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Evaluation of University Education in Architecture at the Undergraduate Level from the Viewpoint of Professional Needs and Employment

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Research Article

Abstract

Architecture education has long been related to many topics. The assortment of these topics and their correct arrangement in the learning process has been one of the key subjects in forming educational systems and the description of courses in this university major. Simultaneously, the effectiveness of an educational system in educating people in the work environment is another concern that is considered as a measure of the quality of the same educational system in public judgment. This study aims to recognize the areas of employment and capabilities affected by the areas of knowledge and skills that each job position requires. To this end, in terms of their relationship with each skill, the arrangement and planning of architecture courses are valuable for qualitative and quantitative review.

Under a qualitative paradigm and with a logical reasoning approach, the current research tries to understand the relationship between effective parameters in the common fields of employment of architecture graduates with approved courses in the discontinuous bachelor's degree. For this purpose, the researchers use a pairwise analogy of skill-specialized parameters of architectural employment and hierarchical analysis to measure the frequency of courses and the weighted frequency of the criteria.

The description of the approved courses as the most effective upstream plan in the architecture education system has a rigid and inflexible body that, while not responding to creating effective areas to reinforce the students' ability to enter numerous fields of employment due to their central vision, has caused a waste of student time while studying and learning topics that they do not use in

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a professional environment as provided. On the other hand, the top graduates of this educational system are very similar in terms of similar learning; they have a lot of competition in limited fields.

Keywords: Architecture Education; Employment; Professional Architecture; Business; University Education

1. Introduction

Architecture education's scope must comprise a wide range of knowledge and skills that help architecture students become an architect who can play an effective role in society. However, a variety of architecture education courses in some contexts, such as the design of form and space, criticism and investigation of architectural works, principles of buildings' restoration and maintenance, and theories about the creation of manmade spaces, etc., cannot by itself make architecture students choose different approaches for their careers after graduation.

Albeit, it is confirmed that variety in diverse and sometimes different topics on architecture education has a long history. This background goes back to the late first century BC when Vitruvius† theocratized architecture education, which is so far a debatable issue in architectural circles. Vitruvius believed that an architect must be trained in all environmental areas, social and cultural topics, artistic traditions, and construction techniques (Hojjat, 2011: 114). In his opinion, various professions are inculpated in architectural design; hence, it is essential to consider these professions in architecture education: drawing to produce a sketch, geometry to produce design and recognize proportionality, visual sciences in detecting light in the building, mathematics to assess costs and dimensions, history to express symbolic properties for an employer, philosophy to define personal ritual and viewpoint, physics to understand nature rules, music for theoretical aspects to find mathematical (sound-dependent) ideas, and medicine to diagnose health status of building's site, law to teach rules and regulations related to building, and astronomy to understand harmony in the world (Hearn, 2003: 31). This diversity is still, after centuries, tangible and touchable in architecture education and speeches about skills required for architects to enter this profession.

Born as a result of European architecture education, the modern architecture education in Iran goes back around the current 100 years. Architectural education has been assigned to the university over the past century, and the student-professor education process still exists. However, the second education mode is not the research case of extant study because employment is involved in this mode, and the builder enters the profession space as an apprentice from the first stage of learning. The considerable point of architecture education at university is that this process has been developed to educate more effective and productive graduates for a professional society. However, the inefficiency of architectural design education and wide gaps between current education and labor work are the most common concerns and discussions among architecture instructors in various faculties of Iran (Lalbakhsh, Ghobadian, Azizi, 2020, 318).

For example, Simoni and Abbasi (2022) evaluated the performance of academic education of architecture from the perspective of quality of technical and executive skills and entering this profession from the viewpoint of consultant and designer engineers, professionals and practitioners, faculty members, instructors, and students at a lower level relative to other performances of this educational system. Although this study is not a hundred percent general, it includes some feedback

† Marcus Vitruvius Pollio (70BC-15BC)

from workspace and university that somewhat reflects the relative assessment in the professional scape of architecture.

One of the crucial concerns in any educational system is how to design and compile a curriculum. On the other hand, every person who enters the educational system aims to achieve a better occupational and professional position, changing the conditions after education. There will be a difference between a person who has received higher education and an individual without any education in this field (Mahfar and Shahbazi, 2020: 93). However, it is a consensus the case that the higher education system is a fundamental part of society and is intimately related to the labor market and socio-economic development of the country. Despite a slight expansion of universities and higher education institutions in recent decades, unemployment issues and lack of skills among youth have increased in Iran. Meanwhile, inconsistency of educational and research policies, programs, and content with society and the labor market's needs are major obstacles and disturbances in youth employment, requiring special attention (Ghorbanalizade and Najar Nahavandi, 2014: 74).

Alade (2011) conducted a study entitled "trends and issues on a curriculum review in Nigeria" and concluded that curriculum review practices must be shifted from theoretical to practical ones. In this regard, Hadizadeh et al. (2020) introduced sustainable employment after the need for a labor market and employment rate for education, fostering and creating competency among graduates.

