

An Analysis of Skills Priorities in the Architectural Education System at the Bachelor's Degree (Comparative Study of the Top Ten Architecture Schools of Iran and the World)*

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ABSTRACT

The architectural education, like other disciplines, has undergone various changes and revisions many times after its inception, and, the views of decision makers of this field have had a very effective role in this process because of their impact on the process of shaping educational systems and environments. In various educational systems, there have always been some ambiguous points about the time duration needed to complete the courses, the basis for selecting the courses offered, and the type of skills taught. In the article ahead, it is attempted to provide an optimal model and coherent strategy for educating architecture by investigating the characteristic of various educational systems at international and national levels, whereby the architecture students benefit from effective and purposeful education. Accordingly, by adopting the correlation method, in a dependent way combined with a causal and systematic approach, architecture education is considered as a system, that can be investigated and analyzed through the general systems theory. At the end, the analysis of skills priority indicate that "flexibility" is recognized as the most specific characteristic of the description of the architecture courses in the world. This issue, that is applicable in two areas: "flexibility in elective courses" and "flexibility in the subject of architectural design courses", is based on the way students are evaluated and select courses, depending on their talents. The obtained results indicate that this issue has been neglected in the Iran's architectural education system.

Keywords: Architecture Education System, Skill Priorities, Flexibility.

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1. INTRODUCTION

Education is one of the axioms of human life, and considered as the behaviors that individuals are involved in it directly or indirectly throughout their lives. The process of education, like all fundamental processes of life, is a constant principle whose content evolves due to the changes in circumstances of each era over time, and it is necessary to establish balance between the education mode, tools, needs, and facilities of various communities. Throughout history, education has been one of the pillars of civilized communities, and in the present era, its importance has grown to such an extent that the quality of education has been defined as value added (Azizi, 2008). According to Albert Einstein, “knowledge of the truth is not enough; if we do not want this recognition to be destroyed, we must continuously renew it with uninterrupted effort” and this emphasizes the importance of education (Vafamehr & Sanayeian, 2008). From a sociological point of view, education is the method of transferring science and adapting it to the needs of community under the specific social conditions. Henri Pirenne says “Education refers to the changes made with the repetition of a living being’s behavior to adapt to the environment. So, in addition to expanding facilities concerning adults’ education, today’s community needs to expand short-term or long-term education plans”. It is worth mentioning that what distinguishes modern education from traditional education is the attitude to lifelong education.

In the current world, which is constantly representing the infinite scopes of sciences in the form of new discoveries and findings, man is facing with a great abundance of knowledge and awareness; a thirst for learning and discovering calls him to investigate the borders of this boundless land and meanwhile reminds him the restriction of complete learning of these sciences. Therefore, due to the infinite scope of science and knowledge and also the growing number of those interested in learning sciences, it is necessary to adopt a proper strategy to transfer an appropriate amount of knowledge to them. Accordingly, in all disciplines, including architecture, regarding education, scrutinization and asking about the most appropriate education method as well as the most accurate educational content have always been considered by professors and the practitioners of this issue.

In many countries around the world, global education is currently witnessing a transition of crisis, and according to scholars, this transition depends on achievement and activation of standards in the educational structure. Regardless of some standards that are at the moderate level in the disciplines, architecture education is very poor in some issues such as “crisis of academic careers”, “student experiences” and “university-industry relationship”, despite achieving some of the global higher education standards from the perspective of UNESCO. This issue has some achievements in

some cases due to the efforts of educational managers of some educational institutions, but it should be realized within a framework to achieve a system. To this end, it is required to identify fundamental weakness in the systematic thought of the academic courses description (Altbach, Reisberg, & Rumbley, 2014, p. 33).

In other words, in each discipline, the debate about the necessities shaping education for the profession is always characterized by discussing about what students should learn. By designing and reviewing the bachelor and master curricula of profession-based disciplines, important categories such as team working, recognition of real issues, understanding the complexity of the professional work environment, and how to extract theory from practical experiences can be taught (Razzaghi Asl, 2012, p. 25).

Architecture education is one of the important and key issues in the development and growth trend of architecture in Iran and the future of architecture in Iran and the world (Mahdavinejad, 2005, p. 70). Nurturing students’ creativity and spirit of criticism in presentation of architectural designs and accurate and exact evaluation of them has specific complexities, and the lack of enough attention to the side factors influencing evaluation has made current methods of judgment to face with fundamental challenges, thereby influencing the practice and profession of architecture. The professional specialties resulting from the educational process raise concerns about the lack of coherence and the effective linkage between various theoretical and practical courses that today has created a fundamental gap between the classes and workshops of architecture (Mir Riyahi, 2015, p. 108). This linkage and how to pay attention to the factors affecting the evaluation are dependent, or in a more explicit way, in accordance with the course description and how the curriculum is arranged.

About the effectiveness of a young architect’s mental system, the curriculum can undoubtedly be one of the most influential parts of the educational system. This system, along with “course content”, “course priority”, and “emphasizing the goals of programs” plays a highlighted role in the challenges and successes of the contemporary educational system (Asgari, 2012).

In the present research, the educational content and those skills obtained by the students after education are investigated. Moreover, by investigating the educational content of the architecture courses at the bachelor’s degree in some of the world’s top universities, as described below, the skills derived from these programs have been extracted. Then, by comparing the description of courses offered by faculties in terms of “arrangement of courses” and “the importance of each skill”, the priority assigned to the skill and the impact it has had on the education have been investigated in details. During this process, answering the following questions will be helpful:

- What skills have priority in the architecture education at the universities studied?

- What are the reasons for the high output of the curriculum in the worldwide case studies in terms of educational ranking?

2. RESEARCH METHOD AND PROCESS

The quality of an educational system, i.e. the main parameter affecting the ranking of an educational level, is the status of graduates of this system in terms of knowledge, attitude and abilities acquired, so that the current level of these capabilities, competences and attitude acquired can be attributed to the educational system (Bazargan, 2002, p. 56). Developed countries are considered superior in this respect, so knowing their success and experiences can be a roadmap for developing countries with a developmental mindset. Thus, by investigating the factors playing a role in these educational systems, models can be extracted based on which the success of the educational system of the country concerned is ensured.

In the present research, the performance of top universities in architecture education has been studied using the correlation method, in a dependent way combined with a causal and systematic approach to architecture education. The studied universities were of the first 20 top universities of architecture in the world level^{1,2}, and in sampling domestic universities, the priority was based on the academic level of the faculties of architecture presented in Iran's National Organization of Educational Testing, and Islamic Azad University was selected as one of the samples with emphasis on the university branches in Tehran province.

Among the important topics that can be investigated and considered in the architecture education regarding the specific characteristics of this discipline, is the method of attracting architecture students. Courses questioned in the evaluation of the volunteer indicate the relationship between pre-university skills and the chosen discipline (Eslami & Naghd Bishi, 2013, p. 4). Therefore, the investigation of student attraction method and consequently continuous evaluation of their activities during the academic years reflect the students' orientation. In this regard, both issues of the "description of courses proposed by a faculty" and "how they take these courses" are influenced.

