THE REFLECTIONS OF EDUCATION CONCEPTS ON PHYSICAL SPACE: A CASE STUDY

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Abstract

The role of the theoretical and thematic information is very important in architectural design. To provide a firm base for the design concept, a comprehensive research must be conducted on the subject to gain different points of view and approaches about the design problem. Approaches like the pragmatist strategy in design, practice-based research or evidence-based design are attempts to create a connection between practice and theoretical information on different levels.

Design of educational facilities in particular is a complex process including physical, functional, pedagogical and psychological aspects simultaneously. Although it is a difficult and exhausting process for the designer, it contains great benefit in terms of gaining experience and knowledge. Therefore, it potentially comes up as a suitable subject for architectural training, especially for the design studio course which is at the focal point of the formal architectural education. Besides its complicated spatial organization scheme, regarding pedagogical diversities and the relationship between different functions, the need for thorough research about the subject and multidisciplinary coordination makes it a useful instrument of education.

The subject “education” contains a large number of academic and theoretic works with different focal points. While some theories propose different strategies of learning and teaching, other ones focus on the learning environment and aim to create a relation between the natural and artificial surroundings and the students. There are also some theories that take art or science into the central point of education. Studies like these about the initial contents of education might have great contribution in designing educational facilities.

The selected case study for the subject of this paper is the architectural design studio for third year students. In the beginning weeks of the course students were given lectures by experienced academics and professionals and they were encouraged to conduct their own research about education concepts, systems, or philosophies. As the project site, a neighborhood with light urban density was selected, so that theoretical context of the design problem can be the in the focal point of studies and examined comprehensively. Throughout the semester the reflection of the theoretical knowledge on architecture was inspected in the juries, 1on1 and group discussions and some special exercises. The students were orientated towards expressing the abstract philosophies of education in an architectural way using different 2 or 3 dimensional graphic communication tools. The assumption in this paper signifies that a firm theoretical foundation about educational concepts reflects on the architectural design in a positive way to create more effective spaces for education and to come up with innovative ideas about spatial organization of learning environments. Consequently, the case study proves that especially in complicated design problems like educational facilities, it is crucial to provide a wide and firm theoretical context about the subject, keep it in the focal point of studies all through the semester and emphasize its importance frequently with different exercises.

Keywords: architectural education, design studio, education concepts.

1 INTRODUCTION

Architectural design is a complicated process with many components and input data. There are many different approaches about executing the process which put different components in their focal point. The famous phrase of modernist architecture “form follows function” by Louis Sullivan emphasizes the importance of functionality in an architectural product. Nowadays the functionality of a building holds a much more complicated definition than earlier times. Besides physical functionality, psychological needs, social requirements or public demands must be considered when designing an architectural product. “Architecture is first and foremost about serving people and society. AIA gold medal winner architect Steven Ehrlich states emphasizing the complex structure of architectural design: “This is an architect’s responsibility: to design buildings that fulfill their practical purpose, bring people together, and connect us to the natural world while preserving precious resources.” [1]. In reference to this
statement, architectural design is supposed to have a strong informational basis regarding the subject of design. User opinions, former researches or theoretical and conceptual approaches about the subject are crucial for the success of the architectural product.

The ways of theoretical information affecting architectural design can be observed in many instances. Regardless of the ways or methods, a thorough and multidirectional academic research must be conducted about the subject of design. There have been different approaches where theoretical information or academic research can be beneficially utilized for architectural design practice. One of them is practice based research (PbR) where an original investigation is undertaken in order to gain new knowledge partly by means of practice and the outcomes of that practice [2], which is widely used in design based disciplines. PbR is also defined as an integration of professional experiential knowledge-gathering and academic research [3]. Another method for utilizing information in architectural practice is evidence-based design (EbD) which can be defined as the process of basing decisions about the built environment on credible research to achieve the best possible outcomes [4]. The outcomes of EbD are generally highly influencing factors in the design of health facilities. Another approach is using pragmatist strategies of John Dewey in design, as mentioned by Östman. Pragmatist strategy provides means for explaining the complexities of the world, and constitutes a basis for a different research strategy, one which could be fruitful for design research and design theory [5].

