

## Survey in Curricula Civil Engineering with Respect to Environment

*\*Akramolmolok Lahijanian*

*Department of Environment Management, Graduate School of the Environment and Energy,  
Science and Research Branch, Islamic Azad University( IAU),Tehran, Iran*

Received 7 August 2010; Accepted 2 October 2010

---

**ABSTRACT:** The study aimed at a critical assessment of the environmentalism components introduced in the civil engineering curriculum in India polytechnic colleges (state of Tamilnadu) and associate degree level Technical Institutions in Iran .The objective of study was to compare technical education curriculum in civil engineering with respect to environmentalism. Both qualitative and quantitative techniques were used as content analysis method. Qualitative analysis was carried out to compare the curriculum with respect to environmentalism components. Study samples are drawn from the educational and academic institutions in India and Iran. For the purpose of quantitative analysis, t-test, F-test, and factor analysis were used. To establish reliability of the tools, Cronbach Coefficient of Alpha was calculated. Then quantitative analysis was carried out to test the hypotheses formulated. The results revealed that there were significant differences in total environmental subjects in the curriculum of civil engineering in terms of techniques and technologies. These are examples of different practices in case of academic institutions of Iran: Soil pollution and noise pollution are very much neglected. Contents on ISO standards related to environmentalism are missing. No specific strategy has been laid down to teach environmentalism in technical education. Content is mostly towards classroom, and no emphasis on practical experience, fielding visit/industrial visits.

**Keywords:** *Component, Curricula, Techniques, Environmentalism, Methodology, Education, Associate Degree*

---

### INTRODUCTION

The International Union for the Conservation of Nature (Andonora, 2003) has observed that Environmentalism in Education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among man, his culture and his biophysical surroundings. (Bradott, 2003) has said Environmentalism in Education is a way of implementing the goals of environmental protection. Environmentalism in Education is not a separate branch of science but it is a life-long integral education (Macdonald, 2003).

Billings, 2004 indicated that Environmental education aimed at producing a citizen that is knowledgeable concerning bio-physical environment and its associated problems, knows how to approach these problems as well as being motivated to work towards their solutions. (Blunden, 2001) stated Environmentalism in education emphatically proclaims

and convinces us that, “We are part of a natural system, the earth, and ultimately subject to the limits of the system”. The conflict between the human needs to develop resources and preserve nature has to be resolved (Brady, 2007). Any inputs on the protection and conservation of environmentalism during the training period would help individuals in addressing environmentalism issues while designing and making decisions on developmental activities (Schawartz, 2003).

In comparison to many other sectors of education, technical education is blessed with a large human resource (technically qualified staff) and infrastructure (laboratories, equipments, facilities for field orientation, etc.) who can easily appreciate, support, integrate and incorporate the perspectives of environmentalism in the curriculum(Blaikie,2000).

The inclusion of this component in technical curriculum could be an initial step on institutionalization of environmental education; however, it would be

---

\*Corresponding Author, Email: [Lahijanian@hotmail.com](mailto:Lahijanian@hotmail.com)

equally important to train the translators of curriculum- the teachers who make environmentalism technical appealing to the students through showing high competency in implementing these principles in the educational settings (Vincent, 2008). This integration process necessitates devising a comprehensive approach to curriculum development in environmentalism.

The objectives of the present study were:

-To compare Technical Education curriculum in Civil Engineering Programs in India and Iran with respect to environmentalism.

-To identify the environmentalism components introduced in the civil engineering curricula and assess the contents critically to find out whether suggested techniques and technologies can be internalized and used by the students of polytechnics of India and Associate Degree Level technical institutions in Iran.

It has been to this end that content analysis and comparison of the curriculum of civil engineering in both countries were taken into account.

## RESEARCH METHOD

In this part the sample, development of research tools, and data collection method were presented in some details. The technique of establishing reliability and validity of these tools were also presented.

### Qualitative Analysis

To compare the Environmentalism components in the curricula of the Civil Engineering of Diploma level of India and Associate Degree level of Iran, content analysis was done.

