The Environmental Engineering Education in Higher Studies in Bangladesh and Malaysia: An Approach for Sustainable Development

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Abstract

Malaysia and Bangladesh are traditionally and culturally-rich countries in the globe family. But their environments have been degrading due to many causes such as over population, poverty range, utilization of natural resources etc. In coping with these problems, some measures have been taken at policy levels. As an initiative, different kinds of environmental education have been introduced at different levels of the curricula and technical education is also given priorities. The engineering environmental education at institutions of higher learning may play a significant role in this regard. This study finds that the Environmental Engineering Education is rich in Malaysia compared to Bangladesh which has been taught in the different 18 public universities out of 20 and 13 private universities out of 18 in Malaysia respectively which have been made based on the survey reports on the university’s websites. Similarly, there are 32 public and 52 private universities in Bangladesh where the environmental engineering education has been taught in the 20 public and 50 private universities. This study also observed that the government of Bangladesh and Malaysia are giving priorities on the technological education. Malaysian higher education, however, is in better position in technology education when compared to Bangladesh. This paper will examine the present discourse on the environmental engineering education and research with policy matters at IHLs in Bangladesh and Malaysia based on the primary and secondary sources. A case study consisting of 20 respondents from the faculty positions at the University of Malaya may be done for the purpose of attaining sustainable development and environment towards our generations on this earth, our home.

Keywords: Environmental Engineering Education; Higher Studies; Sustainable Development

1. Introduction

The history of Education in Malaysia is old. The country achieved her independence in 1957 from the rule of the British administration. In fact, Malaysia is one of the diversified environmentally rich countries in the globe and her economy is of the Asian tigers of the world enjoyed the remarkable growth over the last few decades with the industrialization, agriculture and tourism playing leading role in the economy and at present facing many problems. In terms of education, the Government of Malaysia is quite aware about the quality education. The Government of Malaysia believes that education plays a critical role in developing human capital and can crucial part in sharing the economy towards knowledge based economy. With a view to achieving this, the Government has already passed several laws and policies such as the National Council on Higher Education Bill 1996, the Private Higher Education Institutions Bill 1996 and the National Accreditation Board Bill 1996. Moreover, in order to make effective of higher education, the Government has adopted some strategies for ensuring quality with world class education. The Nine Master Plan 2006-2010 is the most notable. Historically, her beauty and tradition is well known to us but has been
facing numerous problems such as air pollutions, water pollution, deforestation, Pollution of Inland and Marine Waters, Soil and Coastal erosion over fishing, Coral reef destruction etc. In order to cope with these problems, the Government of Malaysia and Bangladesh passed some important initiatives in this regard.

2. Results and Discussion

The Government of Malaysia is quite healthy to the engineering environmental education in higher education in Malaysia. The four research universities have been contributing to this filed in addition to other universities in Malaysia. A brief discussion on this topic is made here in this regard.