As mentioned by Kolko [6], the design process is often described as “magic”. But the magic of design is as much the magic of the creative and imaginative factors of any inquiry. In order to unveil this “magic”, to the extent possible, we must reintegrate the notion of experience in inquiry and surface, or make visible, how experience drives inquiry [7].

2 CURRENT SITUATION IN FORMAL EDUCATION

2.1 Educational methods in the world

Education has been a major concern for mankind throughout history. Following the dogmatic modalities of religion in the middle age, enlightenment arose in the renaissance period and education acquired a humanistic approach with scientific methodology based on empirical evidence and observation. The industrial revolution reinforced the effects of science on education and thence education became a field of research for social sciences. In the 20th century, scientific approaches in education grew in quantity and quality. Education became more formal with official regulations and the process was divided into periods like primary or secondary education. Compulsory primary education also commissioned in the first half of the 20th century. In this period many educational systems were created whose principles and methods have been an inspiration for contemporary education concepts nowadays. Educational methods like Montessori, Waldorf, Reggio Emilia or theories such as Harkness and Piagetian form the basis of today’s educational systems.

With the rapid growth in technology, especially innovations in communication have its effects on education in the late 20th and early 21st centuries. Use of technological facilities in learning environment has become widespread throughout the world and student based teaching methods have taken possession of education. New concepts and systems have been developed based on the foundations of 20th century approaches. The diversity in the society and multiculturalism also affects the educational concepts in a way which enables the students to have more opportunities to discover their talents and interest. Mankind’s reunion with nature, combined with the struggle against the consumption of natural resources and energy requires the educational facilities to offer indoor- as well as outdoor activities which raise awareness of human-nature relationships of students. A number of schools with different approaches are nowadays trying to raise a conscious and wise human youth.

2.2 Current situation of Formal education in Turkey

In the last decades Turkey is getting through a complicated and unstable period in terms of education. Since the foundation of the republic, the 5 years of compulsory primary education was the base of the system which was followed by 3 years secondary and 3 years of high school education. In the late 1990’s, the system was transformed into an 8 year compulsory education which combines primary and secondary education in the same school and leaves higher education to be optional with a 4 year period. That system was roughly criticized especially about its effects on student selection exams for undergraduate education.
In 2012 the government switched the education system again, this time bringing an untried 4+4+4 system which provides in total 12 years of compulsory education. Students can go through all the three 4 year periods of education in the same school or they also have the opportunity to switch between different schools every 4 years, taking exams in a national level. This system has also had some minor in process-adjustments such as the minimum and maximum age for starting the education, or the type of the exams between different levels.

Although the quantitative issues of the system seem to be in the focal point of discussions, Turkish education system seems to be problematic in quality as well. The instability of the system causes the educators to loose concentration on the contents of the courses, and the importance encumbered on the exams between levels causes the loss of the main purposes of education. Turkish students and teachers are ranked low on international level detection tests which means either the contents of the curriculum is insufficient, or the implementation of the curriculum includes mistakes. In addition, there are many other problems about the education in Turkey, including insufficient number of schools for the high and rapidly growing population resulting on extremely high numbers of students stuck in one classroom; poor facilities for curricular and extracurricular activities; and incapable educators with poor qualifications as they are the outcome of the same defected education system as well. A complicated problem like this cannot be solved in a short term, but it is possible to overcome these problems with a holistic approach including all the participants of the system as a whole. The design issues in educational facilities is an aspect of it, so the architects shall play a role in the improvement process of the education in Turkey.

3 DESIGNING EDUCATIONAL FACILITIES

Designing educational facilities is an architectural process strongly related with pedagogy and psychology. The functionality of spaces is not limited with the physical aspects as it covers many different fields of study in scientific and academic means. The design principles applied in contemporary schools come from the background of significant methods in the 20th century which are based on thorough scientific research as well as practical experience.