The comparison was done based on following parameters.

- 1-Course Title
- 2-Content
- 3-Methodology
- 4-Approach
- 5-Adequacy of Content
- 6-Distribution of Content
- 7-Level of Complexity
- 8-Sampling methods (Technical)

Inadequacy in Civil Engineering curricula with respect to Environmentalism was also identified. Environmentalism components in other subjects in Civil Engineering were also found out.

### Sample

According to (Best, 2002), “in every branch of science we lack the resources to study more than a fragment of the phenomena that might advance our knowledge”. It is difficult to study the whole population of a given universe to answer study questions posed. It is therefore convenient to pick up a sample out of the universe proposed to be covered by the study (Reidel, 2003).

In the present study sample was drawn from India and Iran. India has got several states and about 1200 polytechnics which are spread all over these states. On the other hand the entire country of Iran has only got 33 Associate Degree level Technical Institutions. These technical institutions are equivalent to polytechnics colleges of India. Both aim at producing technicians to join the labor force. Therefore, matching the sample size between these two countries remains an obvious problem (Chandra, 2004). Further, in India student strength of the polytechnic colleges varies from 500 to 2000 depending on the available engineering diploma streams. Besides student strength there is a wide gap between in teacher strength in a Polytechnic College in India and Associate Degree Level Technical Institutions in Iran.

In India each state follows the curriculum developed by Directorate of Technical Educations of that particular state barring a few autonomous polytechnic colleges in the country (Rao, 2006). This is to say that uniform polytechnic college curriculum is not available in India. All Associate Degree Level Technical Institutions in Iran follow the same curriculum developed by the Government Agencies quite contrary to the practice in India.

In Iran, the technical institutions are geographically spread all over the country and a few of them are difficult to approach. This fact proved to be a major constrain in administering the research tools. In the present study questionnaire schedules were used to collect data. It has been observed that sending questionnaire by post is not always the right option to collect data. Receiving of responses through post varies between 10% to 40% return back of the filled in questionnaire.

To counter all these difficulties purposive sampling technique (Sharma, 1995) was used at every stage for the present study. Fifteen polytechnic colleges from Tamilnadu of India were included in the present study. The researcher camped in the Polytechnic Colleges and Associate Degree level Technical Institutions for a few

days depending on the availability of the sample to administer the research tools in person. The numbers of Associate Degree Level Technical Institutions considered for data collection purpose were 25 in Iran. Thus a total of 40 institutions were covered for the present study.

#### **Data Analysis**

Both qualitative and quantitative methods were used to for the purpose of data analysis.

For the purpose of comparisons content analyses of the Civil Engineering Curriculum of Diploma Level (Directorate of Technical Education, Tamilnadu) with respect to Environmentalism Components and Civil Engineering Curriculum of Associate Degree Level Technical Institutions were carried out

The tools used for quantitative analysis were t-test, F-test, and factor analysis. The collected data were analyzed to draw inferences. To establish reliability of the tools Cronbach Coefficient of Alpha was calculated.

#### **RESULTS AND DISSCUSSION**

Results related to content analysis:

**1-** In India, diploma course is taught in both full time and part time modes. The course duration is 3 years in full-time and 4 years in part-time mode. In Iran the associate degree has duration of two and half years and it is only offered in full time mode.

**2-** Apart from environmentalism in engineering subjects just in a few environmentalism components are included in other subjects, e.g., applied chemistry (first year) in India and chemistry (second year) in Iran.

**3-** Environmentalism in Education is taught under the subject heading, "Environmentalism Engineering and Pollution Control" in Civil Engineering program in India; it is taught under the subject heading, "Environmentalism Promotion" for Civil Engineering in Iran.

**4-**In Environmentalism Curriculum of India the emphasis was on water pollution and its related issues rather than air pollution and its related issues but both water and air pollution and related issues were emphasized equally in Iran.

