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## The Evolution of Space in Schools Architecture Based on the Role of Their Governing Educational system (Case Study: Sepahsalar School, Darolfunoon, and Alborz High school)

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### Abstract

Educational system of the society is one of the fundamental pillars of emergence, development, and transfer of its cultural elements. The system itself involves four pillars, including educational structure, instructor, learner, and educational environment. Earlier researches on the architectural history of Iranian schools indicates that the relationship between education and school architecture has not been widely explored. The main research question is how the transformations of educational system have been relevant with the transformations of Iranian schools spaces? The study aims at recognizing the spatial evolution of Iranian schools architecture. It seems that with the transformation of Educational system in the Qajar period and the establishment of Darolfunoon academy, the system and the architecture of schools have gradually shifted the traditional school to new ones. Based on a historical-interpretive approach, data were gathered using library method, then were analyzed citing historical documents. To this end, three periods were identified in the educational system and architectural developments and three typical schools of the given periods, including Sepahsalar School, Darolfunoon academy, and Alborz high school, and their relevant educational systems were analyzed. Studies suggested that the traditional system had been based on the concurrent life and learning, coordination of spiritual and worldly sciences, and Interactive relationship between master and disciple. This system had interacted with the architecture of schools, with prominent features such as considering one place for living and learning, the use of schools for religious affairs, and considering large spaces for schools. In the next period, the religious aspect and the interaction between disciple and master has been removed from schools such as the Darolfunoon, but the overall shape the central courtyard has been preserved and the function of the chambers has shifted to classrooms. Finally, in the modern educational system, the architecture of schools has become linear, the classes and their layout has led to a unilateral teacher-student relationship, and has distanced from the architecture of the traditional schools.

### Keywords

Educational System, Schools Architecture, Darolfunoon Academy, Sepahsalar School, Alborz High School.

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## Introduction

The development of any educational space reflects the emergence of a professional activity in the society which performing it demands learning certain and programmed trainings. In other words, along with the social dividing of work and activities and the development of institutions and facilities, it is impossible to accomplish some works without receiving necessary trainings (Kiani, 2012: 118).

Based on the needs of the instructor and the learner, different typologies of educational environments have been provided, but nowadays, the most well-known training space is known as school. Concurrent with the emergence of schools, the teaching approach has been transformed and taken a new shape. This paper attempts to separately examine the structure of educational system and environment (schools), then explores their relationships. Diagram 1, represents a perspective of the paper as well as the impressive and impressionable factors in achieving the goal.

### Literature review

As one of the most important Islamic architectural elements, school has been studied by many researchers. These researches have been categorized as follows:

- Those which have mainly dealt with Islamic architecture and devoted a part to schools, such as Helen Brand (2001). These have studied schools like other elements of Islamic architecture in the whole Islamic territory. In this regard, Pirmia and Memarian (2008), have introduced it in the field of Iranian Islamic architecture.
- Others such as Soultanzadeh (1985), in his paper entitled "The History of Iran's schools from the Antiquity to the Establishment of Darolfunoon", have particularly investigated schools and reported the history of some features of existing schools or those which were documented in historical manuscripts. In another article entitled "Mosque-Schools of Tehran", Sultanzadeh (1999), has introduced these structures in Tehran. Molazadeh (2002), has prepared an encyclopedia of the buildings of Iran's current schools.
- The latter have dealt with the architecture or architectural components of one or more schools. For example, Savaqeb (1994), has studied Khan School in Shiraz or Zomorshidi (2009), has studied Sepahsalar School. More ever, Khani and his colleagues (2012), have comparatively assessed the architecture and the decorations of Ghiasieh Khargerd School and Isfahan's Chaharbagh School.
- All of these have only studied the school architecture

and in some researchers such as Houshyari and colleagues (2013), in an article entitled "Mosque-School Typology in Iran Islamic Architecture", have briefly explored the relationship between educational system and learning environment.

## Bases of Education in Iran

According to educational experts and Behavioral Scientists, Educational System consists of four bases: instructors, learner, educational structure and organization (including curriculum, teaching practices, methods of training, training process, etc.), and educational space. These are completely interrelated. Therefore, a deep insight into this interrelation is needed in order to understand the architecture of schools and the history of its transformations. This research attempts to study Iran's educational system, in its contemporary development milestones, along with the changes of educational space architecture (namely, schools).

The history of educational system can be divided into three periods:

- First, a period in which the educational system was completely dominated by seminaries, so that their students were directly or indirectly leading the Maktab system. This period has existed before the Qajar dynasty, thus it can be considered as the longest educational period
- Second, the next period began from the mid-Qajar when Iranians became gradually familiar with western civilization and culture. In this time, clerics and those who had been educated in West, alongside each other and sometimes together ran the system.
- Third, in the last period which started with the overlordship of Pahlavi the First and gradually spread throughout the country, clerics were completely excluded from the educational system and it was only ruled by those who had been educated in West. In this time, clerics were banned from involvement in any educational activity (Nasiri, 2005: 122).