However, profound studies must be repeated due to time variations among graduates of each discipline based on the different and various labor markets. Asgari et al. (2020) considers flexibility in the recreation of curriculums as a condition for stability of architectural education programs and indicates this subject when comparing optional and flexible courses in leading universities. This case requires identifying different aspects of architectural employment in Iran and the world.

Besides the viewpoint of architecture education' scope, some studies have been conducted on the employment of architecture students and graduates and have reached some results that are matched with findings of studies about the concern of employment in other engineering disciplines. For instance, Mirjalili (2022: 297) introduces technical skills, social skills, skills in using appropriate technology, teamwork skills, systematic thinking and attitude, work and project management skills, and skills with working with data and information as skills required for employment of architecture graduates. She explains that the academic education system must strive to increase students' employment rate in workplaces to strengthen the skills mentioned above.

Therefore, the extant study aimed to find the employment aspects introduced to students by architecture education and to what extent students can alleviate the educational system's shortcomings in entering the workspace through this process. Accordingly, the present paper first introduces the identified aspects of employment in architecture, and their required talents and competencies, then examined the function and shortcomings of the educational system in this case. It is worth noting that entering the employment skills as the common literature with other disciplines is not the discussion case of extant study.

2. Research Method

The extant study was done based on logical-mathematical reasoning. Linda Grout and David Wang (2013: 341) express that causal studies with logical reasoning are influenced by a series of existing knowledge or factors that have been ignored, leading them to a coherent design within single frameworks with a considerable and sometimes innovative explanatory power. The present study aimed to examine effective values in planning curriculums of architecture discipline with an emphasis on bachelor's degrees. In this case, after employment fields for architecture students were

assessed, courses or teachings required for each field were evaluated. In logical reasoning, research, definition, relationship, and expression are important components; hence, the theoretical foundation section of the study defines employment areas then architecture BA courses are categorized as shown in Tables 2 and 3. In the next step, the inner relationships of these courses are examined in pairwise comparison through Analytic Hierarchy Process (AHP) through relevant software[‡]. The case that has been illustrated in Fig 3 is finally compared with the frequency of each value in the table of courses approved by the Ministry of Science. Fig 1 depicts the research steps.

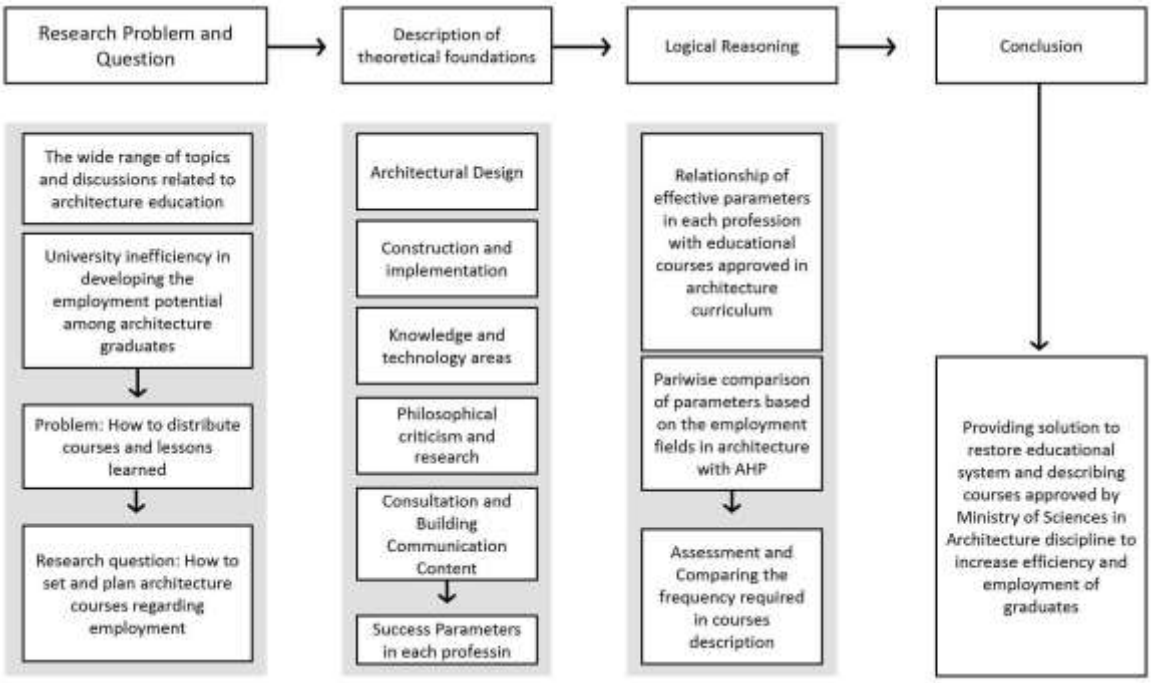

Fig 1 Research Model's Process

3. Theoretical Foundations: Employment Areas in Architecture

The challenge of employment in the academic educational system requires a suitable knowledge about employment areas. Although this is an obvious cause, the author's observations indicate that architecture students and graduates of different degrees always argue that professional space literature is unknown in practical fields and categorical diversity. Architecture students consider architectural design as their main professional aspect due to the presence of a large number of courses entitled "architectural design" and its derivatives. However, the educational system has tangible inefficiency in terms of architectural design. Regardless of design and implementation that are tangible and demanded aspects of employment appliers, there are other various jobs in world architecture scope explained herein.