**5-**Components like types of demands of water and factors affecting the capital demand have been dealt with elaborately in the curriculum of India; no such content has been incorporated in Environmentalism in Technical Education Curriculum of Iran.

**6-**Detailed discussion on energy generation has a place in the curriculum of Iran whereas no methods of energy generation have been incorporated in the curriculum of India.

**7-**Detailed discussion on various techniques of industrial waste, sewage and water treatment was included in Civil Engineering Diploma Curriculum of India; whereas there was only specific discussion on industrial waste and sewage treatment techniques in Associate Degree Level Civil Engineering Curriculum in Iran.

**8-**In the Diploma Level Civil Engineering Curriculum of India there is no discussion on history and background of air pollution, whereas in the Associate Degree Level Civil Engineering Curriculum of Iran contains detailed history and background discussion on air pollution.

**9-**In the Civil Engineering Diploma Level Curriculum of India, certain emphasis is on environmental legislations whereas no emphasis is on environmental legislation in the Associate Degree Level Civil Engineering Curriculum of Iran.

**10-**Components such as water demands and factors affecting the capital demand have been dealt with in some details in the curriculum of India; no such content has been incorporated in Technical Education Curriculum of Iran.

Civil Engineering Curriculum at Diploma Level in India and Associate Degree Level in Iran consist of several subjects. Though there is one Environmentalism content specific subject in each Civil Engineering Curriculum there are certain other subjects in the same curriculum which contain environmentalism components. The following table gives the data related content of Environmentalism in other subjects of Civil Engineering Curriculum of India and Iran.

**Table 1: Comparison of Environmentalism Components in India and Iran**

S. No	Factors/ parameters contributing	India	Iran
1	Subject title	- Environmental Engineering & Pollution Control	- Environmentalism Promotion
2	Nature of Arrangement	- Divided into 5 units	- Divided into 2 chapters
3	Content	Unit 1 1.1. Quantity of water 1.2. Collection and conveyance of water Unit 2 2.1. Quality of water 2.2. Treatment of water Unit 3 3.1. Water Distribution systems 3.2. Laying and maintenance of water lines Unit 4 4.1. Collection and transportation of sewage 4.2. Treatment and Disposal of sewage Unit 5 5.1. Treatment and disposal of industrial waste 5.2. Pollution control	Chapter 1 Water pollution  Chapter 2 Air pollution
4	Methodology	<ul style="list-style-type: none"> <li>- Content is spread out in the increasing order of difficulty.</li> <li>- Objectives of environmentalism content were not given</li> <li>- The method of teaching is directly through classroom instruction.</li> <li>- Appropriate strategy to teach the content is not mentioned in the syllabus.</li> <li>- No simulation method is adopted to teach environmentalism components.</li> <li>- Knowledge, skills, attitude, evaluation abilities are incorporated through content.</li> <li>- Content is not specific in relation to the present situation.</li> </ul>	<ul style="list-style-type: none"> <li>- Content is not spread out in the increasing order of difficulty.</li> <li>- Objectives of environmentalism content were given.</li> <li>- The method of teaching is directly through classroom instruction.</li> <li>- Techniques and tactics are not mentioned in the syllabus.</li> <li>- No simulation method is adopted to teach environmentalism components.</li> <li>- Knowledge and attitude are only incorporated through the content.</li> <li>- Content is not sensitive to present day situations.</li> </ul>
5	Adequacy of content	<ul style="list-style-type: none"> <li>- Environmentalism was explained through water pollution, Industrial waste treatment &amp; Management. The content is spread out.</li> <li>- To understand the importance of the water distribution systems.</li> <li>- To understand the importance of transportation and distribution systems of domestic sewage.</li> <li>- To understand the importance of water treatment and sewage.</li> <li>- To explain the role of industries in water pollution.</li> <li>- To understand the importance of industrial waste treatment.</li> <li>- To understand the pollution control measures through environmental legislations.</li> <li>- Soil and Noise pollution topic are not covered.</li> </ul>	<ul style="list-style-type: none"> <li>- Environmentalism engineering components in curriculum explains air pollution and water pollution. The content is spread out.</li> <li>- To understand Environmentalism concerns and needs.</li> <li>- To understand the importance of clean water, sanitation and sewage distribution systems.</li> <li>- To understand the importance of water and sewage treatment.</li> <li>- To understand the role of industries in water pollution.</li> <li>- To understand the importance of industrial waste treatment.</li> <li>- To understand water pollution control measures through environmentalism indicators.</li> </ul>
6	Distribution of content in allotted hour	<ul style="list-style-type: none"> <li>- The hours allotted are sufficient to teach environmentalism components given in the content.</li> <li>- Application of environmentalism technology is taught in laboratories.</li> <li>- Learner can perform a limited set of activities related to air and water pollution.</li> <li>- Teaching models are not available for teaching the discipline.</li> <li>- Focuses on Environmentalism training and application skills necessary for citizenship action are not incorporated.</li> <li>- Method-matter (content) match is not indicated.</li> <li>- Little attempt has been made to establish links between different parts of curriculum.</li> <li>- There is no element of field visits/industrial visit.</li> <li>- The time allocation for environmentalism subjects is suitable for class room teaching only.</li> </ul>	<ul style="list-style-type: none"> <li>- The hours allotted are not sufficient to teach environmentalism components given in the content.</li> <li>- Application of environmentalism technology is minimum.</li> <li>- Learner is not involved in the activities, related to air and water pollution.</li> <li>- Teaching models are not available for teaching the discipline.</li> <li>- Focuses on Environmentalism train and application skills necessary for citizenship action are not incorporated.</li> <li>- Method-matter match is not indicated.</li> <li>- There is no links between different parts of environmentalism curriculum.</li> <li>- There is no element of field visits/industrial visit.</li> </ul>
7	Level of Complexity	<ul style="list-style-type: none"> <li>- Sampling details of water, land, soil is dealt with great importance.</li> </ul>	<ul style="list-style-type: none"> <li>- Sampling details on Environmentalism activity are dealt with. Sampling methods of pollutants, such as air pollution and water pollution are not mentioned.</li> </ul>
8	Sampling methods (technical)		

