

## ASSESSMENT OF CIVIL ENGINEERING EDUCATIONAL SYSTEM IN IRAN: PROBLEMS AND SOLUTIONS

**Behnam Mobaraki<sup>1</sup>, Jose Antonio Lozano-Galant<sup>2</sup>, Gonzalo  
Ramos Schneider<sup>1</sup>, Jose Turmo<sup>1</sup>**

<sup>1</sup>Department of Civil and Environmental Engineering, Universitat  
Politècnica de Catalunya BarcelonaTech.  
C/ Jordi Girona 1-3, 08034, Barcelona, Spain  
behnam.mobaraki@upc.edu, gonzalo.ramos@upc.edu,  
jose.turmo@upc.edu

<sup>2</sup>Department of Civil Engineering, Univesidad de Castilla-La  
Mancha.  
Av. Camilo Jose Cela s/n, Ciudad Real, 13071, Spain.  
Joseantonio.lozano@uclm.es

**Key words:** Engineering Education, Curriculum, Civil  
Engineering, Iran Universities, Educational Program.

**Abstract.** Engineering education is a mighty driver of society growth and is one of the most effective instruments for eradicating the poverty and essential task for improving economy and social facilities in each country. A good educational system in university that ensures learning for all students provides them with necessary skills for success in both academic job and industry. This paper has comprehensively evaluated civil engineering educational program in universities of Iran. One of the weaknesses of education system in Iran is that the society is suffering from educational inflation and paper qualification which lead to a painful situation to the economy of this country. For instance, in the year 2001, two millions and two hundred thousand people attended the university entrance exam, which has fallen to 800,000 in 2015. Evidently, it has reached to less than half in a decay. Therefore, by reduction of applicants' population in the recent years, many of the capacities and created costs for educational system are becoming useless.

## **1. INTRODUCTION.**

Civil engineering may be divided into a wide spectrum of sub disciplines: Construction of buildings, bridges, dams and tunnels are the first duties of a civil engineer that comes to mind, as they are their most impressive creations. However, the basic fields of civil engineering in most of the countries are categorized in construction engineering, structural engineering, geotechnical engineering, transportation engineering, surveying, water resource engineering and environmental engineering. Construction engineering deals with planning, building and maintenance of structures [1]. Construction engineers turn analysis and designs into reality, which is the tangible part of each project. In the structural branch, engineers are focusing on analysis and design of structures. Geotechnical engineers analyze the behavior of the rock and soil, which affect the response of underground and above structures [2]. Transportation system of each country builds the economic infrastructure of that country [3]. Transportation engineering deals with analysis, design, construction and maintenance of all types of transportation facilities. The surveying branch is related to surveying and levelling of lands using different engineering facilities and mapping. Water resource engineers are responsible for physical control of water, which leads to design and construction of hydraulic structures such as pumping stations, dams and water distribution systems. Environmental engineering have become increasingly common since it deals with sewage management, purification of water/air systems and treatment of chemical wastes.

## **2. A BRIEF HISTORY OF HIGHER EDUCATION AND CIVIL ENGINEERING IN IRAN.**

The first civil engineering institution in England was established in 1818 in United Kingdom-London and the dominant engineer Thomas Telford became its president in 1820. Throughout the history, Persia (Iran) always has been a cradle of science. Shapur 1 of the Sasanian Empire in 240 A.D. built the oldest university of the world with the name of Jundishapur. This university was one of the most important medical research center of that time. Jundishapur University has played an important role in the fields of Alchemy (Chemistry) [3], Biology and medical sciences. Iranian, Greek, Indian and Romanian scholars carried out their scientific investigations there. The history of civil engineering in Iran backs to the year 1934, when Tehran University (UT) was founded. UT is the oldest modern university of Iran, which was established by the court minister of the Pahlavi dynasty Abdolhossein Teymourtash and is known as the mother University of Iran [5]. Natural science and Mathematics, Theology, Literature (Philosophy and educational sciences), Medicine, Law (Political science and economic) and Engineering were the first faculties of UT. Presently, UT contains 16 faculties, over 500 fields of study, 260000 alumni and more than 2000 assistant professor/associated professor/full professor [6]. Civil engineering department of UT offers 10 fields of study, leading to the degree of Bachelor of Science (B.Sc.), Master of Science (M.Sc.) and Doctorate of Philosophy (Ph.D.) that were authorized by Ministry of Science Research and Technology (MSRT) in Iran [7, 8].