## Iranian educational system in the traditional period (First Period)

In the early years and before the establishment of school, the higher educational system was remarkable in many respects. First, it was not an organized one and wherever a wise or a jurist sat, students were circling him and benefited from his knowledge, so the education was performed in its most natural way. Second, master and disciple were entirely free and the scholars were only seeking the essence of knowledge not a physical place for learning. Third,

this organization and the teaching approach were not normally developed and as more nations converted to Islam, the system became richer. Fourth, gaining a better understanding of Islam was the main goal of higher education (Dorany, 1997: 83). Three different educational system can be recognized in the upper mentioned periods which are as follows (Qodousifar, et al, 2012: 39):

- Theoretical Trainings: these primarily developed for theoretical sciences such as theology and its branches, spherical astronomy, mathematics, and Medicalsciences. These trainings relied on the literature and lectures.
- Practical Trainings: these involved industry, business, and arts education and were based on training during the work of the artisan master.
- Spiritual Training: this training which was a composition of culturing and ethical education was prevalent among Sufis and Fetyan groups.

In the present paper, the focus is on theoretical training, but this does not mean that all these systems

were separated. In some cases such as medical sciences and astronomy, the theoretical training was associated with research and practical training.

**Educational Sat'hs or Sections:** Mainly, there were three theoretical traininglevels. "Moqadamat", "Sat'h" which is the equivalent of high school, and "Kharej" which is the equivalent of today's higher education (Dorany, 1997: 83).

**Curriculum:** Primarily, education in high schools had an Islamic goal. Thus, in the beginning of school emergence, the Quran and Hadith became the center of all educations. During the 10th century, various scientific fields, including different philosophical thoughts and attitudes, particularly pre-Islam philosophies, astronomy, chemistry, medicine, and music was taught in Shia schools. Medicine was taught not only in the schools, but also in the mosques (Durkheim, 1985: 31).

**Teaching Practices and Methods of Training:** School teachers were free in choosing the kind of education and its methods. Basically, the teaching practice in schools

Table 1. Types of teaching practices, learning processes, and studying methods in theoretical training. Source: <http://ensani.ir>.

<b>Processing</b>	These include methods that are used during the main process of education, the teaching-learning process and study-research process
<b>Lecture</b>	In this method, verbal presentation is been used for explaining and realizing subjects. This has a very long history in the educational system of seminaries and was a prevalent method in the early days of Islam which was frequently used by clerics and governors in mosques and pulpits.
<b>Exposition</b>	Exposition means writing, but writing is not an independent method. Nonetheless, it has a particular usage in Kharej subjects. However, writing is an important component of all educational practices, but here, it exactly concerned with writing Kharej lessons.
<b>Hearing</b>	In the seminary, some students learn their lessons through hearing the subjects.
<b>Debate</b>	In this method, at least, two persons sit face to face and discuss scientific issues. The history of this method returns to the time of Socrates, Greek philosopher, 470-399 BC.
<b>Narration</b>	Narration is a pillar of Islamic educational programs. Some think that paying great attention to narration, roots in the nature of Arab intellect and the huge ability of this nation to remember the subjects.
<b>Velitation</b>	In this method, the question is the starting point and the core of debate among scholars and themaster. The students ask a question from the teacher, then he gives his answer. And the exchange of views, a conflict occurs on the claim of the opposite side. The important point in this method is that both students and teachers are aware of the educational purposes of the velitation and do not bring other motivations in this process.
<b>Disputing</b>	Dispute roots in ancient millenniums. The base of this method is posing an antagonistic question and efforts from the opposite sides to reject the views of each other.
<b>Studying</b>	Traditional study method is seminary specific one.

was in the form of expositions of the teacher about a specific topic followed by a discussion took place between him and the students (Kardan, 1957: 1126). Table 1, presents a summary of theoretical lessons training methods. In most of these methods, a mutual interaction between master and disciple can be sensed (table 2).

According to Table 3, three different spaces, including mosque, Maktab, and school were used for theoretical training. One or more of theoretical training (Moqadamat, Sat'h and Kharej) were given in each of these places.

**Iran’s educational system during the transitional period (second period)**

With the beginning of the 19th century and the Russians massive violations to Iran, the Iranian government had to attract the support of a powerful European country to prevent such attacks. Therefore, Iran’s relationship with Britain and France strengthened again. Among these, the presence of expert bodies of these two countries, following the bilateral agreements, contributed to the development of Iran and initiated reforms in the country. Despite this fact that most of the agreements were left unfinished after a short time, but its effects were very essential in transforming the educational system and familiarity with new educational methods as

well as new sciences (Kiani, 2012: 161). In the first half of the 18th century, important changes occurred in Iran, among which were the adaption of European modern education and the efforts of the kings and a number of the officials to develop it in the large cities of those days, and then in the smaller ones. Formally, this important event started with the establishment of Darolfunoon in 1852, but practically, its arrangements have been beginning since 1810 when two Iranian students were sent to Europe to study, although some school building was built a time before (Nasiri, 2005).

The educational style in Darolfunoon was quite modernized and European, and those who tended to learn Arabic and Persian languages, theology, and Islamic law had to register in traditional schools which were still responsible for these fields of education (D’Allemagne2, 1999: 218).