The research process is as follows: first, the undergraduate architecture curricula of five abroad universities were investigated. Then, based on the research findings described later, they were categorized with the emphasis on the skills proposed in the discipline of architecture and presented in the form of diagrams by each academic semester. The diagrams indicate the number of units related to each skill in each semester and by investigating them the approach of each university to prioritizing specialized architectural skills can be understood. Subsequently, the results obtained from the study of each university were merged and a coherent model was obtained.

The same process has also been performed for 5 domestic universities. Considering that the same undergraduate architecture curriculum is applied in all of the related Iranian universities according to approved at the three hundred and sixty-fifth session of the Supreme Planning Council on 11. 15. 1998 (Ministry of Science, Research & Technology, 1998) and there are few differences in their educational systems, several universities in Tehran have been investigated.

In the last step, the results obtained from the investigation of foreign samples are considered as a model and what is going in Iran was compared with it to obtain a relatively comprehensive knowledge of the status of domestic universities and to provide some strategies for improving the educational system of architecture in the country according to this knowledge.

3. DETERMINATION OF CASE STUDIES

In order to achieve the objectives of this research, as stated earlier, it was necessary to investigate the curriculum of a number of universities. Selecting foreign universities was performed based on the world ranking announced³ in the two consecutive years of 2016 and 2017, focusing on the discipline of architecture. These universities are MIT (US), California-Berkeley (US), Hong Kong (China), California-Los Angeles (US) and Sydney (Australia). In terms of domestic samples, five universities of Tehran have been randomly investigated, including: University of Tehran, Art University, Shahid Beheshti University, Iran University of Science and Technology, and Islamic Azad University (Sample Unit: South Tehran).

4. FINDINGS

In order to achieve the objectives of this research, as stated earlier, it was necessary to investigate the curriculum of a number of universities. The citation findings in the present research consist of the two parts of "direct" and "indirect" references. In this topic, direct documents included programs, announcements, and instructions presented by the educational centers studied or their upper-level educational regulations, that were based on the past ten years' documentations available on the internet databases of the five foreign samples, and the signified documentations of the domestic universities available in the archives of their educational departments. In this respect, the indirect documents included oral and written dialogues with students, graduates, and some professors of the studied universities, whose interviews focused on inferential questions centered on titles such as "the impact of the educational system", "the ratio of selection right in developing their learning at the time of studying", and "how to use learning in the period of studying and graduation".

In this research, investigation was based on the attitude

research in relation to the subject of architecture education. Since the individuals' attitude towards each subject is not directly observable, an inferential approach⁴ was used (Bédard, Déziel, & Lamarche, 2012, p. 97). Accordingly, the research was a case study that has been carried out on the attitude toward academic education method in the discipline of architecture using two scales of "direct" and "indirect" documents and references related to it.

5. DEVELOPMENT OF THE SET OF SKILLS

By investigating the programs presented by the universities and syllabus of the bachelor course of Architecture Engineering in Iran, approved at the three hundred and sixty-fifth session of the Supreme Planning Council on 11. 15. 1998 (Ministry of Science, Research and Technology, 1998), a set of skills was obtained for classifying the courses of case studies (Table 1).

Table 1. Matrix of Skills

Skill	Skill Description
Drawing	The ability of two-dimensional and three-dimensional drawing by hand or software; creating mental ability to visualize space and the possibility of drawing it from various angles; recognizing and visualizing the lines, surfaces, volumes and their intersections; spatial understanding of volumes; exercises that strengthen the ability to understand architectural maps and also accurate and exact drawing of them.
Presentation	Strengthening oral and written skills in recording architecture; the ability to use various techniques and tools of presentation and expression.
History of Architecture	Familiarity with the samples of the history of architecture in various eras and styles; acquaintance with the concepts existing in each one of these styles, their characteristics and features; presenting the evolution trend of the architecture of various eras of the history, differences and similarities as well as determining the turning point to the history of the mentioned building; acquaintance with the historical, intellectual and social roots impacting on architecture, the context of the emergence of each one of the styles in the course of history, with reference to parallel or diverse movements.
Structures and Materials	Recognizing forces and acquaintance with various behaviors and its legislation; recognizing structures, support, balance and various structural systems; recognizing types of loads; using balance equations; determining internal forces; recognizing structural characteristics of sections, acquaintance with the behavior of materials and their reactions under the influence of forces.
Theoretical Foundations	Overall mastering of the architecture discipline; gaining insight into the architecture discipline; creating a link between architecture and other topics from an intellectual but not applied perspective; investigating architectural works across cultures; creating necessary intellectual contexts as a prerequisite for advancement in the field of architecture; providing the necessary scientific and artistic knowledge for an architect; investigating and analyzing subjects related to architecture; for example psychology in architecture.
Designing Courses	Dealing with an architecture project in the form of a single whole; the method of achieving the overall idea and nurturing it to achieve an architecture design, applying the design process to create an architecture design; acquaintance with factors influencing an architecture such as environment, context, functional system and spatial organization; attention to functional factors, adjacent and neighborhood considerations; adaptation to environmental ecological conditions.
Technical Courses (Facilities, Environmental Control of Building, Sustainability, etc.)	Investigating the climate performance of buildings; recognizing climate-impacted architecture, general theories related to climate and thermal, acoustic and mechanical behavior of buildings, human characteristics and the concept of comfort in association with climatic-environmental conditions, ventilation in the building and investigating the light and sound effects in the building; acquaintance with building heating and cooling methods.

Urbanism	Familiarity with the concepts and definitions of architectural, urban and regional planning; acquaintance with the process and methods of architectural planning, architectural complexes and lands use planning; acquaintance with the systemic attitude in planning; acquaintance with the method of using environmental studies in the urban planning and architecture; familiarity with city standards, urban criteria and the way they affect the city body and architectural elements; familiarity with urban spaces and urban design knowledge.
New Orientations Related to Digital Architecture profession	Specific use of software in order to implement digital concepts in architecture body by focusing on software application. Familiarity with the issues related to construction of building in the real environment; preparing students to enter the architecture profession by attending at this space or doing real projects; familiarity with the order and relationship of organizations involved in the emergence of building designs; investigating resources needed for doing construction practices and procedures regulating construction practices; familiarity with the usual types of contracts between the employer and the builder; describing the efficiencies and failures of the professional work area.
Elective courses	A set of courses that are selected arbitrarily by students.

6. EXTRACTION OF SKILL MATRICES BY CASE STUDIES

Architectural courses, despite the variety of their syllabus based on the skills considered for students to enter the profession, have been considered in all educational systems and in this regard, the tastes and tendencies of the role of these courses or their importance are assessed based on time and place, and the diversified plans in the form of long-term or short-term programs in Iran and the world are being implemented. Accordingly, in the present study, it was tried to revise the rationales behind these attitudes based on the regulation of the educational titles in the classified formats accepted by various educational departments in order to achieve the intended answers.