3.1 Educational methods and their reflections on the learning environment

One of the mostly known methods is the Montessori method with its worldwide reputation and applications. The method is named after Maria Montessori, who founded the first Montessori school in San Lorenzo, Italy in 1907. The method’s main objective is to create a natural environment for the children where everything is suitable for the children’s age and growth, where possible obstacles to development are removed, and where the child is provided with the means to excercise the child’s growing faculties [8].

![Montessori learning environment](image-url)
According to the Montessori method, the classroom must give the child freedom of choice, many alternative methods and places for learning activities, didactive materials, and a well instructed feeling of independency. In order to educate the whole child, the child must have the freedom to develop physically, intellectually and spiritually in a prepared environment [9].

Another important method is the Steiner-Waldorf education which is embodied on the education philosophy of Rudolf Steiner, who is originally an architect. In Waldorf schools, the conceptualisation of the classroom as a containing structure enables the spatial and social structures for learning and thinking as a collective endeavour, and for the class as a reflective and social community. Both the building structure and the class structure provide room, physically as well as socially, for thinking as collective reasoning in the class(room) [10].

In the waldorf schools, the classrooms are organized according to the physical and psychological requirements of the students. The places related with outside activities such as gardening and woodworking are located in the ground level, as the main classrooms are are arranged in the entrance level close to the main common functions.

Another important example for the spatialization of educational philosophies is the Reggio Emilia approach. Reggio Emilia environments are based, in part, on the schools’ embracing of Dewey’s educational philosophy, and as such, teachers believe that the best environments for children are rich and complex, support relationships between people and ideas, and have a strong aesthetic appeal for teachers and students alike [12]. Therefore, the so called “piazza” plays one of the most important roles in the organization of the space. The piazza is a place of meeting, a public place of the school which plays the same role in the school building as the piazza does in the town [13].
The concept of Reggio Emilia Schools gives also great importance to the role of arts and crafts in preliminary education. Workshops for different fields of interest in and outside of the school building, as well as the walls for painting are strongly emphasized in a Reggio Emilia learning environment.

Nowadays schools with different names and teaching or learning methods in preliminary education are growing in number. Schools and methods such as Nord Anglia, Sudbury or Summerhill are trying to come up with innovative approaches in education which have the “student” as an individual with special needs in the focal point of their studies.

3.2 Designing educational facilities in the 21st century

The characteristics of the built environment in educational facilities have a significant effect on the cognitive development of children and the concept of learning is in a rapid change in the 21st century. Considering the fact that we are living in an interconnected world, the development in the technology and science makes it also necessary to search for new methods for teaching and learning. The possibility of permanent connection to the rest of the world thanks to the worldwide communication devices, technological tools that give the students the opportunity to learn in more effective and direct ways, as well as new studies in the field of psychology and pedagogy which put the students in the centre of the learning process instead of leaving them in a passive state; require an alternative perspective to the concept of “learning environment”.

Although many things have changed in the concept of education in the last decades, the main medium called the “learning environment” is still the classroom with its physical existence. There are indeed alternative methods of teaching which don’t require the classroom as a physical space, such as virtual classrooms or distant learning, but they are not yet a competitive rival to the concept of classroom as it is accustomed, especially in the preliminary education phase. It is well known that the classroom as the learning environment has a big influence on learning processes. The classroom needs to be adequate to provide the students and teachers with the instruments they need to use in the learning and teaching processes. By UCLA Center for Mental Health in Schools, effective schools and classrooms are defined as follows:

- personalizes contacts and supports in ways that build trust over time and meets learners where they are
- offers accommodation so all students have an equal opportunity to learn
- adjusts class size and groupings to optimize learning
engages students through dialogue and decision making and seizing “teachable moments”
incorporates parents in multiple ways
dresses social-emotional development [14]

The architecture of educational facilities is highly dependent on the educational trends of its time. In the traditional approach to education the classroom takes its form towards putting the teacher in a predominant position in front as the student desks are lined up in a regular and stable order. The flexibility of formation and additional facilities are limited because of the lack of demand for differentiation. In addition, the features of the classrooms for different grades of education are all the same, which means the demands of children in different ages are not appreciated. Modern approaches on the other hand, put the student in the central point of education and let their demands and needs shape the classroom. Emerging pedagogical researches prove that it is important to feel comfortable in the classroom and it is the key to be successful in the learning process. Contemporary terms such as modularity, flexibility and compatibility are starting to play their parts in the design of the new classrooms.