[‡] Expert Choice - v11

3.1. Employment from the Perspective of Design and Architecture

Architecture and design are profound and broad concepts. Although the design, sciences, and engineering scopes can be separable, they affect each other. This implies the requirement of parallel teaching of theoretical and practical architecture courses. As shown in Figure 2 and Table 1, engineers and scientists conclude based on pure knowledge regardless of personal ideas. While designer does design actions based on implicit knowledge and sometimes their personal and intuitive viewpoint. Designers and engineers tend to transform the world's future into a superior condition, but scientist strives to understand the world. Scientist and designers' action is human-centered, while engineers' performance is technology-based (Rezaie, 2014: 56).

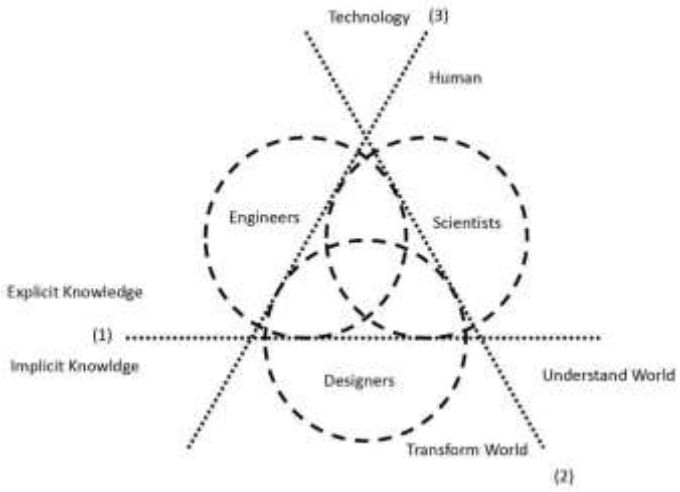

Fig 2 Relationship, differences, and similarities between sciences, engineering, and design (Bartneck and Rauterberg, 2007: 738)

Table 1 Comparison between sciences, engineering, and design

	From the scientists' point of view	From the engineers' point of view	From the designers' point of view
Understanding and knowledge	Based on the explicit knowledge		Based on the implicit knowledge
How to look at the case	Regardless of personal and expressible opinion		Based on a personal and sometimes intuitive point of view
Working concerns	Attempt to understand the world	They tend to transform the future into a better condition rather than the current world	
Performance focus	Human-centered	Technology-centered	Human-centered

The design theorist and expert in design methods and theories, Horst Rittel, explained that some activities, such as planning, policymaking, and engineering, have a specific form of design. Like the design, these activities solve wicked problems while sciences solve tame problems. Because a person cannot remember, search, and study all variables of a wicked problem, many individuals from different ranges of engineering and design sciences control unsolved problems (Rittel and Webber, 1973).

The subject of revealing design and estimation of problem-solving approaches again emerged after it disappeared in 1980, especially in engineering and industrial design disciplines. Since then, sciences, engineering, and design again approached each other, and then design aspects were developed in sciences and engineering. Many scientists have searched different design process areas, such as applied tools, managerial methods, design problem structure, design activities, and design philosophy over recent years (de Vries, Cross and Grant, 1993: 1623).

Donald Schön§, the philosopher of this scope, explains that architects in professional activity rely more on the acquired design techniques and initiatives in the profession than on academic or school teachings. According to his study, practical thinking is more useful for the design process than single technical and theoretical rationality, the thinking that does not occur in schools (Rezaie, 2014: 58).

The design has various techniques to comprise many secrets and ambiguities. If we want to provide a leading educational system, identifying such secrets and ambiguities and their differences is so broad that they cannot be briefed in this study.

3.2. Employment from the Viewpoint of Architecture and Implementation

After architecture students end their academic careers and exit the university, they face different approaches and routes with different trends, so architects have a different working profession. A student encounters some challenges for different reasons when entering the architecture profession as a constructor or executor, which is expressed by various pieces of literature such as construction, contraction, surveillance, implementation, and restoration.

The first category of reasons entitled "individual conditions" include "non-use of practical experiences in an academic atmosphere," "low knowledge about contemporary technology due to absence of approved description of courses," and "difference in gender adoptions." The second category includes "work labor conditions:" "doubts caused by mistrust in university," "non-introduced routes in university," and "weak employment system" caused by employer's fear of loss, reduction in implementation quality, and absence of information bank during education (Hojjat, 2012: 216). Moreover, this issue may lead to preventive function, instead of instructing function, of some governmental systems and organizations due to different excuses, such as the time gap between graduation and entrance exam of an engineering system, which causes an uncertainty period (Seyyedian and Hassanpoor, 2014: 6), which makes the third category, i.e., "executive and legislative engineering system."

