Qaytbay Madrasa (1472-4 A.D.)

Names of Educational Institution	* Mosque-Madrasa of sultan Qaitbay, * The funerary complex of Sultan Qaytbay. * Maq'ad of Sultan Kait Bey.	
Era	Circassian Mamluk	
Building Types	Complex (Funerary, Religious, Educational)	
Location	Northern Cemetery, Cairo, Egypt	
Building Functions	Madrasa, Mausoleum, Sabil.	
Educational Institutions	Primary Education	Kuttab
	Craft Education	Teacher Workshop
	Higher Education	Mosques, Schools, Khanqas, Libraries, ScientistsHouses
Teaching Methods	Craft Education	Training on skills of the craft

	Higher Education	Oral teaching
Educational Curriculum	Primary Education	Quran, Reading, Mathematic, Writting
	Craft Education	Geometry, Cosmology, Temporal
	Higher Education	- Sources of jurisprudence, Quranic interpretation, Prophetic traditions, Science of Quranic recitation. - Geometry, Arithmatic, Appearance
The Design of the Building		

Table (7): The analysis of The Madrasa of Sultan Qaytbay [Authors]

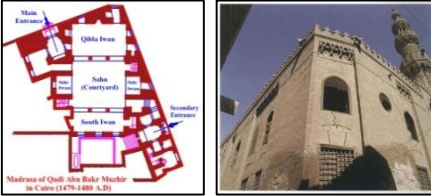## 3.6 Mosque of Qadi Abu Bakr Ibn Muzhir (1479/884 AH)

Names of Educational Institution	* Madrasa of Qadi Abu Bakr Muzhir, * Qadi Abu Bakr Muzhir Complex * Sabil and Kuttab of Qadi Abu Bakr ibn Muzhir	
Era	Circassian Mamluk	
Building Types	Complex (Educational, Religious)	
Location	Cairo, Egypt	
Building Functions	Mosque, Madrasa, Sabil.	
Educational Institutions	Primary Education	Kuttab
	Craft Education	Teacher Workshop
	Higher Education	Mosques, Schools, Libraries
Teaching Methods	Craft Education	Training on skills of the craft
	Higher Education	Oral teaching
Educational Curriculum	Primary Education	Quran, Reading, Mathematic, Writting
	Craft Education	Geometry, Cosmology
	Higher Education	- Jurisprudence (Fiqh), Sources of jurisprudence, Qur'ãnic interpretation, Prophetic traditions, Science of Quranic recitation. - Geometry (Building contracts), Arithmatic
The Design of the Building		

Table (8): The analysis of The Mosque of Qadi Abu Bakr Ibn Muzhir [Authors]

3.7 Complex of Sultan El Ghuri (1504-1505/909-910 AH)

Names of Educational Institution	* Mosque-Madrasa of Sultan Qansuh al-Ghuri * Sultan Qansuh al-Ghuri Funerary Complex. * Complex of al-Ghouri.
Era	Circassian Mamluk
Building Types	Complex (Educational, Funerary, Religious)
Location	Al-Muiz Street, Cairo, Egypt
Building Functions	Mosque, Mausoleum, Madrasa, Sabil-Kuttab

Educational Institutions	Primary Education	Kuttab
	Craft Education	Teacher Workshop
	Higher Education	Mosques, Schools, Khanqas, Libraries, ScientistsHouses
Teaching Methods	Craft Education	Training on skills of the craft
	Higher Education	Oral teaching
Educational Curriculum	Primary Education	Qur'an, Reading, Mathematic, Writting, Poetry, History
	Craft Education	Medicine, Geometry, Cosmology, Temporal
	Higher Education	- Jurisprudence (Fiqh), Sources of jurisprudence, Qur'ãnic interpretation, Prophetic traditions, Science of Quranic recitation. - Geometry (Building contracts, Science of Optics, Science of Area, Science of Weight), Arithmatic, Obligations, Appearance
The Design of the Building		

Table (9): The analysis of Complex of Sultan El Ghuri [Authors]

4. Future Vision for The Architecture Education

Between all aspects of architectural education in Islamic architecture (educational institutions, teaching methods and presentation methods) this section focused on the transmission of architectural idea between the different eras of Islamic architecture to base on it as a point of departure in formulating a future vision for the design of the architectural design studio.