Darolfunoon was the first school that was established in Tehran in European style. It was built using the public funds and its arrangements were provided by Amir Kabir. This school was officially opened by Nasereddin Shah in 1851. At first, seven teachers from different European countries (including Austria, France, Poland, and Netherland) with several Iranian translators started working in it. It academic disciplines included infantry, cavalry, artillery, engineering, medicine, surgery, pharmacy,

Table 2. Types of teaching method in terms of the interaction of teacher and students in theoretical training. Source: <http://ensani.ir>.

<b>Samerai style (disciple-centered)</b>	In this style, disciples are the focus of the discussion and the master is not the main lecturer, but at the end of the session sums up the ideas and make his conclusions.
<b>Classic style (master-centered)</b>	In this style, master is the most active one and acts as a lecturer, but the disciples are less active.
<b>Two-step style</b>	In this style, the lesson is taught in two sessions. In the first session, master presents the subject in the master-centered style and disciples have less opportunity to ask questions. But the second session is handled disciple-centered in order to provide an opportunity for the less talented ones to replenish their findings.
<b>Collective research</b>	In this style, there no common master-disciple relationship and some people choose a topic or a principle of Islamic jurisprudence in a scientific meeting and investigate it, then share their findings and criticize the opinions of each other.

Table 3. The relationship between educational elements and educational environments. Source: authors.

Objectives	Educational Organization	Educational Program	Educational Practice	Emergence Quality	Curriculum	Trainer	Learner	Educational Level	Responsible Organization
Mosque Fully consistent with the objectives of Islam	-----	Encourage and Educate those who converted to Islam	Create circles of teaching and training	Educate the converts and promoting the properties of Mohammad (PBUH)	Mostly Quran, Hadith and Islamic sciences and sometimes worldly sciences	Prophets, Imams, their students, Gnostics and knowledge	The most general limitless type of education	Moqadamat and Sat's	Public
Maktab Read, write and understand the rules of religion	Has no specific organization	No limits regarding age, duration of education, beginning of education and, ...	Individual verbal, and memory-centered teaching	Children graduating from mosques and the plurality of students	Quran, Hadith, Fiqh and calligraphy and literature	Clerics and tutors	The children of the rich and the public	Moqadamat	Public
School Familiarity with intellectual and traditional sciences	Organized and relatively regular	Order starting date and duration of study	Teacher-centered, based on sources and books	Response to specific needs of the society and being more specialized sciences	Quran, Hadith, interpretation, mathematics, logic, philosophy, and astronomy	Scholars, jurists, and scholars	Disciples and young scholars	Sat'h and Kharej	Governmental

mineralogy, etc. Darolfonoon courses could be considered as a combination of theoretical and applied lessons in high school and university levels. Its graduates who were often from aristocratic families had obviously gained higher posts (Zamiri, 1994; 158). Table 4 presents the four main pillars of the modern system of education in Iran, in particular the Darolfonoon, and its feedback from the society. According to Eiravani (2014), this period is the preparation era of modern educational system in Iran. It coincided with reformistic efforts of Abbas Mirza in modernizing the army and dispatching students to Europe (1791), Amiri Kabir in establishing Darolfonoon (1851), and Mirza Hassan Roshdiyeh in establishing the first modern primary school (1888). The establishment of missionary schools are also a symbol of modernization in Iran. Characteristics of the education system in this period

can be summarized as follows:

- The addition of new sciences, foreign languages, and non-religious lessons to the course;
  - Introducing school as a non-governmental phenomenon;
  - Supporting women's groups and religious minorities;
  - Introducing school as a base for intellectualism toward the Constitutional Revolution (table 4).
- Iranian education system in modern times (third period) With the rise of Pahlavi I stand the occurrence of changes in political regime during 1927, initial attempts was made to make education a public one and to realize the practical rule of government over education (Seddigh, 1968; Mohammadi & Ghaini, 2002) and led to the creation of a centralized educational system. The characteristics of the educational system in the field of education, which was later renamed

Table 4. Characteristics of the educational system during the transitional period. Source: authors.

	Trainer	Learner	Educational System	Educational Environment
<b>Modern Educational System at the Beginning of the 19th Century</b>	Foreign advisers and teachers as well as those who have educated abroad	Troops, in particular soldiers, and those who wish to study	The transformation of educational system and familiarity with modern educational methods and new sciences	An environment retrieved or imitated from traditional school

as “Culture”, during the reign of Reza Shah, are as follows:

- Compulsory unveiling of girls and female teachers to attend the classes.
- The removal of religious education from primary schools (Hosseini Rooholamini, 2005: 92).
- The Establishment of mixed schools for the first time since 1933 (Hosseini Rooholamini, 2005: 141).
- The establishment of new educational programs such as the Scout Organization and sports by American and Iranian teachers. Dr. Jordan, chief of the American College (Alborz High School) was active in this area (Mokhtari, 1947: 271).
- The establishment of the Academy (Literature) and the Conservatory of Music (and struggling with religious sanction of music) in 1935 (Mokhtari, 1947: 271).
- The establishment of Thought Development Organization in 1939 which through the national program of Curriculum Reforming and Standardization was assigned to more efficiently foster patriotism and monarchism in textbooks of primary and secondary schools (Darbeiki, 2003: 176).