6.1. FOREIGN CASE STUDIES

The Departments of Architecture at the selected universities have claimed innovation and revision of educational courses over the past decade based on the elective criteria mentioned in the research method section, and the tastes and tendencies mentioned earlier are more evident in the ordering of their titles with regard to the emphases of the education system of each one. Due to the verbal limitations of the article, it has been tried that the selected samples have the maximum diversity and innovation so that they can help to draw the roadmap.

6.1.1. Massachusetts Institute of Technology

The Department of Architecture of this university offers a set of courses for the bachelor's degree that provides an extensive education for students with clear professional goals and those interested in having

a solid foundation for their profession; the set of Course 4 and the set of Course 4B are offered at the bachelor of architecture degree and the bachelor of Architecture Studies degree, respectively (Department of Architecture, 2016-2017).

In this program, while utilizing suitable educational environment, the interactive relationship between architecture designing, construction technologies, computations, history, theory and critique of architecture and art are emphasized, and on the other hand, the suggestions of department show the program commitment to the ecological, technological, political, cultural and social issues of the built environment. Also, by committing to a strong and interdisciplinary orientation throughout the program, students are challenged to be creative, innovative and responsible leaders in this field.

The program of this university has been organized in such a way that it establishes rational and regular context for students with the aim of enhancing the understanding of architecture (as a contemporary cultural product with social, economic and political considerations). Experience has proven that a large number of seminars, educational workshops, lectures and workshops provide the educational environment in order to foster creativity and critical thinking. Accordingly, adapting to new methods and tools is consistently on the agenda of the architecture course planning of the mentioned university.

In Figure 1 the number of units assigned to each skill is observed. The first to third priorities are including "designing skills", "theoretical foundations" and "elective courses". It is worth mentioning that the set of elective courses are offered only in the fifth semester (final year) (Fig. 2).

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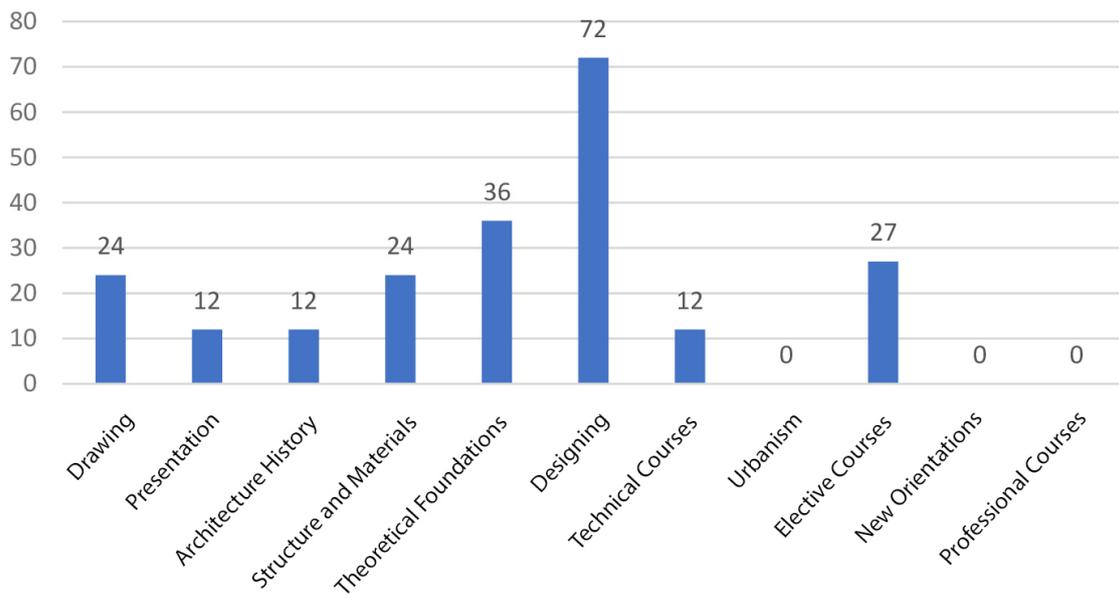


Fig. 1. Number of Units Assigned to Each Skill throughout the Course (by Credit Units) at the Massachusetts Institute of Technology

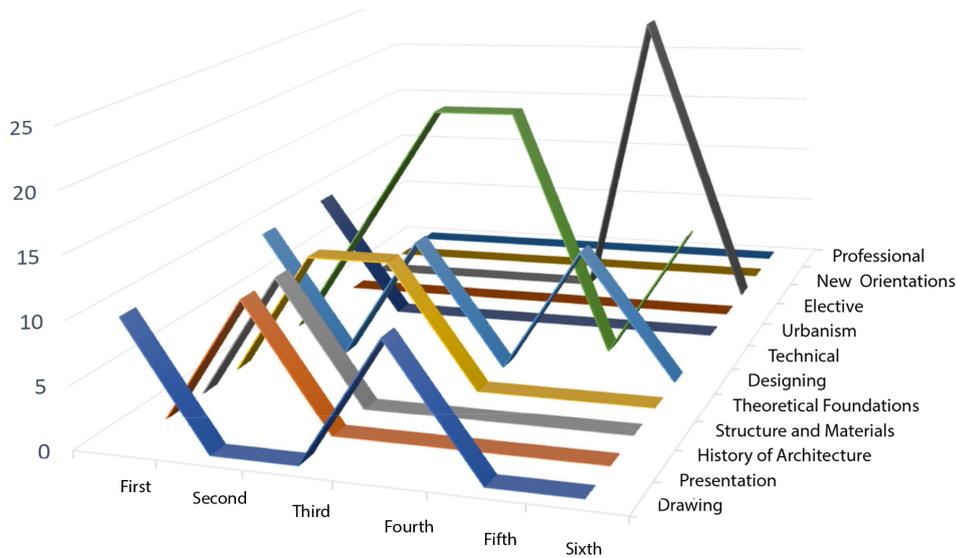


Fig. 2. Number of Units Assigned to Each Skill in Terms of the Semester at the Massachusetts Institute of Technology

6.1.2. University of California, Berkeley

The curriculum of this university is planned in such a way that it fosters individual thinking and gives students a balance of basic knowledge and skill along with flexibility to pursue their favorite fields. A variety of degrees are offered at this university that have considered students' various professional and educational needs and goals, while preparing them to lead architecture, research practices, and fields related to the building industry and environmental designing (Department of Architecture, 2015 -2016).

In the introductory education course, a four-year program is offered for receiving the bachelor of art

degree with the specialty of architecture and both pre-professional and liberal arts oriented education are offered. Also several minor courses are offered for bachelor courses of all disciplines in this university that include sustainable designing, cultural and social factors, the history of the built environment, environmental designing, and urbanism in the developing countries.