Responsibility of generating the idea	I.A.	Co-operations between many responsible persons in the building design		
	C.A.	Architects work as independent or valuable members within the design teams		
Place of generating the idea	I.A.	Publically: In field of society		
	C.A.	Centrally: In architectural offices		
Source of ideas	I.A.	Quran and Prophet Sunnah Similar buildings in the society		
	C.A.	Multi Sources		
Type of generating process	I.A.	Co-operative	C.A.	So private
Relationship between the idea and the design method	I.A.	it depended on transmitting the idea as a tool for generating the idea		
	C.A.	it depended on building analysis by computer software in generating the idea		

Table (10): A comparative study about the architectural idea between Islamic architecture and contemporary architecture: I.A. Islamic Architecture, C.A.: Contemporary Architecture [Authors]

4.1 The Transmission Of Architectural Idea In Islamic And Contemporary Architecture:

This section presents a comparative study about how the architectural idea was transmitted during Islamic architecture eras and how it can be helpful in contemporary architecture in the suggestion of the prototype of the design studio.

The transmission of Architectural Idea in Islamic	Islamic Architecture		Contemporary Architecture	
	Tools of Transmitting Ideas			
	Category	Tools	Idea Progress Stages		Tools
	Words	Textual References	Discovering Methods	Collecting Information and Forming Background	Educational Pockets Hall
		Visual Notation System			Educational Films Hall
		System of Verbal			Projects Exhibition Hall
					Projects Models Hall
	Image		Personal learning Methods	Suggesting The Idea	Brain Storming Hall
		Graphic Representation			Oral Discussion Hall
		Visual images Transfer		Improving The Idea	Discussion/Lectures Hall
		Notational System			Virtual Reality Lab
		Standard Plans			Computer Software Lab
					Libraries
	Memory	Visual illiterates	Presenting learning Methods	Forming the Final Idea	
		Models			Verbal Transmission
		Similar Examples			Presentation Lab
		Mental Estimation			

Table (11) Transmission tools of the architectural idea in Islamic architecture and contemporary architecture [Authors]

4.2 The Design Of The Architectural Design Studio

From the previous presentation of the different methods and tools of transmitting the architectural idea in the Islamic architecture and contemporary architecture the research reached to suggest the following design of the contemporary design studio.

The suggested prototype of the architectural design studio consists of three zones: the idea generating zone, the pause zone and the completing the design of the project zone. The generating Idea zone in the design studio contains many components distributed on four zones, the student not allowed to go step forward to the second zone without passing the previous one:

Zone 1: Collecting Information and Forming Background

This zone contains educational pockets hall, educational films hall, projects exhibition hall and projects models hall

Zone 2: Suggesting The Idea

This zone contains brain storming hall and oral discussion hall.

Zone 3: Improving The Idea

This zone contains discussion/lectures hall, virtual reality lab, computer lab and libraries

Zone 4: Forming the Final Idea
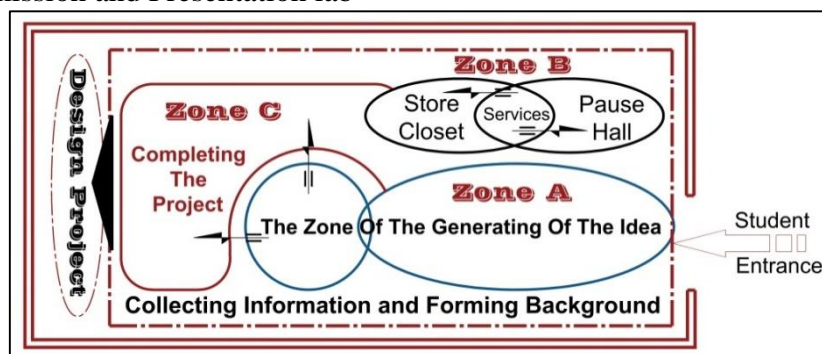
Verbal Transmission and Presentation lab

Figure (10): The suggested Prototype of the of the contemporary architectural design studio [Authors]
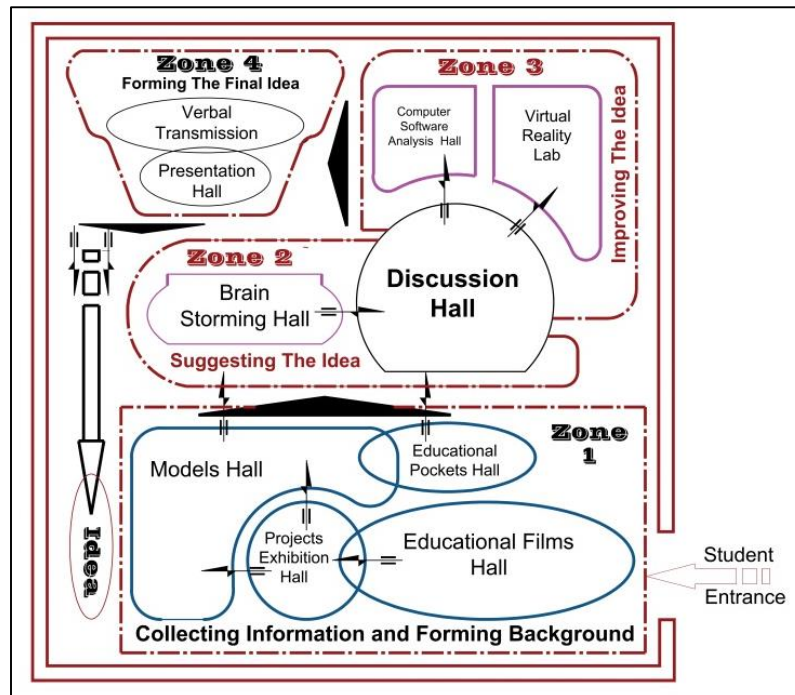
Figure (11): The suggested Prototype of the zone of generating the idea in the design studio [Authors]