This case has been observed among associate graduates of architecture who are introduced as technicians in the educational system. This case redirects the employment status of technicians in labor division and expertise-based hierarchies (traditional internship and apprenticeship) towards a social hierarchy-based labor vision. It enhances office tasks, relationships with the employer, and the design of reconstruction projects in implementation-related issues. This case has not been defined in the official area of these individuals' jobs and education (Nari Ghomi and Bahreini, 2018: 15).

In case of implementation, none of the educational methods can be as useful as a person's experimental understanding, which is essential in implementing "testing," "doing," and "experiencing objectively" to approach the learning cycle to the performer or executor's

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§ Donald A. Schön (1930-1997)

responsibility (Farzian and Karbasi, 2014: 4). In other words, those architects that graduated as executors from the academic field highly need a primary awareness of how to implement. Lack of empirical background among graduates in the labor market and lack of physical knowledge about the work atmosphere may cause many problems for those who want to enter the executive workshops. It can be stated that weakness in the practical education of architecture is the main reason for such shortcomings (Hojjat, 2012: 18).

Non-trust in executive systems in universities over the past decade has been made due to inappropriate evaluation systems or unjustifiable leniencies requiring revising executive courses' assessments. This case is directly related to the spirit and property of consumers and employers, so it is an undeniable part that, unfortunately, cannot be flexible in learning aspects. This can restore inefficient sectors by interfering engineering system when students are earning, denying the university's responsibility [**], narrowing the time gap between entering the profession and graduation (Seyyedian and Hassanpoor, 2012: 10).

3.3. Employment from the Viewpoint of Knowledge and Architecture

Naturally, a group of graduates must be prepared to attend scientific areas of architecture discipline. It was tried to search feasibility of this case in the structure proposed by the University of Tehran (2013), notified to Iran's universities in 2017 by the Ministry of Sciences, Research and Technology.

Headlines of architecture courses[††] indicate the presence of knowledge and scientific fields among multidisciplinary architecture discussions on educational courses of this discipline. This topic that was mentioned in the introduction section of the study could provide the field for the development of knowledge-based activities in architecture employments in some areas, such as anthropology, sociology, psychology, chemistry (materials and materials science), physics (static, dynamics, energy, light, and sound), and computer (software and hardware).

Some aspects, such as spatial planning, can be introduced as a context between design and knowledge area in architecture knowledge scope. In spatial planning, an architect is neither a designer nor a scientist that sees humans from a high look but assesses needs and puts them in norms' literature.

Architectural planning is applied research and a part of the decision-making process based on research in parallel. This case can be done while designing educational activities for architecture schools and universities and consulting engineers' service descriptions (Navai, 2014: 23). Of course, architectural planning is the forsaken aspect besides design. The reality is that many architects, particularly architecture students, are interested in design but do not like planning, so they focus on design, considering architectural planning a cumbersome issue that slows them down (Navai, 2015: 20). The mentioned issue has led to a lack of attention to this need in architectural society and earns profit for a certain group of graduates with mastery over this profession in current conditions of Iran.

[**] This concern is more seen in universities that cover their functional costs by adopting more students.

[††] For more information see the approved course description for the architecture bachelor's degree (University of Tehran, 2013) notified to Iran's universities in 2016 by the Ministry of Sciences, Research, and technology.

3.4. Employment from the Viewpoint of Philosophy, Criticism and Architecture

A good architect can also be a good critic. This case is fulfilled if the architect considers some criteria for the criticism tools. An architect can acquire more experience by learning these criteria over their academic education. Such experience can be chosen as a pattern used to assess and judge architectural works. This forsaken field in Iran has become popular in the architecture discipline globally. However, this case has not received considerable attention from gifted graduates despite its profitability among other skill-based professions.

Wayne Attoe believes that a provident criticism is more useful than a retrospective one. Criticism is a behavior, not just a judgment (Attoe, 1979: 234), implying that criticism is a talent that requires a qualified person, a person who has basic knowledge, to analyze sheer intuitions of a phenomenon and examine whether it is suitable for future based on the acquired knowledge and understanding (Tayefeh, Hodjat, and Ansari, 2016). Judgment is one of the conventional aspects of criticism, which intensifies competition between architectural atmospheres and improves its standards and qualitative level (Mayahi et al., 2021: 295). Criticism of architecture projects and determination of their superiority vary through time because students and people's opinions and ideas and effective criteria, such as the final formation of design, aesthetics of architecture quality, and criteria related to building function or building position in the environment change through time (Tayefeh, Hodjat, and Ansari, 2016).