### **3. AN OVERALL REVIEW ON CIVIL ENGINEERING IN IRAN.**

Since education in civil engineering is a decisive component for development of every society and its economy, all countries all around the world have created various types of educational system to help their people and society to grow up. In Iran, civil engineering at graduate level is divided into three groups: civil-civil, civil-survey and civil-water. Students of civil-civil deal with the problems of structures and earthquake, geotechnics, hydraulic and transportation [9]. When the location of the structures is determined, surveyors identify the boundaries and features of the property to determine the site circumstances since during their education they acquire the profession of determining three-dimensional positions of points, distances and angles between them. Civil-water engineering in Iran at graduate level is concerned with quality and quantity of water resources, which are located in both underground and above ground. This branch of civil engineering is intimately connected to the analysis and design of pipelines, water supply networks and hydraulic structures. In Iran full time Bachelor, master and doctorate students in civil engineering will be anticipated to perform their degree in 4, 2 and 4 years respectively. The aim of bachelor degree in civil engineering is to educate generalist engineers who have solid foundation in this field of engineering [10]. Therefore, the B.Sc. program's student in Iran should pass 142 credits, which contain 22 credit of general courses, 25 credit of core courses, 14 credits for elective courses, and 81 credits for specialized courses. Master program in Iran normally involve 30 credit units and has a duration of one academic year for passing the courses and in the following year, candidate should perform 6-credit thesis. There are not huge differences between different

academic degrees in UT and other universities in Iran since, all of them are regulated by Ministry of Science, Research and Technology (MSRT). However, according to the major fields of department's professors, the elective courses may be changed in different universities. Ph.D. program, as the highest academic degree in the world, might be pursued by two different ways: course-based and research-based [11]. The most classical-form of Ph.D. is course-based. In this type of doctorate program, students are obliged to attend the classes and pass the defined courses. After taking part in these classes, in the fourth semester they have to take a general exam, which is a combination of all presented courses in the past semesters and so called comprehensive exam. This is the most difficult part of doctorate program in Iran since usually questions are posed as challenges and it is expected that deep and thoughtful answers will be given to these questions. Essentially the main purpose of comprehensive exam is that the student who participated in different classes, shows his/her knowledge in various educational fields. In other words, student must be able to prove his/her mastery of the subject. The most anxious thing about the comprehensive exam is that, you can only fail once in the exam and if you fail that for the second time, you will be expelled from the university.

#### **4. CHALLENGES OF CIVIL ENGINEERING IN IRAN.**

Evaluation of the differences among engineering educational systems among different countries may leads to create a better Iranian educational system by incorporating the positive aspects of different assessed systems. One of the weaknesses of civil engineering educational system in Iran is that engineering education is not considered as an investment for industrial system

growth since, the education system emphasizes on increasing the knowledge and neglect the growth of skills. There are many different things that could cause the mentioned problem. For instance, lack of engineering activities and laboratory equipment have an adverse effect on increase of skill, growth in achievement and performance of civil engineering students. Therefore, In the current system, there is a tendency toward education of engineers who are ready to have academic or theoretical jobs but not operative ones such as the ones increasing and improving national production or fulfilling the technical needs of the country. One strategy that can be used in this context is having long term planning for civil engineering students, which includes increasing the budget for establishment of equipped laboratories and at the same time enhancing professional job opportunities. Other strategies that may be used are presenting practical courses, making students familiar with real projects and preparing them for getting inside the industry. paper qualification in Iran leads to a painful situation to its economy. In table 1, statistics of students and universities in different countries are provided. According to the last announcement of Ministry of Science, Research and Technology (MSRT), Iran with 80.28 Million population has 2640 universities which is 5 times more than developed countries, among which the share of public universities from the student population is 68% and 32% is the share of private ones. China and India with 1.415 and 1.342 Billion population have 2481 and 1620 universities respectively. In Iran in the year 2001, two millions and two hundred thousand people attended the university entrance exam, which has fallen to 800,000 in 2015. Evidently, it has reached to less than half in a decay. Therefore, many of the capacities and human resources for the Iranian educational system are becoming useless by reduction of applicants' population in recent years. Since

Globalization is a process of interaction and alliance between different people, societies, universities and organizations, one of the most effective solution for the above mentioned problem is enhancing international collaboration of universities in Iran with the first level universities of developed countries, which leads to have foreign exchange programs, balanced quality and quantity of educational services with applicants' quantity and an increase in the number of professional organizations. Moreover, following novel educational methods such as virtual learning or e-learning lead to flourish students' creativities and increase collaboration between students and professors of different universities.