Although the classroom is in the focal point of design considering an educational complex, it is not the only component the architect needs to be concerned about. The school as a learning environment is also defined as a transaction and interaction space. There are 4 defined levels of interaction in a school: 1) interaction among students, 2) interactions between school personnel and students, 3) interaction among school personnel, 4) interactions between the school, families and the community [15]. The emerging, student oriented approaches bring new perspectives to the common places such as study room, library, lunch- and sports hall, or even administrative offices. The increasing importance of student and parent affairs or guidance puts these kind of spaces into more significant positions as not only notional, but also physical states. New technologies in learning resources requires the library to be a more open and dynamic space. Different methods in physical training and sports cause changes in the sports areas and gymnasiums. Overall, the design of educational facilities is going through a period of change in the last decades. In addition, considering the fact that decisions about education are based on actual conditions and national or regional policies, it is also important to follow the regulations about educational facilities in order to achieve a valid and legally acceptable outcome.

4 CASE STUDY

The studio course selected for the case study is ARC3002 at the architecture department of Bahcesehir University in Istanbul, the architectural design studio for 3rd year 2nd semester undergraduate students. It was assumed that as the students in this level were only 1 year away from graduation, it was reasonable to deliver them a realistic design problem with certain restrictions and requirements. The subject of the design problem was defined as educational facilities and its architectural program was prepared by the studio instructors according to the existing system and regulations in the country. The students were required to design educational facilities which can not only meet the regulations in the national and regional level, but also provide the opportunity to experience an innovative and comfortable learning environment for its users. The main outcome of the studio course was intended to be the improvement of the ability to deal with intricate architectural programs with a strong theoretical foundation. To keep the theoretical portion of the design problem in the focal point of the studies, the project site was decided to have a low urban density and historical context. Therefore, a site in a developing district on the northern outskirts of the city was selected. In that –almost-rural neighbourhood, the studies about the theoretical background of the design subject were intended to be more comprehensive and efficient.

In the beginning week of the studio course, after the site visit the students were given a lecture about the design of schools from an educator’s perspective, by an experienced professor of educational sciences from Bosphorus University, Istanbul. Through that lecture they got familiar with phenomena such as behaviourism, cognitive sciences and humanistic approach. After that a second lecture was given about the general concepts of education in the contemporary world, and the most frequently referred education concepts and systems like Montessori schools or Harkness method were introduced shortly. On the next phase; based on the fact that “self education” or “learning by doing” are some of the best learning methods, the students were asked to conduct research about educational systems and education philosophies in groups they formed independently. The selected research themes were as follows:
After their research, each group presented their outcomes to the rest of the class and the documents were shared among the students so that each of them are informed about all of the research subjects. All the students were responsible for studying the documents and getting familiar with them to be able to adapt the necessary theoretical information into their design with the proper methods.

In one of the forthcoming weeks another lecture was given by a fellow architect who is specialized in school design. He shared his experience and some examples from different places around the world and Turkey. In the lecture some difficulties were emphasized which an architect shall face when designing a school, as the regulations in Turkey are not very flexible and open for new approaches. However the presenter of the lecture concluded that in any circumstances it is possible to create a successful spatial organization and a supporting learning environment if the design is focused on the users -in this case students and teachers- and their needs.

Two important terms emphasized during the design process were “flexibility” and “compatibility”. To practice these terms' reflections on the space the students were asked several times during the semester to study the internal organization in a classroom with the purpose of creating flexible and compatible spaces. Using some modules for working stations, choosing varied furniture or using separative panels the students tried to come up with spaces which are compatible for different kinds of activities carried out in a classroom. Some students conducted surveys with primary school students, to understand their needs and requests better, and to develop the design process in that direction.