3.5. Employment from the Viewpoint of Consultation and Architecture

According to contemporary Iranian literature, the personality of consultant architecture equals consultant engineers, while consultant engineers have been classified in design and implementation scopes. However, a consultant in the architecture discipline is a person who is familiar with architecture scope and can guide and help investors, purchasers, or consumers to make choices and decisions. The lack of such job in today's architecture occupations have led to the advent of unstructured activities, such as "estate consultation offices."

Consultation is a professional relationship between consultant and client, a new phenomenon and modern psychology knowledge's achievements. Hence, the importance of this issue makes the consultant do the consultation process for the client. The consultant must know theoretical and practical perspectives of consultation techniques. Although practical use of consultation techniques is a kind of art that its fulfillment depends on the consultant's personality traits, teaching consultant techniques and methods will increase the probability of their success in consultation (Ghadbeygi, 2018: 27).

In the literature on consultation based on psychology, "self-awareness," "ability to adopt unconditionally," "transparency," and "empathy" are introduced as qualities of a successful consultant (Ghadbeygi, 2018: 29). However, the current system of estate consultants in Iran that benefit from investment realization is not transparent. This context has not been considered an employment chance while being introduced as a business idea in the employment' entrepreneurial area.

A part of this literature is done in the presence of some individuals out of the architecture scope in the defined real estate guild. However, architecture consultation is not limited to housing cases and can cover investment in construction projects and behavioral-psychological issues in selecting the proper architecture for natural and legal consumers.

It is worth noting that some other contexts have been ignored in the architecture discipline but are beyond the scope of the extant study. Moreover, some skills, such as teaching, have been

considered in previous scopes due to some qualities but cannot be taken as a job in the literature of associate graduates.

4. Data Analysis

As mentioned in the research method, the extant study weighed and prioritized jobs and required educational courses to identify the priority and association between professions and educational scopes in approved courses. In this literature, each educational scope of architecture discipline in the notified course includes various headlines of architecture BA that are learning options and criteria for analyzing relevant occupations. Data analysis and results derived from Expert Choice 11 software led to a pairwise comparison between criteria and options, as shown in Fig 3.

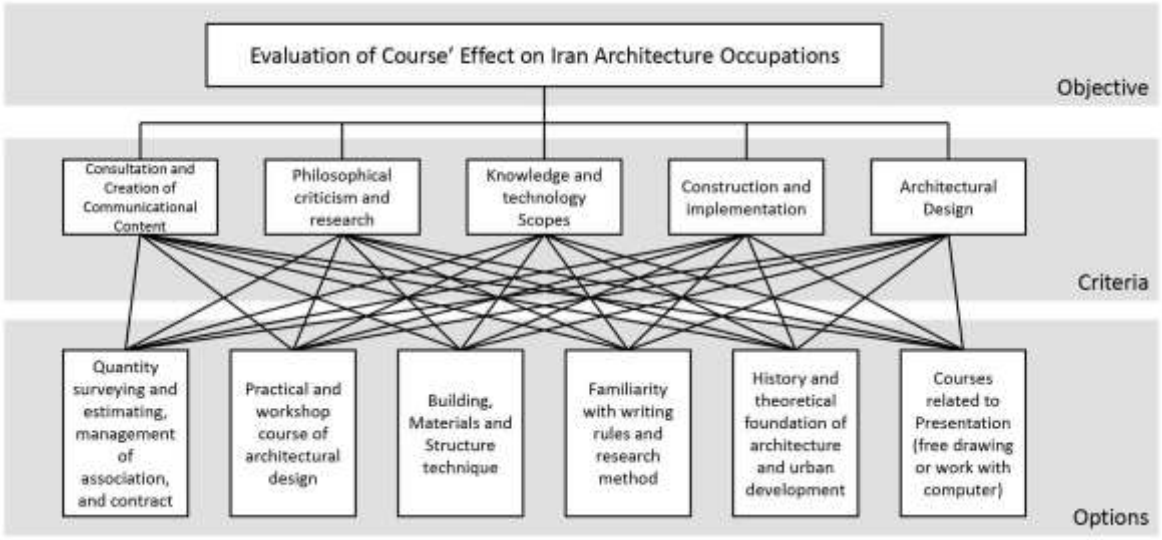

Fig 3 Tree chart of pairwise comparison between criteria and options

Some questionnaires were designed to ask experts' ideas and rate comparison in this research. Experts of this study comprised 15 architecture discipline professors who were entrepreneurs in the employment field. These experts were selected using snowball sampling within two steps: criteria (employment fields) were examined then areas affecting each occupation were assessed in terms of achievement. In this case, a number between 1 and 9 was chosen for comparisons per step to indicate the importance of two assessed pairs from the experts' point of view. Then the whole data were inserted into the software, shown with an inconsistent rate of 0.05 in Table 2.