2.1 Environmental Engineering Education in Malaysia

The Role of University of Malaya: At the Faculty of Engineering, University of Malaya, a program entitled ‘Bachelor of Engineering’ on the Environmental education has been teaching. Its core objectives are to produce students who can solve technical problems related to water, air and solid waste management. The solutions to these problems require a complete and integrated system as well as effective expenditure that are closely related to human interaction and our complex ecosystem. Its aims is to impart in graduates solid knowledge of engineering fundamentals, principles and applications, in the sense of accountability and responsibility to the environment and society with respect to professional ethics, social conduct and the environment as well as to equip graduates with the ability to apply critical thinking in identifying, formulating and solving engineering problems. The environmental engineering education may the learners to build their careers in the areas of the construction firms, government agencies, housing & building development companies, industrial waste management firms, urban & city planning firms and the urban waste management companies etc. Around 35 course modules attached in the appendix 1 are designed covering different areas in the environmental engineering education in Malaysia. In terms of chemical engineering, it also deals with the environmental education to some extent. There are some ideas as read follows: It is about changing raw materials into valuable products that is used everyday. The chemical engineers play key roles in industries, as diverse as petroleum processing, pharmaceuticals manufacturing, food processing, textiles, and chemicals. While developing the processes, chemical engineers help to manage resources, protect the environment, and control health and safety procedures. In its website, it also mentions that there are some career opportunities such as chemical engineer, process engineer, safety engineer, environmental engineer and control engineer etc. About the Role of University Sains Malaysia: The school of civil engineering involves in teaching at the undergraduate levels directly in any of the disciplines such as building design and construction, road, highway and bridge, dams, waterways and irrigation systems, water supply, air quality, transport, geotechnical, public health. This school also offers the specialization in the area of water, river, hydraulic, environmental engineering, and advanced public health advanced transportation and traffic, advanced geotechnical engineering etc., at the postgraduate or the graduate level. This university is offering the MSc degree programmes by mix mode full time only in the following areas master of science in structural engineering; master of science in environmental engineering and the Master of Science in sustainable river management. If we look into the environmental engineering education in the chemical engineering programmes, we can find that the objective of this program is to produce professional engineers with knowledge and ability to analyze and solve problems in chemical engineering wider context and able to interact with others including towards their field and society environment. This school offers leading to the degree of bachelor of engineering degree (Hons.) in chemical engineering in one of the specializations are as process control, biochemical and environmental engineering and separation process and catalysis. At the postgraduate level, the school of chemical engineering has been striving to maintain high professional standards with a strong research orientation since its establish in 1992. This school is leading to the master’s in science, masters in science by mixed mode or doctorate degrees by research, either for full-time or part-time studies. The students working in industry can also undertake a research topic of interest to his/her employer subject to approval by the university. It is noted here that the students can do research on the environmental monitoring and control technologies as mentioned in the research areas of this program attached in the appendix 2 and 3. Laboratories Facilities: The school of chemical engineering is well equipped with modern and up to date laboratory facilities for teaching and research works in the area of the chemical reaction engineering research, bioprocess engineering research, separation process research and environmental engineering research. The school of mechanical engineering offers postgraduate studies by research in various fields such as energy, air conditioning, vibration, combustion etc; for the degree of M.Sc. and Ph.D that are quite
relevant to the environmental engineering education.  The Role of University Putra Malaysia: It is one the research universities in Malaysia. The department of chemical and environmental engineering offers at the undergraduate a range of options and structure for masters and doctoral students the area based on thesis and without thesis in the area of chemical engineering, biochemical engineering, environmental engineering and the material science and engineering and environmental technology management etc. At the graduate level, the department of chemical and environmental engineering, UPM offers a range of options and structure for masters and doctoral students in the same areas as mentioned in the undergraduate program. The bachelor of engineering (chemical) programme is also responsible as mentioned earlier. The department of chemical and environmental engineering currently offers bachelor of engineering (chemical) for undergraduate students. This program is conducted over 8 semesters within a four year period. There are a few of specialized areas offered by the department include environmental engineering and biochemical engineering. It is fully accredited and evaluated as the same kind. The department of biological and agricultural engineering offers a four-year, bachelor of engineering programme. Agricultural and biosystems engineering is a discipline of engineering fundamentals and the biological sciences in the analysis and solution of problems in the agricultural and biological systems. It encompasses all engineering activities related to agricultural production and the processing of agricultural and other biological products. It also encompasses the management and monitoring of natural (including land, water, air, and energy) and biological resources.  The Role of National University of Malaysia: There are several engineering departments and faculties are working on the engineering and environmental related teaching and research. The department of the civil and structural engineering was established in 1985 and offers academic programmes for bachelor, masters and doctorate levels in civil, structural and environmental engineering disciplines.  As to the role of University Technologi MARA, Malaysia: There are some programs on the environmental engineering education in Malaysia such as Master of Science in Civil Engineering (Environmental Engineering) based on the coursework. Some course are also notable such as structure engineering, water engineering, transportation engineering, geotechnical engineering, materials engineering and environmental engineering and doing research work on this issues.  Regarding the role of the Universiti Malaysia Perlis has been teaching the Environmental Engineering education under a school of the Environmental Engineering along with the school of bioprocess Engineering. Its contribution is very much wide compared to any other schools in Malaysia.  The School of Environmental Engineering is the seventh school established in UniMAP and was founded in January 2006. The school currently offers two programs; Bachelor of Engineering (Environmental Engineering) and Bachelor of Engineering (Building Engineering) since July 2006 and July 2008, respectively. The programs are in line with the Education Plan 2001-2010 to produce engineers who are capable of comprehending globalization and k-economy challenges towards achieving a developed nation status.  The Role of Universiti Kuala Lumpur is teaching the Marine Engineering Technology that may be a part of the environmental engineering education in Malaysia and the Universiti Teknologi Petronas is also concerned with the Petroleum Engineering. Some important steps are also done in the International Islamic University Malaysia on the environmental engineering education in Malaysia.  Under the faculty of civil engineering, some programs such as the Master of Science in Civil Engineering in Environment, Construction. Water, structures and geotechnique; have been teaching and the degree is awarded in this regard. It is noted here that the IIUM Engineering Journal is published biannually carefully referred international publication in the area of all in engineering aspects including the environmental engineering education.  The contribution of thee Role of Technological University of Malaysia: A department on the Environmental Engineering education, under the Faculty of Civil Engineering is leading on the environmental civil engineering education in Malaysia established in 1976. It provides a sound environmental engineering education to Diploma and B.Sc. students in Civil Engineering, the department also undertakes research, provides consultancy services to industry as well as offering postgraduate courses and continuing education through short courses and seminar sessions to practicing scientists and engineers in environmental related fields. The courses for this program including the MSC in environmental management engineering are designed as mentioned above. The Malaysia Civil Engineering Journals are contributing a lot to the engineering education and environment in Malaysia.  The Role of Universiti Malaysia Sarawak: Under the faculty of engineering, the environmental engineering education is taught at the undergraduate program. In the chemical engineering department, a course on Environmental Engineering is also taught. Some research works on this issue is also done.  The Role of Universiti Tenaga National: Under the civil engineering faculty, some fundamental engineering education in the area as mentioned earlier is also taught in this university.  It is also noted that most of the private universities in Malaysia do not have the environmental engineering department where
the environmental engineering education is taught. On the other hand, most of the public universities have this department where the environmental engineering education is taught.