The main program offers a comprehensive introduction to the field of architecture and also by utilizing the studies in a variety of fields, provides opportunities for preparing students to enter the professional work of architecture designing and presentation, building

construction and architectural technologies, the history of architecture, culture and the community. Its ultimate goal is to “train the specialists” for the various jobs of the architecture profession and to create flexibility and dynamics in the teaching method with regard to the specific opportunities depending on the passage of time.

Flexibility and dynamics are fulfilled through the course selection right or the subject of designing within the framework provided by the department based on the student's interests and skills. The process of presenting the courses is in this order that in the first and second year the student is allowed to choose a course among the courses related to the historical and social (first semester) and technological (second semester) domains. Also, in the second semester of the third year, the student, in addition to choosing one of the two orientations of research designing or studio, selects his research subject in the orientation of research designing and structural courses (among energy, environmental or construction topics) in the workshop orientation.

It is necessary to explain that among the courses, seven breadth courses are required to pass; these courses should be taken from the fields of social and behavioral sciences, biological sciences, international studies, literature and art, historical studies, philosophy and values, that maximally two courses from each department is adequate for this purpose.

According to Figure 3 skills priority for the research designing orientation is: 1- designing; 2- main architecture courses; 3- the history of architecture and structure and materials; and for the workshop orientation (Figure 4) is: 1- designing; 2- main architecture courses; 3- structure and materials and the history of architecture. In both orientations, the elective courses are located at the fifth priority and all units related to them are presented in the seventh and eighth semesters (final year) (Figures 5 and 6).

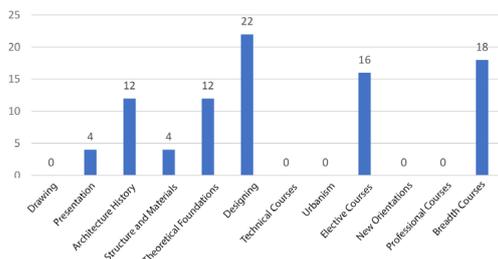


Fig. 3. Number of Units Assigned to Each Skill throughout the Course (by Credit Units) for the Research Designing Orientation at the University of California- Berkeley

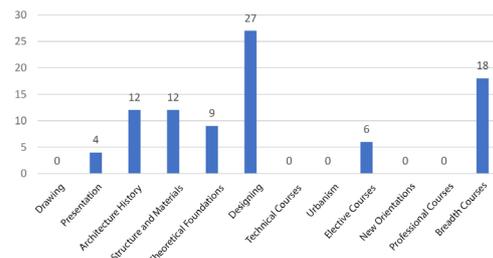


Fig. 4. Number of Units Assigned to Each Skill throughout the Course (by Credit Units) for the Workshop Orientation at the University of California – Berkeley

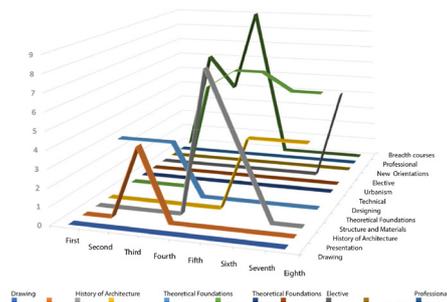


Fig. 5. Number of Units Assigned to Each Skill for Research Designing Orientation in Terms of Semester at the University of California – Berkeley

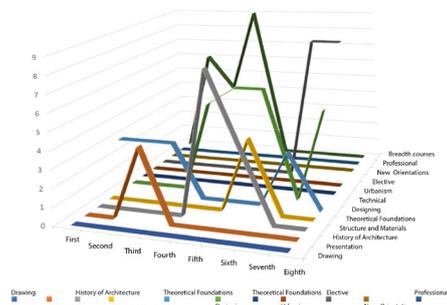


Fig. 6. Number of Units Assigned to Each Skill for Workshop Orientation by Semester at the University of California – Berkeley

6.1.3. University of Hong Kong

The curriculum compiled for four-year Bachelor of Arts and Architecture Studies at the University of Hong Kong provides high-level general education during which sufficient skills are taught to the students to enter the related disciplines and comprises two major sections of study and workshop courses. The structure of the study courses has been designed based on problem-centered learning in the designing workshop to stimulate the student's social sense, motivate one's creativity, and ultimately deep knowledge is obtained from the discipline under study. Although designing programs in the workshop deal with usual issues, various attitudes lead to functional, environmental, and social challenges (Faculty of Architecture, 2016). All designing workshops, a major part of history,

the theoretical foundations, technology, and visual interactions courses are offered in two parts, that the first part is offered in odd semesters and the second part is offered in even semesters. This teaching method is a structured approach that the theoretical courses entirely related to workshop courses are offered in each semester and provides this capability that the knowledge and skill taught theoretically is applied experimentally and simultaneously.

According to Figure 7, “Designing” courses are the first priority, “Basic Courses of Architecture” are the second priority and the courses of “Structure and Materials” are the third priority. “Elective” skill is the fifth priority and is limited only to two courses. The set of courses of this skill is also offered in the seventh semester (Figure 8).

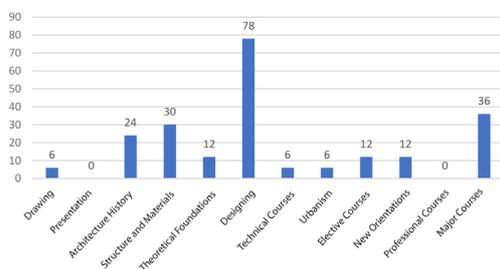


Fig. 7. Number of Credits Assigned to Each Skill throughout the Course (by Credit Units) at the University of Hong Kong

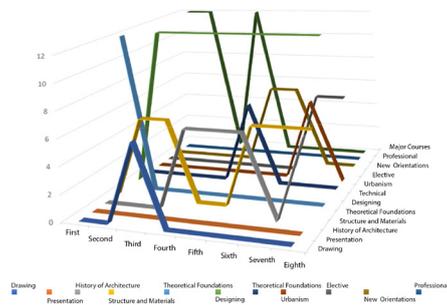


Fig. 8. Number of Units Assigned to Each Skill by Semester at the University of Hong Kong

6.1.4. University of California, Los Angeles

The curriculum of this university in the discipline of architecture focuses on the three sections of “Designing”, “Critical Studies” and “Technology”. In short, it can be said that each section has a separate approach, and what is common is updating education based on the changes of each course as well as paying attention to the orientations related to each one (UCLA: Architecture & Urban Design, 2016).

In the section of designing, the integration of architect and urban designing is regarded, and experiences and form researches are considered. In addition, regarding social changes, technological innovations and environmental changes, and thus finding designing solutions for the changing world, are among the approaches of this section.

The second part, critical studies, is a kind of interdisciplinary attitude that in addition to architecture and urban designing is also related to the departments such as history, art history, art, film, comparative literature and urban planning, which gives it the feature of dynamism and productive capability. On the other hand, the interaction between critical researches and new developments in the field of architecture and urbanism enables students to gain a comprehensive awareness in the theoretical and historical practices with a social, political, cultural, technological, contemporary designs and so on approach, and ultimately student’s creativity and critical thinking are fostered.