Table 2 Results of pairwise comparisons through software

Criteria		**Architectural design**	**Construction and implementation**	**Knowledge and technology scopes**	**Philosophical criticism and research**	**Consultation and creation of communicational content**
Options	Total	0.403	0.352	0.131	0.069	0.045
Courses related presentation (drawing or)	0.296	0.488	0.184	0.163	0.122	0.093

History and theoretical foundations of architecture and urban development	0.307	0.225	0.13	0.730	0.951	0.417
Familiarity with writing rules and research method	0.273	0.088	0.094	1	1	0.097
Building, materials and structure techniques	0.510	0.204	0.776	0.881	0.391	0.278
Practical and workshop courses in architectural design	0.542	1	0.223	0.212	0.298	0.271
Quality surveying and estimating the management of association and contract	0.495	0.115	1	0.360	0.159	1

According to Table 2, the second row indicates students' willingness for activity in each branch from the experts' points of view. In this case, most graduates looking for a job are willing to work in "architectural design" and "construction and implementation" scopes. The "knowledge and technology" scope is just limited to some science and technology parks and knowledge-based companies due to the poor infrastructures of the country; hence, most graduates do not know anything about it. In addition to these three scopes, "philosophical criticism and research" and "consultation and creation of communicational content" had the lowest frequency. This issue in the first scope may stem from the need for further studies and the presence of many uneducated individuals in the second scope.

It does not matter to what extent the scopes mentioned above are accepted; the less-accepted scopes have more chance for employment and progress. Moreover, the required skills for each scope are worth identifying, so the required discussion for entering each scope is assessed relative to each other by experts who participated in this research.

For field courses, the curriculum approved by the University of Tehran (2013) was examined, and each course's headlines were reported in Table 3 based on the course's focus in previous groupings. The approved curriculum is the first revision of architecture education technique after

the Islamic Revolution, designed and ordered by the Supreme Planning Council and notified universities in 2017. In this comparison, general and optional courses were removed from the investigation process.

Table 3 Courses introduce in the description of courses approved for architecture bachelor's degree (University of Tehran, 2013: 11-13)

Course categories	Total of units	Course title and unit	Frequency
Courses related to presentation (drawing to computer)	12	Architectural expression 1, 2, 3 (2 units), Sketch 1& 2 (2 units), and Architectural Presentation through computer (2 units)	0.105
History and theoretical foundations of architecture and urban development	19	Human, nature, and architecture (2 units), World architecture (2 units), Islamic Architecture 1 (2 units), Islamic Architecture 2 (3 units), Contemporary architecture 1 & 2 (2 units), Theoretical foundations of architecture (2 units), Foundations of planning urban spaces (2 units), and Design of urban spaces (3 units)	0.166
Familiarity with writing rules and research method	0	Courses of this headline have been removed from the new curriculum and are just defined based on the research activities in other courses	0
Building, materials, and structure techniques	28	Building materials (2 units), Building 1 & 2 (2 units), Static (2 units), Enforcement of materials and steel structures (2 units), Design of concert buildings (2 units), Construction systems (2 units), Adjustment of environmental conditions (2 units), Electrical infrastructures (light and sound) (2 units), Mechanical infrastructures of the building (2 units), Technical design (3 units), Familiarity with maintenance and restoration principles (3 units), and Mapping (2 units)	0.245
Practical and workshop courses in architectural design	51	Architectural design basics 1 2, 3 (5 units), Architectural design 1, 2, 3, 4, 5 (5 units), the Design process in architecture (2 units), Village design and analysis (3 units), and Final Plan (6 units)	0.447
Quality surveying and estimating the management of association and contract	4	Management and workshop associations (2 units), Quality surveying and estimating (2 units)	0.035
Sum	114		

According to the ratio of each row's unit to total, the approved curriculum highly concentrated on "practical and workshop course of architectural design" followed by "building, materials, and structure technique" and "history and theoretical foundations of architecture and urban development." However, to what extent are these scopes accepted in employment spaces? Experts compared courses' importance in specific activities to answer this question. This case has been investigated in diagrams 1-6 by comparing weighted frequency rates from the experts' point of view with the weighted frequency of units relative to the whole curriculum.

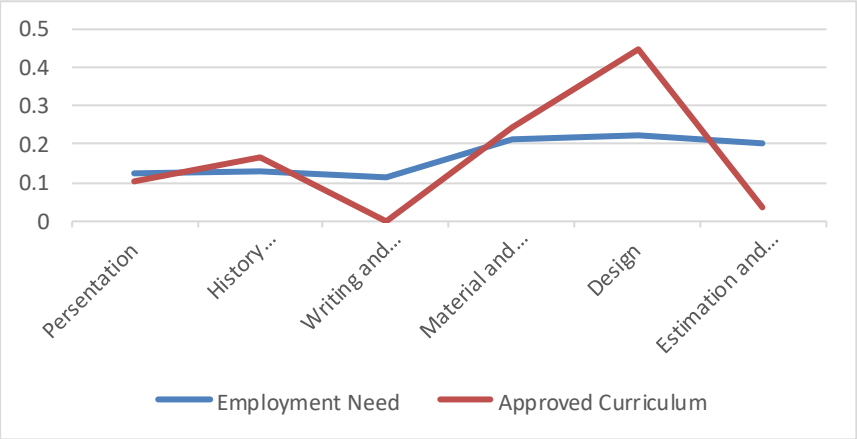

Diagram 1 Comparing frequency of the importance of the curriculum approved by the Ministry of Sciences based on employment need assessment (overview)