### The architecture of Iran’s traditional schools

History of schools: the educational environment in Iran was mainly Islamic. “In short, school can be defined as an institution for higher education in which, traditional Islamic sciences (including Hadith, Interpretation, jurisprudence, etc.) are taught. It was an answer to specific needs of the Islamic society. It was designed to be used by a completely innovative institution (Hillenbrand3, 2000: 173). In this time, education was informally divided among Maktab, Mosques, and seminaries. Therefore, maktab developed along with seminaries and indeed

served as the primary course for entering seminaries (Dorrany, 1997: 71).

Apart from the mosque which has long been used as an important center of education, particularly in the fourth century, creating special places, named schools, for teaching religious and literary sciences became common. Iranians preceded all other Muslim nations in creating such places (Safa, 1959: 265). Many researchers (for example, Hattstein4 and Deliu5, 2011: 362; Petrushevsky6, 1975: 101; Hillenbrand, 2000: 214-215) consider Khorasan, in particular Neishabur, as the origin of oldest schools of the Islamic world and assume Buddhist architectural sets in eastern Iran and Khorasani House as architectural roots of schools. The peak of school building was during the reign of Seljuks and by the efforts of Khajeh Nizamolmulk (Kasaie, 1995: 93). Nizamiyeh School which was built by Nizamolmulk in Baghdad became a milestone of school building in the whole Islamic world. Unfortunately, nothing has remained from this school to make researchers able to investigate its spatial anatomy. To this end, only some structures of Khargard School remained erected which its Kofi inscription involves the name of Nizamolmulk, thus it is assumed to be one of Nizamiyeh schools (Hillenbrand, 2000: 236).

These schools were socially rated in a high-level position alongside with other scientific and research centers, such as hospitals and observatories. According to Varjavand (1977), after selecting Maragheh as the capital of Iran, due to high scientific demands or the encouragement of Khajeh Nsireddin Tusi, Iranian great scientist, Maragheh Observatory, one of the most prestigious research centers in the world, was built in 1257. The results of researches done in this scientific center were published in 1264 in

a book called “Zij7 Alikhani” (Internet Website: <http://museum.tbzmed.ac.ir>). According to relevant researches, an educational and research complex can be tracked at the site of Maragheh Observatory which was consisted of:

- The central tower of the observatory and its affiliated astronomical units
- A school to train young researchers in fields such as mathematics, physics, light, astronomy, etc.
- An impressive library with about four hundred thousand books and references
- Resorts for professors and researchers (Varjavand, 1977: 143).

In the beginning, the school was a room in teacher’s house which, of course, was used as a place for students to study, not to sleep (Hillenbrand, 2001: 173).

With the development of education and building more schools for training, other elements were added to this learning environment. The spatial-functional elements of schools included chamber, classroom, library, mosque, servant rooms, and Toilets (Kiani, 2012: 136).

Initially, in four porches Mosques, each porch was assigned to teach one of the Sunni sects (Pirnia and Memarian, 2008: 346). The placement of spatial-functional elements was so that surrounded the central courtyard in four directions. The shape of this yard was a stretched rectangular or nearly a square one (with corners or chamfer angles).

School entrance was located in one side of an axis which intersected the two sides and the center of the rectangle. The space which was located at the other side of the above-mentioned axis (in other word, in front of the entrance), was used for a function other than a chamber (such as dome, prayer room, classroom, library, or a large veranda which served as a mosque or classroom).

Another group of schools had four verandas, two of them were intersecting the entrance axis. The other schools had two distinct areas, instead of porches, with larger craters than chambers located on both sides on both sides of the perpendicular entrance. These spaces which sometimes had patios, were often used as classroom, prayer room, or even library (Pirnia and Memarian, 2008: 138). Before the arrival of modern education, the architectural characteristics of the schools were tangibly so close to those of mosques, and in some element, such as decoration, was exactly the same.

### Architecture of modern schools in Iran

Table 5. summarizes the history and educational

features of Anoshirvan Dadgar High School, Firouz Bahram High School, and Jeanne d’Arc High School to represent the transformational period of the educational system and architecture.

### Case Studies

Among the schools built in these three periods, three prominent ones were selected for this study:

- Sepahsalar School and Mosque as an indicator of Tehrani style (after Esfahani style)
- Darolfunoon is the starting point of the modern educational system replacement. it is a mixture of a relatively modern educational system with relatively traditional place and space
- Alborz High School is the symbol of existence and development of the modern education system which marks a new chapter in designing educational environments. The American College of Alborz is a clear example of the style of the school building based on the educational system at the late Qajar and early Pahlavi. This style has been observed in the majority of schools built at that time. Ease of access to observative and library resources, were among the influential factors in selecting the above-mentioned samples.