### 2.2 Environmental Engineering Education in Bangladesh

Bangladesh University of Engineering and Technology is the most leading university in engineering education in Bangladesh. There are four divisions such as structure, environment, transportation and geotechnical under the department of civil engineering. The environmental engineering division has been providing testing design and consultancy services for more than three decades in diverse areas including water supply: water, waste water and industrial waste quality treatment; solid and hazardous waste management; biogas technology; air and noise pollution; environmental management planning; environmental auditing; environmental site assessment, and environmental impact assessment and monitoring over the years, the division has gained considerable expertise and experience in these areas and has developed a solid reputation both at national and international levels. The group of highly qualified teaching professionals of this division has immense teaching and research experiences at home and abroad. The department of water resources engineering has been teaching much on the environmental education in Bangladesh. The department of the petroleum and mineral resources is also dealing with many aspects of the environmental education in Bangladesh. The industrial and production engineering is an engineering fraternity that is greatly valued internationally. It has been contributing enormously to the improvement of productivity and operations as well as operating conditions of numerous organizations all over the world. The Asian University for women is also teaching the graduate program in environmental engineering and sustainable development that will train students to become engineers with capacity in policy analysis and in devising practical and technologically sound applications for remediation of the many environmental problems facing Asia. The Khulna University, generally the environmental science discipline is the subject that basically deals with the science of the environment with engineering and technological concept, socio-cultural, ecological, economical and managerial aspects of environment to build a balanced environmental sustainability. The department of civil and environmental engineering, Islamic university of technology has been contributing since 2008 with high quality of education in civil and environmental engineering along with quality teaching, research and consultancy with utmost sincerity and hard work. Civil and Environmental engineering education contribute to the health, safety, and quality of life through the design, construction, and operation of public and private infrastructure. There are two programs on the B.Sc. in civil and environmental engineering for 4 years full time and the higher diploma in civil and environmental engineering for 3 years full time. In the several policies, strategies and commissions, the planning, some recommendations in this regard are also made for the environmental engineering education in Bangladesh. Regarding the role of Education Ministry, the Government of Bangladesh is implementing 10 projects in five year plan 2007-200 as to the educational engineering. The National Education Policy 2009 (draft) emphasizes the technical, vocation and engineering education for our environmental sustainability context.