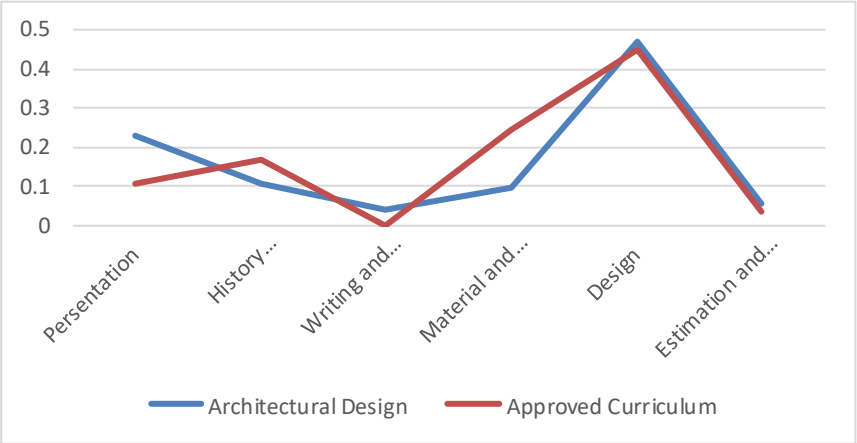

Diagram 2 Comparing frequency of the importance of the curriculum approved by the Ministry of Sciences based on the need to design occupations

As seen in the comparison between diagrams 1 and 2, the approved curriculum is more matched with the needs of a part of this society interested in professional experience in the design environment rather than the total employment rate of architecture discipline.

Diagram 3 depicts that graduates who enter the construction and implementation jobs find a major part of their learned courses during BA irrelative to their activity. They also consider the required topics in the workshop place (project estimation, costs, financial affairs, workshop associations, and contract) limited and insufficient.

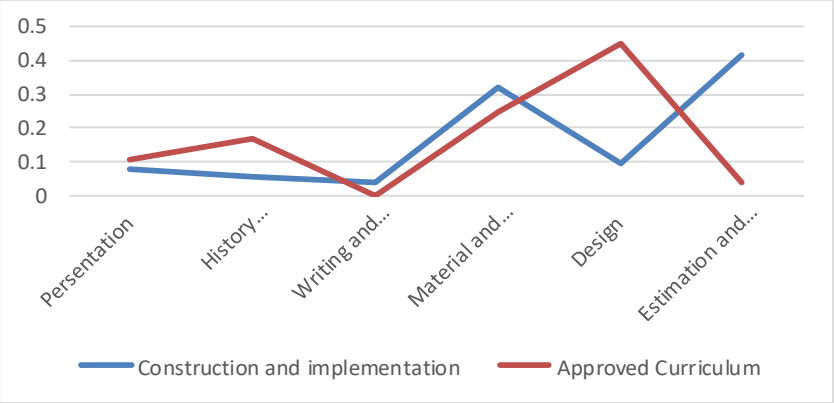

Diagram 3 Comparing the frequency of the importance of the curriculum approved by the Ministry of Sciences based on the need in occupations related to construction and implementation

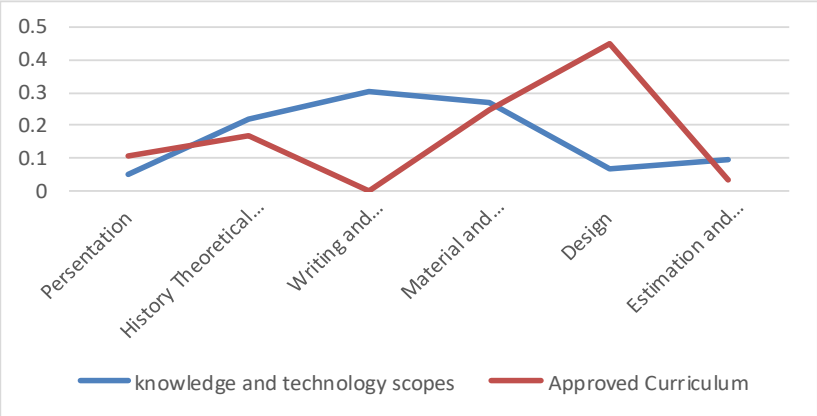

Diagram 4 Comparing the frequency of the importance of the curriculum approved by the Ministry of Sciences based on the need in occupations related to knowledge and technology