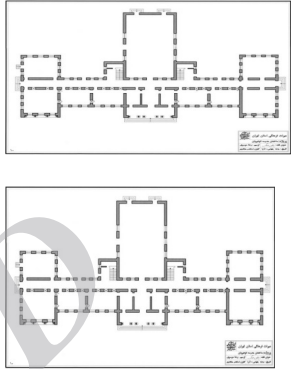
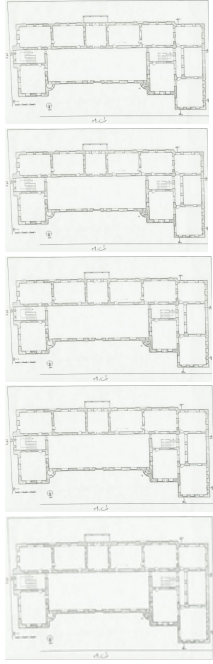
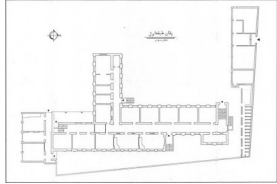
### The analysis of traditional and modern educational environment

History and profile of Sepahsalar mosque-school (martyr Motahari High School)

Two years before his death, Mirza Hossein Khan Sepahsalar, spent his personal assets and income from property inherited from his father to build a school and a mosque in 1878. During the construction process, sometimes he personally supervised the construction work. Sepahsalar School-Mosque which was fundamentally built with a wide space and a luxurious superstructure is considered as the first and the largest mosque-school in the capital. Building large terraces on the upper floor is one of the key features of the Sepahsalar mosque space of the. This mosque is actually one of the greatest innovations of Qajar architectural style. The school yard is 61 cubits long and 60 cubits wide which is surrounded by 60 chambers in two floors.

Religious disciples were residing in these chambers (Mashkouti, 2009: 114). Between the four sides of the yard, four tall porches were built facing each other. One of these porches is called “Maqsurah8” which faces the Qibla. Most chambers have a small porch at the entrance, a space consisting of three main parts, and a closet. The closet serves as a variable

Table 5. The architectural features of the first modern schools in Iran. Source: authors.

School Name	Introduction and History	Prominent Feature	Educational System	Building Plan
<b>AnoshirvanDadgar High School</b>	According to the inscription, the building was built by a Zoroastrians compatriot in 1926.	The formation of the buildingis based on a longitudinal axis in the direction of East and West with a length of 76 meters. Two northern-southern arms on the both sides of the building are responsible for the stability and sustainability of it.	The school's educational system was based on the modern education system prevailing in Europe at the time.	
<b>Firoz Bahram High School</b>	This school was built in 1932 in memory of one of the children of Zoroastrian compatriots on the land of Zoroastrian Association.	The building has a rectangular plan. The impact of Qajar architectural style, due to the short timeinterval with the reign of Pahlavi, is evident on the building, especially the facade. The building has three northern, southern, and eastern facades which were designed according to mirroring style.	Modern educational system	
<b>Jeanne d'Arc High School</b>	The building was founded in 1931 by foreign missionaries in Iran.	The building style is an eclectic one. The use of applied, free and eccentric planning that had been drawn from European architectural ideas, has benefited from Iranian architectural forms, components, and elements.	The educational system was derived from the system prevailing in France.	



room which is located in the quoin of the land and in the spatial hierarchy, it is considered as the most private part of the chamber. Several Shabestans<sup>9</sup> and schools have been built on both sides of the porches and beyond the chambers (Bani Masoud, 2009: 113). History and profile of Darolfunoon School  
Darolfunoon was the first prominent building which was built in Tehran during the reign of Nasereddin Shah. This school was designed in 1849 by Mirza Reza Mohandsbasy (Qobadian, 2013: 68). Darolfunoon established a solid bridge between Iran and European nations and modern civilization. Therefore, its establishment in 1851 could be considered as a milestone in the history of Iran's education.

This school, as the first educational institution which was built by the government in the European style, has demonstrated the increasing understanding of the necessity of educational reform as a part of broader reforms (Bani Masoud, 2009: 115). Generally, the building plan of Darolfunoon which was prepared by Mirza Reza Mohandes bashy consisted of a foursquare building surrounded by 50 square rooms, each of which had 16 m<sup>2</sup> area. There were large porches in front of these rooms and several poles were erected which were innovatively molded and glazed. On the north side, there was a wide yard and several large and small rooms were built which were dedicated to the departments of music and military. Furthermore, beyond the classrooms, there were candle making and pharmaceuticals workshops and a publishing house to publish the needed textbooks.