### 3. Some Case Studies

Most of the respondents think that the position of the environmental education in the higher studies are adequate and does not fulfill the needs and demands of the present day’s requirements. The respondents are not much aware about the significance of these studies in our life and biodiversity perspectives. This education needs to be enhanced and developed for the sake of the sustainable future for our generations on this earth.

### 4. Recommendations

From the above study, the following recommendations may be made here:

- To increase the environmental engineering education in higher studies in Bangladesh and Malaysia
The study observes that environmental engineering education in higher studies is adequate compared to Malaysia. Therefore, this education should immediately be introduced in the different universities in Bangladesh.

The study also finds that most of the private universities in Bangladesh and Malaysia did not introduce the separate environmental engineering education department in higher education. The private universities should come forward with this education.

The research work on these issues is adequate. Some civil engineering journal in Malaysia including the International Islamic University Malaysia and the Universiti Technical Malaysia has been working in this regard.

The environmental engineering education is quite inadequate compared to our present needs and demands. Therefore, the government and the universities should think the importance on this education.

It has keen relations in the environmental sustainability without which the sustainable education and development cannot be made possible.

The universities may do a comparative study with some reputed universities in the global family in this regard.

5. Conclusion

The environmental engineering education in higher studies is one of the pressing needs of the human being on this earth due to the fact that without which we could not lead a healthy and happily life in our mother earth. The universities of Bangladesh and Malaysia are very conscious about the significance of this education in higher studies in these countries. At this present state of this education in these countries are not in a good position but still, they are taking some initiatives for developing the environmental engineering education in the countries. Particularly, the university grants commissions of Bangladesh and Malaysia have been monitoring and supervising the course curriculum in this regard. They have been sincerely working in these areas of studies. The governments of these two countries have been implementing many projects directly indirectly related to the environmental education in these two countries. In the policy and strategies levels, some initiatives are also well discussed in it and the relevant initiatives have been made in this regard. It is noted that the environmental engineering education is almost taught at the faculty of civil engineering levels in the universities. Most of the public universities have been teaching this education. On the other hand, it regrets that this education is rarely taught in the private universities in these countries. The study finds that the private universities almost depend on the market based education like the Business Administration, English, and Law etc. They are not highly considering the cultural, heritage, and philosophical based education including environmental engineering education. The study also finds that some new universities and schools are introducing the faculty of environmental engineering education as a separate entity for environmental engineering education. Some journals on the environmental engineering related educations also are working in this regard but which are quite inadequate for our own needs and present environment. The present scope of this education is wider in Malaysia than Bangladesh. It is also remarkable that there are many co relations between the environmental sustainability and the environmental engineering education without which the sustainable development for our generations is quite impossible. The recommendations presented in this study should urgently be considered for our existence and sake,
References


4 *Environmental Engineering Education on the programme overview*, the Faculty of Engineering, University of Malaya, Malaysia and http://www.um.edu.my/mainpage.php?module=Maklumat&kategori=82&itemid=534&paper; accession on 16.2010 at 12:04 P.M.

5 http://civil.eng.usm.my/v2/index.php?option=com_content&task=view&id=112&Itemid=59; accession on 16.2010 at 12:45 P.M.

6 http://chemical.eng.usm.my/v2/index.php/programmes/undergraduate; accession on 16.05.2010 at 12:50 P.M.

7 Ibid.

8 http://eng.upm.edu.my/v1/index.php?option=com_content&task=view&id=14&Itemid; accession on 16.05.2010 at 1:50 P.M.

9 http://pkukmweb.ukm.my/~jkas/webjkas/EnglishN/undergraduate_courses.html; accession on 16.05.2010 at 2:01 P.M.