The third part of the technology program has a technology-based approach and gives students the opportunity to explore in this highly turbulent field; students will get sufficient skill to exploit these achievements, will recognize emerging technologies and in the field of building related technologies achieve that extent of knowledge and ability that easily enter professional competitions.

According to Figures 9 and 10, the three main priorities of the skills are “History of Architecture”, “Designing” and “Theoretical foundations” respectively, and no elective course is offered.

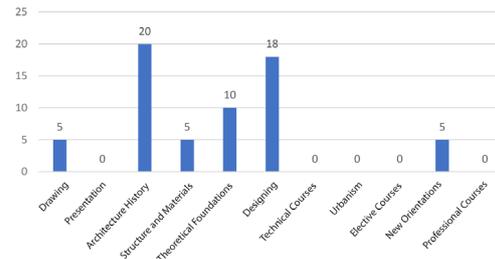


Fig. 9. Number of Units Assigned to Each Skill throughout the Course (by Credit Units) at the University of California - Los Angeles

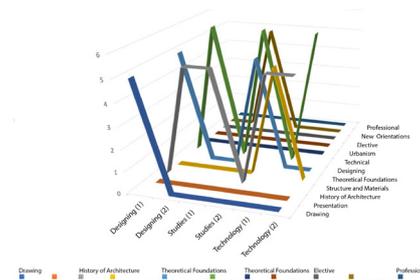


Fig. 10. Number of Units Assigned to Each Skill in Terms of Semester at the University of California - Los Angeles

6.1.5. University of Sydney

The three-year curriculum of architecture in this university is designed to create sustainable environments in the region, both digitally and physically, in order to enhance collective experiences and comprises five orientations, two of which are

shared with other faculties. The three main orientations are as follows (Department of Architecture, Design and Planning, 2016).

The first orientation, architecture and the environment, considers the numerous future roles of graduates in the field of architecture and the skills required in the profession. Students are brought up to enter the professional fields of architecture, and are not only acquainted with the traditional role of the architect, but also with the fields rich in architecture-related innovation and the increasing commercial potentials in the global development-oriented economy.

Architectural designing orientation emphasizes on “designing of the built environment” and includes compulsory units that are challenged in the elective courses. It is noteworthy that “designing” encompasses a wide range of urban designing, policies, planning and architectural sciences, light, energy, construction, acoustics, services, heritage, IT systems that are the infrastructure of contemporary modeling.

In the orientation of designing computation, students are taught to recognize the value of innovative and new ideas and to foster the ability to conceptualize, solve problem, and the feasibility of various designing solutions and transforming idea into reality. The orientation in question has a different nature from other known architecture orientations and the curriculum courses are also “computer-based”. Finally, acquiring the skill to manage resources and tools in financial and social challenges to objectify innovative and valuable solutions makes creative executives from the students. Figure 11 shows that in the orientation of architecture designing, the first to third priorities are assigned to “designing”, “elective “ and “structures and materials, and the history of architecture” courses. According to Figure 12, “structure and materials” skills are the first priority. The “elective, urbanism and designing” courses are second priority and “the profession of architecture, technical, and the theoretical foundations” courses are third priority.

According to Figures 13 and 14, elective courses of the orientation of environmental architecture are offered in the third, fourth and fifth semesters, and in the orientation of architecture designing, they are offered in all academic semesters.

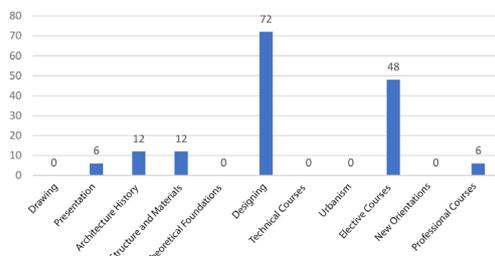


Fig. 11. Number of Units Assigned to Each Skill throughout the Course (by Credit Units) for the Orientation of Architecture Designing at the University of Sydney

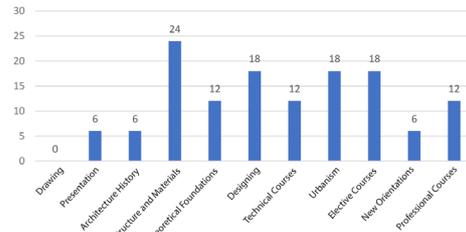


Fig. 12. Number of Units Assigned to Each Skill throughout the Course (by Credit Units) for Architecture and Environment Orientation at the University of Sydney

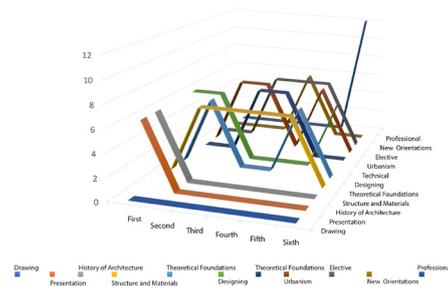


Fig. 13. Number of Units Assigned to Each Skill throughout the Course (by Credit Units) for Architectural Designing Orientation at the University of Sydney

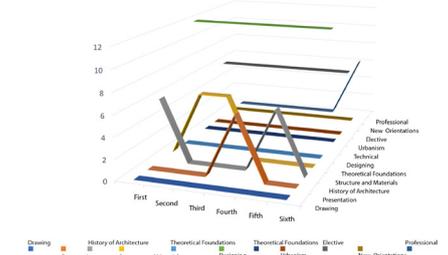


Fig. 14. Number of Units Assigned to Each Skill throughout the Course (by Credit Units) for Architectural and Environment Orientation at the University of Sydney

6.1.6. Summing-up of Foreign Study Cases

The investigation of the educational system of study cases shows that despite the existence of different educational goals and diverse approaches to foster student’s professional skills, most educational approaches are common. By comparing the number of special units of each skill, a range of skill sets prioritization can be achieved that are helpful to determine a comprehensive model based on the investigated educational systems.