In the map of Krziz<sup>11</sup>, Darolfunoon is located north East of Golestan Palace. In this map, the plan of the school is in the form of a yard. Two rooms were located on the northern axis and the southern part of the yard is separated by a hallway from the building. Although, like the plan of all schools built in Esfahani style, the plan of Darolfunoon is a central yard, but its architectural elements is different from the surrounding buildings. According to the remaining images of this school, except spiral pedestals (similar topillars of the Zandiehage in Shiraz) beside the classroom, no evidence of Iran's past architectural decorations is seen at this school. Instead, realistic images of man, plants, and European structures is observed. Also, noogee arch is seen at the body of the building and all the arches are in the form of semicircle which is a mimic of the western neoclassical style which was prevalent at that time in Europe. Scalloped capitals of the Safavid and Zandiyeh era

were replaced with semi-carnitine capitals. The school watch (the western element) was installed on the northern axis. Given the foregoing, the plan of Darolfunoon is similar to that of traditional schools of Iran with features such as the central courtyard and the emphasis on the main axis. But the Facade of the school involves Western symbols and architectural elements. Therefore, the layout and the physical body of this school is a combination of Esfahani and western neoclassical style (Qobadian, 2013: 70).

### History and profile of Alborz High School

Alborz High School is located at the intersection of Hafiz and Inqlab streets in Tehran. In terms of scientific level and educational facilities, this high school has always been among the Iranian best schools in the era of the Pahlavi. This school which was initially founded by the Americans, was known as the American College.

In 1918, Mrs. Harry Moore came to Iran and built a boarding dormitory called the "Hall of Lincoln" and a clinic in the lands of Alborz High School. These two buildings were out of any architectural value, and were later destroyed. At the same time, At the same time, in the south of Dr. Jordan's house, one of the first directors of educational institution, the first official building named the Sciences Building, which was also known as "McCormick Hall" was built. More ever, another building was constructed to accommodate staff. Dr. Jordan's house which was located a bit higher than this location was later destructed.

The central building of Alborz High School was among the first structures designed by Nikolai Markov in Iran<sup>12</sup>. This building is located on the main axis of the site entrance. The building plan of the high school does not look like that of traditional schools plans.

This plan is a stretched rectangle which has two rectangular maneson the two ends of it. The entrance is in the middle the building and has formed a cube out of the main body of the building.

The building has a basement and two floors above it. The vestibule roof in the middle of the building forms a large circle in front of the entrance which is open to the upper floor. All entrance stairs and access to the top floor and the basement stairs are located on the front axis. On both floors, the classrooms are located on the south side of the main corridor in the building. Large halls have been located at the end of two manes in both sides of the building. Plans of ground floor and first floor are quite symmetric,

though it can be considered as a neoclassical plan. But unlike the plan, all Facades of this building have been designed following the Esfahani style. The arches are all ogee ones. Beautiful Rasmi-bandis<sup>13</sup> have been provided overhead the entrance of the building. Roof cover is in the form of a gable which is mounted on wooden trusses (Qobadian, 2013: 143-144).

One of the key characteristics of Markov's works is his tendency toward Islamic-Iranian architectural forms and methods and this tendency is well-exhibited in the design of Alborz High School. The stretched symmetric volume of the school and its entrance is reminiscent of the Islamic monuments and this similarity becomes more evident when one watches it right along the porch-like entrance of the building. The portal and the two towers surrounding it are reminiscent of Islamic castles (Bani Masoud, 2009: 200).

### Discussion

According to the specifications mentioned in the literature, the impacts and comparative interactions between the educational system and environment of these three examples can be described in the following table.

The relationships among education process, learning and teaching methods and the architecture of Darolfunoon educational environment

In Darolfunoon, teachers were foreigners or those who had studied abroad. The change in education method and the shift to western educational system was the result of these teachers' efforts. Each teacher was responsible to teach only one field. The general attendance of students and military forces increased dramatically in the school. Education shifted from generalization toward specificity.

The evidence supporting this issue is the existence of a special class in its special name, such as "Engineering Room" (Dorani, 1997: 130). Materials that were taught in Darolfunoon included a combination of theoretical and applied courses at secondary and university levels (Zamiri, 1994: 158). Course material have become more specialized and applied sciences had been included in the courses. Given the above-mentioned features, the desire for public education has increased the number of students and this rise should be proportional to the density of learning environments. Another issue was the education level of students who were initially taught in one class, and later because of differences in their literacy and understanding, the classes were separated (Pollack, 1989: 211). The sciences have become

more specialized. The main courses consisted of cavalry, engineering, mathematics, cartography, mineralogy, physics, chemistry, pharmacy, medicine and anatomy, surgery, history, geography, and foreign languages (Adamiyat, 1969: 348). Various course materials and practical courses, in particular, led to the creation of new spaces, such as laboratories and workshops, in the school.

The relationships among education process, learning and teaching methods and the architecture of Alborz High School educational environment

Teachers become government employees. The presence of domestic and foreign teachers in the colleges is done under continuous supervision of Ministry of Education. Modern education and replacing it with traditional style is being promoted. Students enter the college after passing the entrance test. Sometimes students study in boarding schools. Students from every social background have the ability to enter school.

Choosing the favorite field of study is among the positive points of this school. The relevance of education with the needs of the society is a prominent feature of Alborz High School.

The management style of Dr. Jordan and the arrival of American educational system lead to a 12-year educational period. Sports classes are included in the curriculum. Courses become more specialized than Darolfunoon. The difference in Lessons of each educational course leads to greater diversity in the curriculum. Preparing students to enter universities is among the benefits of Alborz High School and its modern educational system.