10 http://ipsis.uitm.edu.my/index.php?option=com_content&view=article&id=50&Itemid; accession on 16.05.2010 at 2:19 P.M.


12 http://www.etawau.com/edu/UniversitiesPrivate/Universiti_Kuala_Lumpur.htm; accession on 16.05.2010 at 2:41 P.M.

13 http://www.iiu.edu.my/about/about.shtml?id=faculty; accession on 16.05.2010 at 2:53 P.M.

14 http://www.civil.utm.my/content.php?id=80&cid=6&lang; accession on 16.05.2010 at 3:02 P.M.

15 http://www.feng.unimas.my/Departments/Dept-of-Civil-Engineering/master-of-engineering-civil-programme-by-coursework.html; accession on 16.05.2010 at 3:08 P.M.


17 http://www.buet.ac.bd/cc/; accession on 17.05.2010 at 12:41 A.M.

18 http://www.buet.ac.bd/wre/; accession on 17.05.2010 at 12:46 A.M.

19 http://www.buet.ac.bd/dee/course_material/index.html; accession on 17.05.2010 at 12:51 A.M.

20 http://www.asian-university.org/academicPrograms/graduateProgram.htm; accession on 17.05.2010 at 12:55 at A.M.

List of Appendices:

**Appendix 1:** Some course modules on the Engineering Environmental Education in the different universities in Malaysia and Bangladesh as sample are present here as follows:

- Information Skills
- TITAS I&II
- Thinking and Communications Skills
- Moral and Ethics in the Engineering Profession
- Economics, Finance and Engineering
- Project Management
- Engineering Law
- Management, Entrepreneurial and Engineering
- Computer Aided Design (CAD)
- Engineering Mechanics
• Microbiology for Environmental Engineers
• Concrete Materials
• Civil Engineering Drawing
• Computers & Programming
• Strength of Materials
• Fluid Mechanics
• Fundamentals of Material Science
• Fundamentals of Engineering Calculus
• Fundamentals of Algebra Calculus
• Statistics & Probability
• Engineering Geology
• Land & Aquatic Ecology
• Theory of Structures I&II
• Hydraulics I&II
• Soil Mechanics I
• Water Resources
• Design of Reinforced Concrete I
• Health and Environmental Sanitation
• Ordinary Differential Equation
• Management, Entrepreneurship and Engineering
• Economics, Finance and Engineering
• Civil Engineering Mathematics I & II
• Design of Steel Structures I
• Environmental Chemistry
• Transportation Processes in Environmental Engineering
• Introduction to Principal Processes
• Unit Operations
• Geotechnical Engineering for Environmental Engineers
• Environmental Impact Assessment
• Air and Noise Pollution
• Solid Waste Management
• Wastewater Treatment

Appendix 2: Research Areas on the Environmental Engineering Education
The School has extensive facilities which are presently carried out in the following areas:
• Separation Process
• Treatment of Wastewater & Toxic Materials
• Reaction Process
• Process Control
• Catalysis
• Plant Safety & Hazard Analysis
• Petroleum & Gas Processing
• Environmental Monitoring & Control Technologies
• Membrane Technology
• Modelling, Simulation & Optimization
• Bioprocess Engineering
• Waste Material Utilization to Value Added Products
• Fermentation Process
• Process Development & Plant Design
• Enzyme Technology Energy

Appendix: 3 Area of Research on the Environmental Engineering and related Education in Malaysia
Specific area of studies for the Master of Science and Doctor of Philosophy Degree by Research are as follows:

Environmental Engineering: Landfill Technology, Compositing, Water and Wastewater Treatment, Industrial Wastewater Treatment, Solid Waste Management, Environmental Impact Assessment (EIA), Air Quality & Water Quality Studies, Sludge Management, Noise Pollution Control, Water Quality Modeling


Structural Engineering: Concrete Technology, Masonry Engineering, Concrete Repair Materials and Techniques, Wind Engineering, Earthquake Engineering, Timber Engineering, Tensioned Structures, Shell & Spatial Structures, Computational Mechanics and Advanced Structural Analysis Biochemical and Environmental Engineering etc.