Table 2. Summing-up the Number of Units Assigned to Each Skill in the Curriculum of the Universities Proposed in This Research

Skills	Drawing	Presentation	History of Architecture	Structure and Materials	Theoretical Foundations	Designing	Technical courses	Urbanism	Elective Courses	New and Digital Orientations	Architecture Profession	Major Architecture Courses	Total Units of Each Program
Massachusetts Institute of Technology	24	12	12	24	36	72	12	0	27	0	0	0	219
University of California - Berkeley	Workshop Orientation	0	4	12	12	9	27	0	6	0	0	18	88
	Research Designing Orientation	0	4	12	4	12	22	0	16	0	0	18	88
University of Hong Kong	6	0	24	30	12	78	6	6	12	12	0	36	222
University of California – Los Angeles	5	0	20	5	10	18	0	0	0	5	0	0	63
University of Sydney	Environmental Designing Orientation	0	6	6	24	12	18	12	18	6	12	0	132
	Architectural Designing Orientation	0	6	12	12	0	72	0	48	0	6	0	156
Total Units Related to Each Skill	35	32	98	111	91	307	30	24	127	23	18	72	968
Percentage	3.61	3.3	10.1	11.4	9.4	31.7	30.9	24.7	13.1	2.3	1.8	7.4	100

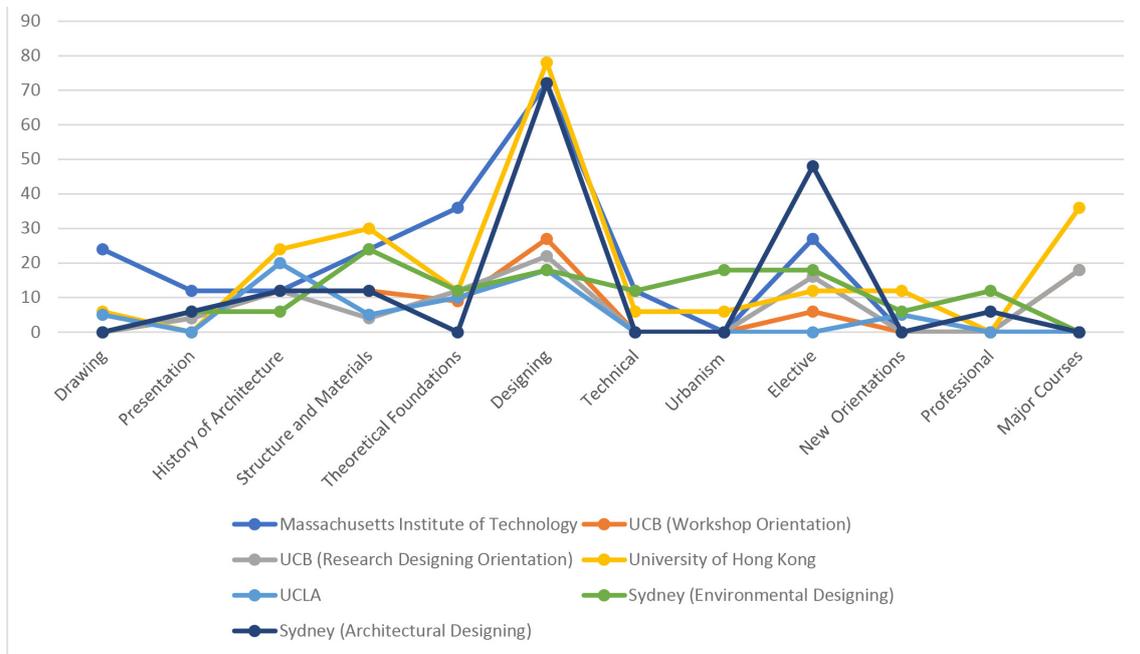


Fig. 15. Comparison and Investigation of the Importance of the Architecture Courses in Five Selected Global Samples

The common features of these programs based on the summary Table (Table 2) and Figure 15 are:

- Elective courses are the second priority after the designing courses (except one case that has no elective courses in its curriculum).
- Of the total units offered, a significant percentage (14.75%) is assigned to elective courses.
- Elective courses are usually offered at the end of education period.
- In all curricula a special attention to the research field is observed.
- Updating curricula and paying attention to innovations related to the field of architecture (social, technology, construction, theorizing, and so on) has provided special conditions for fostering students' information.
- In all programs that offer elective courses, there is this capability to select from faculty or university courses and it is not solely restricted to intra-disciplinary courses.

6.2. DOMESTIC CASE STUDIES

Based on the integrated system declared by the Ministry of Science, Research and Technology, regarding the low ratio and possibility of involvement of the departments of architecture, selecting domestic samples is contemplative. However, taking into account the oldness of the mother universities of architecture discipline, it can be hoped that the variations in these educational systems that lead to strengthening the quality of the results of their graduates can be considered in the research process of this article.

6.2.1. University of Tehran

Based on Figures 16 and 17, the first to third priorities, respectively, are assigned to the skills of “designing”, “structure and materials”, and “drawing” and elective courses are offered in the fifth and sixth semesters (third year).

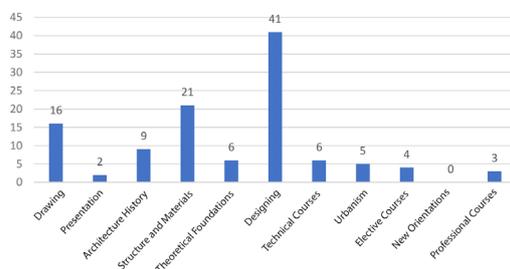


Fig. 16. Number of Units Assigned to Each Skill throughout the Course (by Credit Units) at the University of Tehran

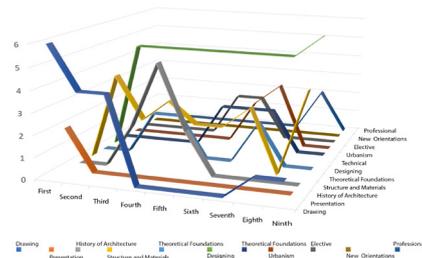


Fig. 17. Number of Units Assigned to Each Skill throughout the Course (by Credit Units) at the University of Tehran

6.2.2. Art University

At the Art University, according to Figure 18, the first to third priorities are: “Designing”, “Structure and Materials” and “Drawing” skills. “Elective “ skill is at the seventh priority. Also, according to Figure 19, elective courses are offered in the sixth semester (third year).

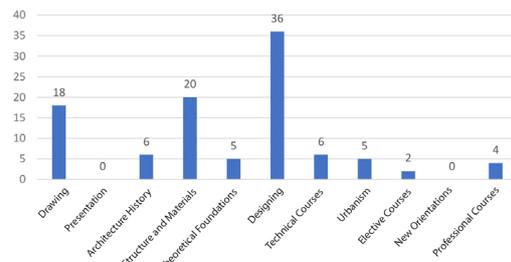


Fig. 18. Number of Credits Assigned to Each Skill throughout the Course (by Credit Units) at the Art University

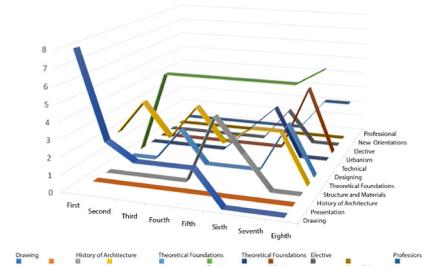


Fig. 19. Number of Credits Assigned to Each Skill throughout the Course (by Credit Units) at the Art University

6.2.3. Shahid Beheshti University

As it is observed in Figures 20 and 21, the first to third skills in the program of this university are assigned to “designing”, “structure and materials” and “the history of architecture and technical” skills and no elective courses are offered.