The new system of education, diversity of teachers, several separate spaces, official teachers, and continuous presence lead to an inflexible disciplinary system and this in turn, is reflected in the architecture of the building. The combination of modern and traditional educational system creates spaces with classical Iranian-European architectural style. Boarding students need to have dormitory. Accessories such as library and dining halls for regular and boarding students are added to the building (Adamiyat, 1975: 87). Exams and selection serve as an entry sieve. Talented students need less supervision, therefore the arrangement of the building space shifts from central courtyard to linear one (Ibid: 91). Modern education, the ability to continue education in graduate schools, 12-year educational period, and different teachers and materials in every course require a special space.

One-way relationship between teacher and student, different materials of each course, the lack of interaction between students, and the lack of discussion context are among the significant feature of this school. After finishing their classes, students return to their home or dormitory. The arrival of foreign teachers and those who have graduated abroad creates a new architectural style which follows both the Iranian tradition and the western patterns (Ibid: 95).

### Tradition Period

In the traditional education system which is based on teachers-students style, the emphasis is on the importance of simultaneous education, , teacher-focused and student-focused education, different educational processes, and seminary system of Sepahsalar school are among the influential factors that led to the formation of collective Madrasas (school and mosques corridors), central courtyard, private chambers, spaces for dialogue as well as multi-purpose places for resorting, studying, and living.

Thus, these multi-purpose spaces paved the way for teacher-students interaction as well as the interaction among the students. The existence of religious aspects is seen not only in the course materials, but also in the spaces, so it can be said that the mosque also served as a school.

### Transitional Period

The replacement of the traditional system with a modern one and the establishment of Darolfunoon caused changes in educational processes, training methods, character of students, teachers, and course materials, so one can expect changes in the educational space. In this period, the school is a public institution which through the efforts of intellectuals and reformists and alongside the traditional education system tries to adopt and localize the modern education system.

Although it has added secular materials and new sciences to its contents, but in some courses it has kept the traditional and religious contents, and in some fields of study, especially in the social sciences, interacts with traditional schools. But there are no aspects of traditional interaction between teacher and student, no religious aspect, and no relationship with

living and studying in one place. In the architecture of Darolfunoon, some features of the traditional architecture, such as the introspective spirit and a central yard, have been preserved, but the spaces have found new functions.

Chambers have shifted to classrooms. The disappearance of the private chambers which, due to lack of an educational system, have been provided for living and resorting of students was a sign of new educational system arrival.

On the other hand, the existence of the central yard in Darolfunoon revealed the remaining of a traditional educational system. Diversified course materials and specially the inclusion of practical lessons in the curriculum led to constructing modern buildings in the school, such as workshops and laboratories. In Darolfunoon, students were sitting on the chairs and each teacher was teaching separately in a classroom (Mahboubi Ardakani, 1975: 270). The change in teaching methods alters the educational furniture and the space dimensions.


Using more update teaching tools, such as blackboards and maps, changed the light exposure of the space. Unlike the traditional schools which students entered the Madrasas directly from the yard, in Darolfunoon, the students had to pass the courtyard and then the corridor to enter their classes. Such an access does not fit the Iranian architecture which is derived from the English architecture of Rolich casern.

### Modern Period

The hegemony of modern educational system on the education body of the country generally set aside the tradition education system and manifests in American College (Alborz High School). The relationship between the student and the society become interwoven and the school is no more considered as a special place for special people. Therefore, the introspective feature of the school is vanished and become extroverted.

Considering a 12-year period for education leads to the separation of students and the differentiation of course materials. Then, multiple diverse classes should be created. Constant monitoring of the students is disappeared and they consciously go to school. Therefore, the central courtyard is disappeared and replaced by a linear formation with two side wings.

Table 6. The relationships among education process, learning and teaching methods and the architecture of Sepahsalar educational environment.  
Source: authors.

	Relevant Educational Space		Learning Method					
			Pre-studying	Attending Classes	Studying Lessons	Discussion	Summary and Commentary	
Process	Lecture	Locating a larger space than a chamber in the plan for the gathering of a large number of seminary students to listen the Lecture of their master was so common. This place was called Madras. In Sepahsalar, there were a Shabistan and a Madras on both sides of the porch. Sometimes lectures have also been held at the Shabistan.	Classic	Chamber	Madras or Shabistan	Chamber, yard, or Shabistan	Madras (if all gathered)	Chamber
	Exposition	Most of the time, expositions were done in the space of Madras or the personal chamber of the student.	Sameraie		Classic			
			Two-step					
			Collective					
			Hearing		This process can be used at the teaching environment	Sameraie		
	Classic							
	Two-step							
	Collective							
	Debate	This process needs a large place for collective research and a smaller and more private one for a double debate.	Collective					
	Narration	It can occur at any space	Sameraie					
Classic								
Two-step								
Collective								
Verification	Since this process occurs in the presence of master and his students, a large place should be provided for such a gathering.	Two-step						
		Collective						
Disputing	In case of master-student disputes, it can occur in the shabistan, but in case of student-student dispute, it can occur in the chamber	Collective						
Studying	This process can occur in any place which has the capability of being used for studying.	Sameraie						
		Collective						
Research	This process can occur in any place which has the capability of being used for studying.	Sameraie						
		Classic						
		Two-step						
		Collective						