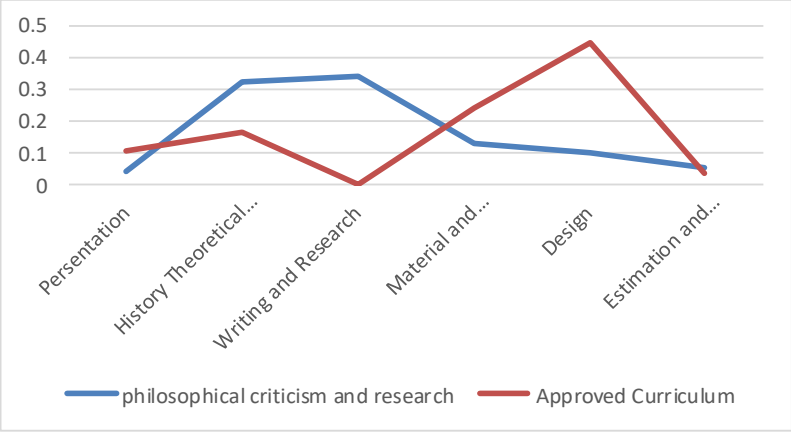

Diagram 5 Comparing the frequency of the importance of the curriculum approved by the Ministry of Sciences based on the need in occupations related to criticism and research

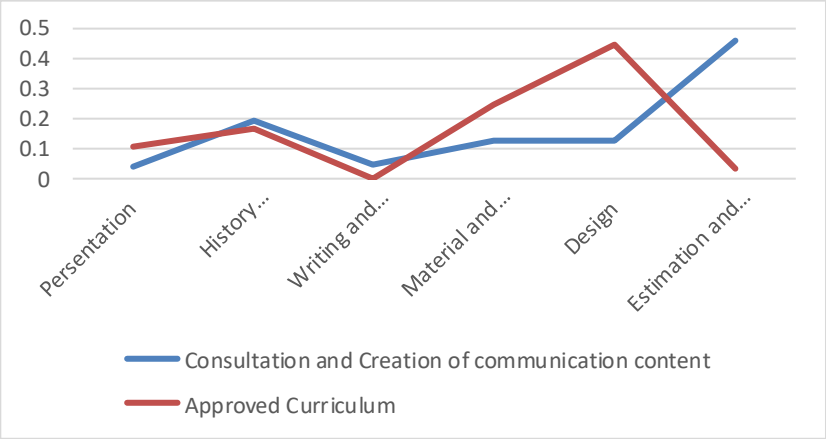

Diagram 6 Comparing the frequency of the importance of the curriculum approved by the Ministry of Sciences based on the need in occupations related to consultation

As shown in Diagrams 4, 5, and 6, the most considerable shortcoming of the approved curriculum is seen in an occupation related to knowledge, technology, criticism, research, and consultation.

5. Conclusion

As mentioned, the current approved educational system is a one-dimensional and hard platform, which has led to similar skills of academic graduates and their willingness to enter the scopes limited to the literature of architecture discipline employment. This issue warns of the necessity of changing architecture discipline planning; therefore, literature on course description must be reviewed to enhance the resilience potential in taking courses and students' arrangement and appraisal. Those occupations that do not require a specific skill undoubtedly do not need to attend courses on those skills as much as other occupations. Hence, further studies can be done to find how five characters of "designer," "executor," "scientist ad technician," "critic researcher," and "consultant" are formed in architecture education literature.

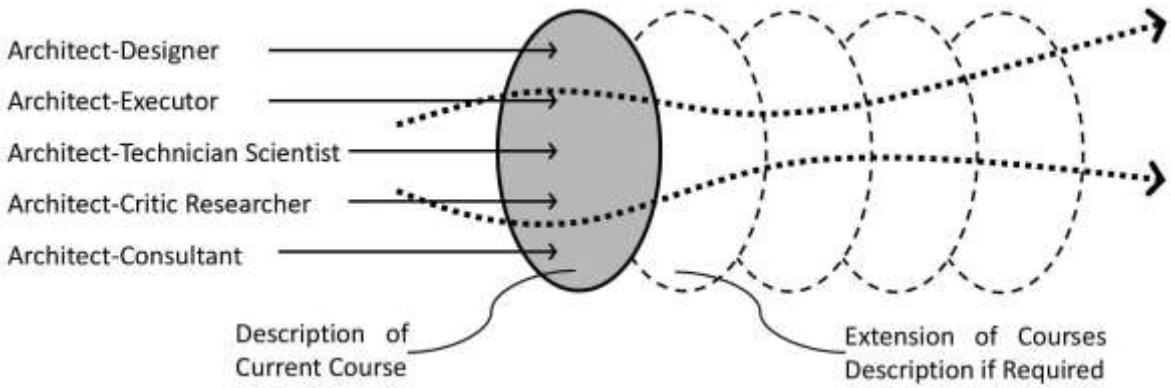

Fig 4 Required extension of courses description if required

The author of this paper believes that the proposed course description must be able to match its structure with students' demands or be based on their talents recognized by the educational system. In this way, all required tasks and roles of society find a time and space in the academic structure, and graduates' diversity can alleviate post-university courses. More intimate relationships will be between graduates and professional platforms.

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