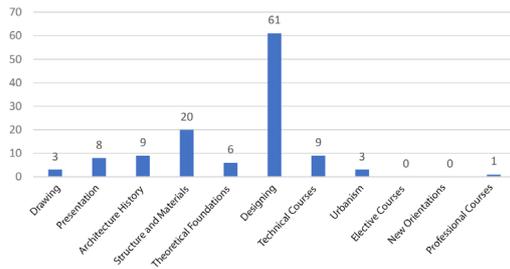


Fig. 20. Number of Credits Assigned to Each Skill throughout the Course (by Credit Units) at the Shahid Beheshti University

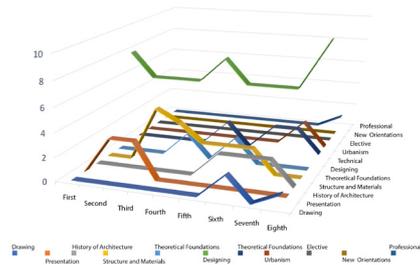


Fig. 21. Number of Credits Assigned to Each Skill throughout the Course (by Credit Units) at the Shahid Beheshti University

6.2.4. Iran University of Science and Technology

What is inferred from the analysis figures of the curriculum of this university (Figures 22 and 23) is that the skills of “designing” “structure and materials” and “drawing” are the top three priorities and no elective courses are offered.

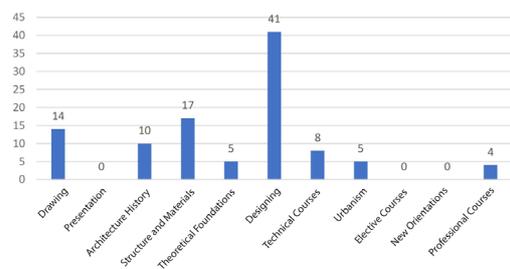


Fig. 22. Number of Credits Assigned to Each Skill throughout the Course (by Credit Units) at the University of Science and Technology

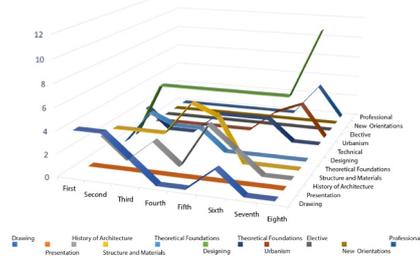


Fig. 23. Number of Units Assigned to Each Skill throughout the Course (by Credit Units) at the University of Science and Technology

6.2.5. Islamic Azad University

The process of presenting the skills in this university is also similar to the previous samples, and as it can be observed in Figures 24 and 25, the main priorities are assigned to “designing”, “structure and materials” and “drawing” and no elective courses are offered.

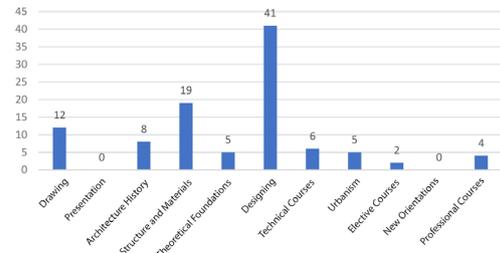


Fig. 24. Number of Credits Assigned to Each Skill throughout the Course (by Credit Units) at the Islamic Azad University

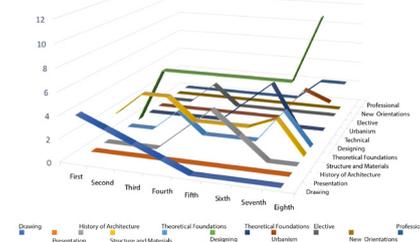


Fig. 25. Number of Credits Assigned to Each Skill throughout the Course (by Credit Units) at the Islamic Azad University

6.2.6. Summing-up Domestic Case Studies

The investigation of the educational system of domestic case samples shows that educational system and courses presentation are common, and the difference between these universities should be explored in cases other than courses description that is outside the scope of this research.

Table 3. Summing-up Number of Units Assigned to Each Skill in the Curriculum of the Domestic Samples

Skills	Drawing	Presentation	History of Architecture	Structure and Materials	Theoretical Foundations	Designing	Technical	Urbanism	Elective	New Orientations	Architecture Profession	Total Units of Each Program
University of Tehran	16	2	9	21	6	41	6	5	4	0	3	113
Art University	18	0	6	20	5	36	6	5	2	0	4	102
Shahid Beheshti University	3	8	9	20	6	61	9	3	0	0	1	120
Iran University of Science and Technology	14	0	10	17	5	41	8	5	0	0	4	104
Islamic Azad University	12	0	8	19	5	41	6	5	2	0	4	102
Total Units Related to Each Skill	63	10	42	97	27	220	35	23	8	0	16	541
Percentage	11.64	1.84	7.76	17.92	4.99	40.99	6.46	4.25	1.47	0	2.95	100

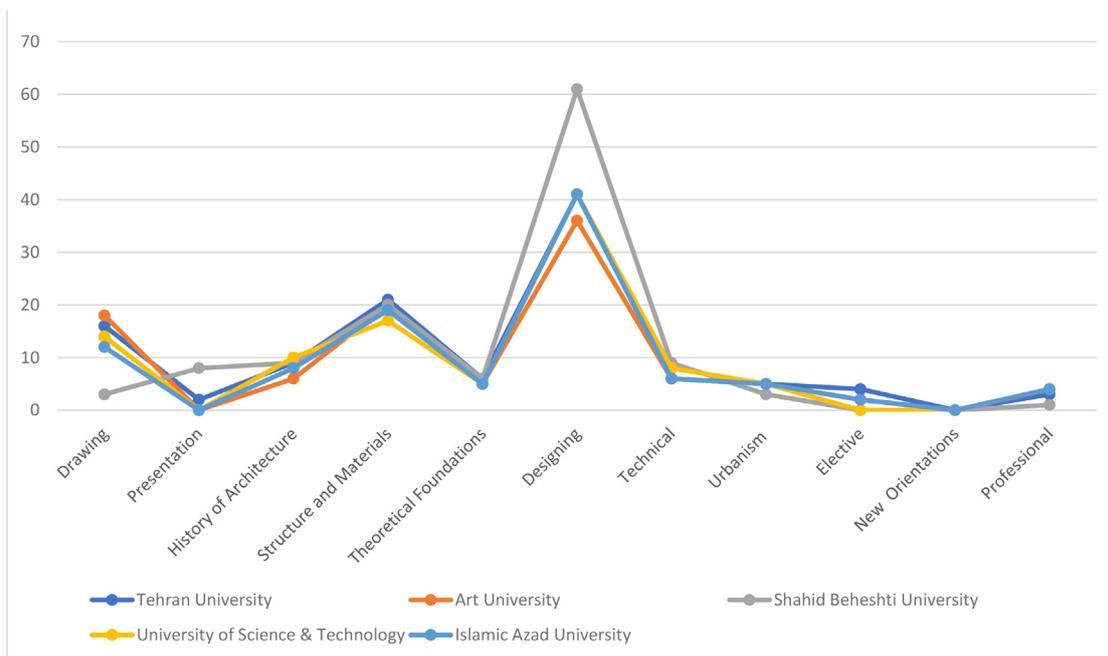


Fig. 26. Comparison and Surveying the Importance of the Courses of Architecture Discipline in Five Selected Global Samples

According to Table 3 and Figure 26, what is resulted from the analysis of the domestic samples is as follows:

- In all cases, “designing” courses are the first priority.
- Of all units offered, a very small percentage (1.47%) is assigned to elective courses.
- Elective courses are usually offered at the end of the educational course (third year).
- All curricula have similar process.
- In all programs that offer elective courses, the number of courses to choose from is limited to one or two courses.