The plan of ground floor and first floor



## Conclusion

From the beginning, the formation and development of the educational system has been based on the requirements of the educational, political, and social system, the impact of other countries, as well as varied global modernized phenomena and in every period, it has been completely transformed. The research hypothesis which is based on the synchronization of educational system and environment, corresponds with the summary obtained from the "Discussion". The educational system had several milestones during the traditional, transitional, and modern periods and at the same time, has evolved the educational environments. In the first period, Sepahsalar School, which was known as Tehran's prominent mosque-school, was established following the traditional education system. This school has been established with traditional architecture and based on the principles and practices of Iranian architecture. Its educational system is based on the dominance of religious materials, theoretical, listening, and speaking methods, the interactive relationship between master and disciple, between living and studying, and among the students. It has been associated with characteristics of this type of schools:

- The existence of spaces for religious ceremonies, especially for prayer
- The existence of large spaces for lectures and multifunctional spaces in various scales and in the form of closed (chamber and Madras), half-closed (Madras porch and chamber's counter), and open (yards and terraces) spaces;
- The existence of chambers for living, teaching, and learning.

In the next period, the arrangements of the arrival of modern educational system is prepared. Darolfunoon, which acts as a bridge between tradition and early modernity of the educational system, involves signs of this shift in its architecture.

In the third period, Alborz High School, with its modern educational system and location, brings about the sign of shift accomplishment. Architecture act as a vessel for human activities, each educational system demands a specific activity, therefore in variation in education, teaching method or course materials is reflected in its contemporary architecture. The other three subsets of the educational system, which are trainer, learner and materials have their own effects on the transformation of educational environment. Based on this interpretation, one can feel the direct impact of the educational system on educational spaces. Suggestions for future research are based on the impact of other factors of the educational system on educational architecture and construction.

## Endnote

1. "Maktab" is an Arabic word meaning elementary school. Though it was primarily used for teaching children in reading, writing, grammar and Islamic studies. Other practical and theoretical subjects were also often taught. Until the 20th century, maktabas were the only means of mass education in much of the Islamic world.
2. Henry-René d'Allemagne was a French tourist which due to his intense interest in antiques traveled a lot to the East. In 1898, he visited Samarkand, Bokhara, Khiveh, and Eshqabad and collected many artistic works such as carpets, textiles, brocade and old metal objects and brought to France. The next year he planned to travel to Iran and visited this country twice. In these two journeys he wrote a four-volume travelogue. In the first two volumes, he explored the social-political system of the Qajar government and in two next volumes, he narrated his memories of Iran.
3. Robert Hillenbrand is the chief of Islamic Art Department in university of Edinburg, Scotland. After finishing his studies at the universities of Cambridge and Oxford in 1971, Hillenbrand started teaching Fine Arts in the University of Edinburgh, and in 1989 was appointed as the head of Islamic Art department at Edinburg University.
4. Markus Hattstein is an independent author who lives in Berlin. He has done several studies in fields of sociology, philosophy, and religion and published several relevant articles. More over, he has written some books about architecture and arts' history.
5. Peter Deliu is a professor of history and sociology at the University of Witwatersrand, Johannesburg, South Africa.
6. Ilya Pavlovich Ptrushevsky was born in 1898 in Kiev. He finished his academic education at the universities of Azerbaijan. Ptrushevsky have done researches about the Islamic world.
7. Zij is the generic name applied to Islamic astronomical books that tabulate parameters used for astronomical calculations of the positions of the Sun, Moon, stars, and planets. The name is derived from the Middle Persian term zih or zig, meaning cord.
8. Maqsurah (literally "closed-off space"), an enclosure, a box or wooden screen near the mihrab or the center of the qibla wall, which was originally designed to shield a worshipping ruler from assassins. The imam officiating inside the maqsurah typically belonged to the same school of law to which the ruler belonged.
9. Shabestan or Shabistan is an underground space that can be usually found in traditional architecture of mosques, houses, and schools in ancient Persia (Iran). These spaces were usually used during summers and could be ventilated by windcatchers and qanats.
10. August Krziz is one of seven persons who were invited by Davoudkhan, during his journey to Austria as the representative of Amir Kabir, to teach Iranian students in Darolfunoon.
11. August Krziz is one of seven persons who were invited by Davoudkhan, during his journey to Austria as the representative of Amir Kabir, to teach Iranian students in Darolfunoon.
12. Nikolai Markov was born in 1882 in Tbilisi in a noble family of the Tsarist Russia. In 1910, he graduated from the Academy of Fine Arts in St. Petersburg and then studied until 1914 in the Persian Faculty of Oriental Studies of the university. This Russian architect built more than twenty architectural works in Iran, especially in Tehran, and is considered as a pioneer of modern architecture in Iran.
13. Rasmi-bandi' is a technique from Iranian classical architecture for construction of domes and to cover vaults, which usually has been used in 'Bazar'

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