4.1 Student works

The final submissions of the students were examined focusing on their approach to educational systems. Most of the students tried to come up with an innovative method for education, but they also had some difficulties to adapt their innovative approach to the rigid educational system in Turkey. One of the problems was that as most of the innovative, student-focused approaches are defining classrooms with a low number of students, the student population in Turkey does barely allow a classroom with less than 20 students. Another problem is that the regulations for educational facilities in Turkey are (outdated but) very strictly defined from the shape of the building to minimum and maximum size of spaces, from required function types to inside-outside relationships in a school building. Nevertheless, the students achieved to come up with innovative ideas about the reflections of educational concepts on physical space. There were certain points of interest where the design ideas became perceptible in the space.

*Flexibility in the classroom*

The mostly referred method to create an innovative environment in the classroom was observed as providing flexibility in the classroom. As the number of students and the size of the classroom were defined, the opportunity to create a flexible classroom most of the students’ idea was to create flexibility via modular furniture and removable walls. The workstations were designed in a way that they can come together creating different shapes and working opportunities.
Figure 4. Student work sample for flexibility in the classroom.

+ **Color use**

The students sought for methods to separate the 4 different fractions in the education from each other, and making use of different characteristics of colors for different age groups was the mostly referred way to achieve it. In the kindergarten classrooms students used more live colors, as growing with the age of the children the colors started to become more smooth to create a calm and quiet learning environment.

Figure 5. Sample student work for color use in the classroom.

+ **Inside-outside relationships**

The approach in the Steiner-Waldorf schools in particular inspired many students to make effective use of the exterior space to create a natural learning environment for the children. One of the methods used for this purpose was to create desirable exterior spaces with the use of natural elements such as trees and vegetation, and the other method was to create an inside-outside relationship within the functionality of the classroom. Even gardening, plant breeding and irrigation activities were considered as parts of the education.
Gathering spaces

After the classrooms, the mostly concentrated areas by the students in the design of educational facilities were the gathering spaces and free activity or study areas as these kind of places in- and outside the school building are the most popular spaces of interaction for children from different ages and classes. The flexibility and variability of the open, semi-open and closed spaces were given high importance by the students.

5 CONCLUSION

It is evidential that theoretical background is a natural component of architectural design. Gathering information about the subject is an important part of the preprocessing phase of the design process as a rigid theoretical foundation ensures the success of the design product. However, regarding the architectural undergraduate education in Turkey it becomes obvious that the theoretical research phase is generally not given enough importance in design studio courses. The architectural program about the selected subject is either given by the studio coordinator in the beginning of the course or it is defined by the students after a short and superficial exploration period about the subject and its supporting functions. In this paper, the main concern of the case study was to make the students understand the importance of research on the theoretical background of the subject. It has been a
decent opportunity that the function was one with a deep theoretical background so that the students had many aspects, historical or contemporary or futuristic, to explore about the subject. The subject “education” contains a large number of academic and theoretic works with different focal points.

The provoked awareness on the theoretical background of education in the research phase made the students understand the significance of the “meaning” in the function of the space. Therefore they felt themselves responsible for looking for alternative and innovative ways of articulation of the space in terms of classrooms and other supportive functions. A surprisingly high percentage of the students have come up with alternative layouts and spatial organization of classrooms. The creativity of the students was well fed with the theoretical information gathered through research. It also provided the students to possess dominance over the functions and they had more confidence on dealing with the design problems they faced throughout the semester.

Consequently in this case study, the research phase on the theoretical background information about the subject in an architectural design studio proved its significance and effect on the features of an architectural design. In every design studio course it will be definitely beneficial to conduct a comprehensive research in the beginning phase of the course, but it wouldn’t be enough by itself. It also needs to be supported in the upcoming weeks with different kinds of classworks and exercises.

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