7. SUMMING-UP

In the present research, the curricula of eight universities among the top universities of the world and five cases from the universities of Iran were investigated. At first, contractual definitions for the skills included in the curricula of these universities were presented, and then on this basis the skill separation of the units was performed. In the next step, the total number of units assigned to each skill during each educational semester and during the course was presented in the form of diagrams that showed the importance ratio of each skill in terms of the number of units assigned to it. Meanwhile, the University of California-Los Angeles (USA) was eliminated from the final diagram and table due to the lack of complete information.

Domestic samples do not have a specific process for educational courses, because the curricula are the same.

According to the summary of both parts of the samples, it can be said:

- Designing courses are the first priority in both categories (except University of Sydney - Environmental Designing Orientation) and there is a significant difference between the ratio of the units of designing courses and other skills.
- In foreign samples, the second priority is related to the set of “elective “ courses, while in the domestic samples the elective courses are not offered or are in the final priorities.
- The number of units assigned to the elective courses varies significantly between the two sample groups; in foreign samples the percentage of elective courses is 14.75% and it is 1.47% in the domestic samples.
- The elective courses offered at the universities around the world have high diversity and reinforce interdisciplinary orientations. Students can pass their elective courses at the faculty or university level, but what is offered in Iran is limited to one or two courses related to the field of architecture and it is not possible for the student to enter the interdisciplinary orientations. In addition, the existence of diversity in

the elective courses that choosing them is the student’s responsibility (by the supervision of a supervisor) allows students to plan their favorite educational route and be prepared for further study or to enter the profession.

- In foreign universities, elective courses are offered alongside research, while in Iran research has a lighter role in elective courses.

It is completely observable that there is “flexibility” in the architecture educational system at world level and has been overlooked in the Iran’s architecture educational system, while it must be acknowledged that in the present era the necessity to form interactive education along with revising the compilation of approved programs and courses description corresponding with the process of progress and the community’s professional space is requested, because of the wide range and proposed perspectives in the profession of architecture with other arts and sciences. In fact, nowadays the basic skills for the graduates of architecture discipline form the basis of curricula that this point needs to be adapted to potential contexts in the future.

8. CONCLUSION

The current rationale of architecture education in Iranian universities is seen in a relatively uniform and linear process without “flexibility”. This important point makes students and universities providing architecture discipline, despite having variables such as “learning talents”, “family education and system”, “primary concepts and main interests that impact entering architecture discipline”, “faculty members’ abilities and specialties”, “parallel and existing disciplines in the university units”, “capabilities and opportunities in the university context” and so on compete with each other by a dominating process as it has been approved during the past three decades. However, this issue in the world’s top universities, because of more “flexibility” of the educational system, as described, establishes a proper context for the variables mentioned.

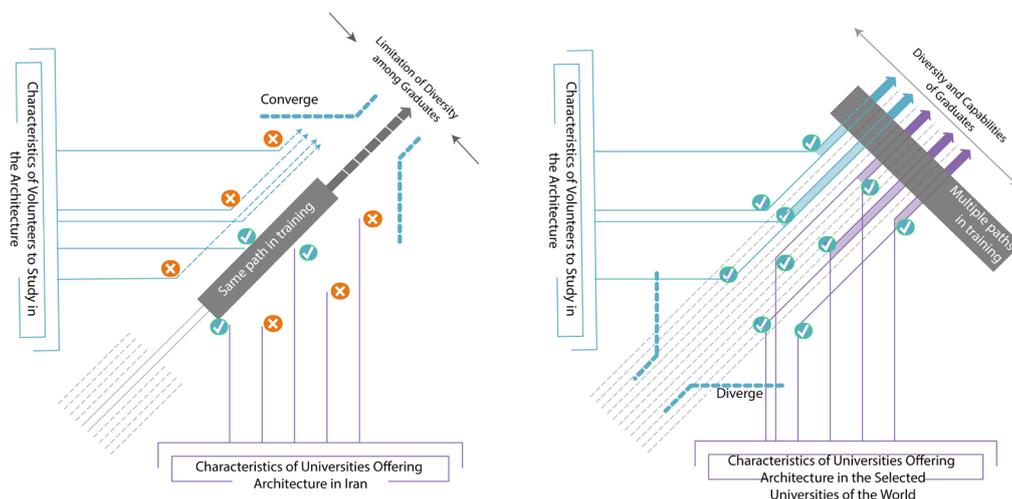


Fig. 27. Comparison of the World’s Top Universities (Right Side) and Iran’s Top Universities (Left Side) Dealing with the Components of Students Variable and the University Environment

As it is observed in Figure 27, Iran's first rank universities have a converging system and attempt to bring students in line with the abilities and interests defined in the description of the bachelor course of architecture in the same logic for all of the country's universities and provide a similar output. However, the world's top universities, with a divergent logic, encourage students to apply their diverse interests and differences in their own specific academic context and strive to make this important point emerge with the talents of each university.

Accordingly, the need to review the logic of systematizing the approved plan of the architecture course description is ascertained and applying

the condition of "flexibility" in it can make the context in the country for "strengthening academic interactions", "educational competitions" and "qualifying the diverse architecture education".

The proposed educational system compared to the current educational system in the accredited domestic universities under debate can be prone and strengthen the difference of attitudes and talents existing among the volunteers and those interested in studying the architecture discipline and their educational context (the schools or faculties of architecture) and would be able to create highly applicable diversity among its graduates.

END NOTE

1. Among other reasons that can be mentioned for selecting the samples are "Transparency of educational performance in course description", "Updating of curriculum in recent decades", "Possibility of correspondence" and "Accountability of the managers of the departments of architecture".
2. For the two consecutive years of 2016 and 2017.
3. The universities under investigation, i.e. "Massachusetts Institute of Technology", "University of California, Berkeley", "University of Hong Kong", "University of California Los Angeles" and "University of Sydney" have received the rankings of 1, 4, 10, 13 and 15 in 2016, and the rankings of 1, 3, 11, 14 and 17 in 2017, respectively.
4. It means that through a semi-structured interview, an individual's opinion on a set of value beliefs is assessed. What is called the attitude research scale in this research method is the same set of beliefs and attitudes about which one expresses his opinion.

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