Table 1. Statistics of students and universities in different countries.

Country	Population (Million)	No. of University
China	1415.05	2481
India	1342.5	1342
Germany	82.30	412
Iran	80.28	2640
England	66.57	291
Italy	59.29	236
Canada	36.89	329

## 5. CONCLUSION.

There are some major problems in today's civil engineering education system of Iran, which should be addressed and solved, if the future of the country has to be secured. In the current system, tendencies of graduates are more toward education of engineers who are ready to have academic jobs but not operative

jobs such as increasing and improving national production or meeting technical needs of country. One strategy that can be used in this context is having long term planning for civil engineering students, which includes increasing the budget for establishment of equipped laboratories and at the same time enhancing professional job opportunities. Other strategies that may be used are presenting practical courses, making students familiar with real project and preparing them for getting inside the industry. paper qualification in Iran leads to a painful situation to the economy of Iran. Moreover, many of the capacities and human resources for the Iranian educational system are becoming useless by reduction of applicants' population in recent years. one of the most effective solution for this problem is enhancing international collaboration of universities in Iran with the first level universities of developed countries, which leads to have foreign exchange programs, balanced quality and quantity of educational services with applicants' quantity and an increase in the number of professional organizations.

## REFERENCES.

- [1] B. Mobaraki and M. Vaghefi, "Numerical study of the depth and cross-sectional shape of tunnel under surface explosion," *Tunn. Undergr. Sp. Technol.*, vol. 47, pp. 114–122, 2015.
- [2] B. Mobaraki and M. Vaghefi, "Effect of the soil type on the dynamic response of a tunnel under surface detonation," *Combust. Explos. Shock Waves*, vol. 52, no. 3, pp. 363–370, 2016.
- [3] S. M. Haeri, "The role of geotechnical engineering in sustainable and resilient cities," *Sci. Iran.*, vol. 23, pp. 1658–1675, 2016.

- [4] A. Gilavand, “A Study of the Growth and Flourish of Ahvaz Jundishapur University of Medical Sciences; A Cultural History,” *Int. J. Med. Res. Heal. Sci.*, vol. 5, no. 11, pp. 83–86, 2016.
- [5] M. Bahadori and M.-H. Azizi, “The first medical journal of Tehran University,” *Arch. Iran. Med.*, vol. 10, no. 3, pp. 420–423, 2007.
- [6] A. Gebru, A. Nasrabadi, and A. Nigussie, “Assessment of postgraduate international students’ learning preference’s at Tehran University of Medical Sciences, Tehran, Iran,” *J. Med.*, vol. 6, no. 1, pp. 14–22, 2016.
- [7] E. Icm, “UNIVERSITY of TEHRAN FACT SHEET 2018-2019 Staff responsible for outgoing PhD PhD students,” pp. 2018–2019, 2019.
- [8] M. R. Alavi Moghaddam, R. Maknoun, and A. Tahershamsi, “Environmental engineering education in Iran: Needs, problems and solutions,” *Environ. Eng. Manag. J.*, vol. 7, no. 6, pp. 775–779, 2008.
- [9] S. Ghaffari and N. Talebbeydokhti, “Status of Environmental Engineering Education in Various Countries in Comparison with the Situation in Iran,” *Procedia - Soc. Behav. Sci.*, vol. 102, no. Ifee 2012, pp. 591–600, 2013.
- [10] A. Jahanbakhsh, M. Pournik, A. Nakhaee, A. Sadighi, M. Azadpour, and M. Emad, “A Comparative Study of Engineering Education in Iran and USA: An Attitude Survey of Iranian Students Abroad,” pp. 1–8.
- [11] K. Kastenhofer, A. Lansu, R. Van Dam-Mieras, and M. Sotoudeh, “The contribution of university curricula to engineering education for sustainable development,” *Gaia*, vol. 19, no. 1, pp. 44–51, 2010.