The suggested is the design of the design studio but the detailed components of each zone, the dimension of each part and the cost of each element will be done in a future study.

5. Research Results

The research reached the following main results:

Results Related to Islamic Architecture

- Islamic architecture constructed its buildings according to the sciences studied by the Muslim architect side by side with professional inheritance and experiences passed down through time and place, and the architect during Islamic architecture eras was prepared and equipped with skills and talents through an organized and systematic education process, this process based on the interconnection and integration of the sciences

- The political and economic stability for long times during the different eras of Islamic architecture led to emerge three levels of education institutions which has a role in the preparation of the architect: Primary Education Institutions (Kuttabs), Higher Education Institutions (Mosques, Schools (Madrasas), Libraries or Bookcase and Crafts Education Institutions (Khanqahs, Book Market, Scientific Councils, Homes of Scientists).

- There were four presentation methods of architectural designs in Islamic architecture they are: architectural drawings (drawing on papers), drawing on skin or stone, drawing on land and three-dimensional models and perspective

- The research determined six functions for the architect in Islamic eras, they are: previewing the old buildings, modifying the design of existing buildings. restoration and reparation of the monuments, maintenance and preservation, supervision of the construction process and determine the cost of projects and make the construction assay

- Understanding the nature of those involved in the design and implementation process of various buildings in Islamic architecture proves that this architectural product of buildings was designed by architects, and there were eight persons participate in the design of educational buildings during the different eras of Islamic architecture as follows: Patrons (Sultan), Architects (mi 'maran). Enginers or Geometrician (muhandisin), Mathematican

(hesabii), Astronomers (falakii), Builders (banayyan), Craftsmen (sanaii), Master (ustadan), and the transmission of architectural idea between the different eras of Islamic architecture was done by three main methods: by words, or by image or by memory.
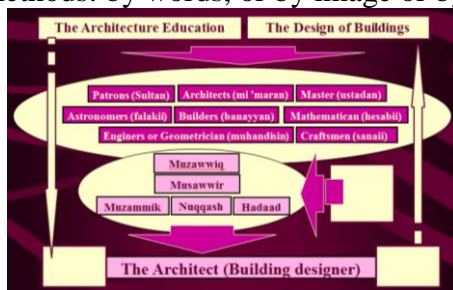

Figure (12): The participants in the design of the buildings in Islamic architecture [Authors]

Results Related to Contemporary Architecture

- In contemporary architecture the archure design studio need to be redesigned to gained high benifical from modern technology and this led to the appear of the following question which this research tried to answer: What is the future of the architectural design teaching studio in light of the applications of the digital revolution in architectural education and in light of the rapid development of educational and learning technology techniques and in Light of international health care requirements?. The answer of this question came on suggesting a future vision for the architectural design studio and it based on the applications of virtual reality in the process of teaching architectural design.

- The research reached to suggest a prototype of architecture design studio in which it consists of three zones: the idea generating zone, the pause zone and the completing the design of the project zone. The generating Idea zone in this design studio contains many components distributed on four zones, the student not allowed to go step forward to the second zone without passing the previous one: Zone (1) collecting information and forming background, Zone (2) suggesting the idea, Zone (3) improving the idea and Zone (4) forming the final idea. This future vision mainly aimed to enhance the functions of the architecture design studio and this will be a step to close the gap between the employment requirements and the final product of the architecture education systems

- Ensuring a highest efficiency in the functional performance of buildings means that it is necessary to ensure a high quality level of its architectural design, and one of the means of achieving this is developing the teaching process of the architectural design in architectural departments and colleges, and a guarantee for this is redesigning the architectural design studios in light of rapid development in design techniques.

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