**Table 2: Content related to Environmentalism apart from Environmentalism engineering subject**

S. No	Country	Level	Course	Duration	Year/Semester	Subject	Common	Uncommon
1	India	Diploma	Civil Engineering	3 Years	First year	Applied chemistry	Water pollution, common water pollutants, control of water, sewage and its treatment, disposal of sewage	Technology of water purification, Purification of drinking water, problems caused by water pollutants, effluents, treatment of effluents, air pollution, common air pollutants, problems caused by air pollutants, control of air pollutants.
2	Iran	Associate degree	Civil Engineering	2 ½ years	Second year	Chemistry	Nil	Shortage of water, indicator and measures of quality and quantity of water, Recycling of substance, methods of energy production.

**CONCLUSION**

Technical education institution has been providing their educational services a substantial of student population. Environmentalism would help them in addressing environmentalism once they join the real world. The study has been conducted to provide a comprehensive approach to incorporated environmentalism in the curricula of technical programmers’ in India and Iran.

The technical education curricula of Civil Engineering in India and Iran were compared with respect to environmentalism a set of identified component. The components of environmentalism included in the curriculum of Civil Engineering in India and Iran were identified. The study also identified the missing curricula components which can be included to enrich the courses in both the countries.

**Suggestions for India**

- 1-Courses dealing with environmentalism should be designed and incorporated into teaching programs of polytechnics throughout the country.
- 2-Polytechnic teachers may to receive training on the environmentalism through attending training programs both at home and aboard.
- 3-The Government should develop and implement a master plan for environmentalism education. The plan should lead to the evolution of an ecological ethos

that is a change of the present callous attitude of people towards environmentalism.

- 4-The courses in management and engineering should be reoriented to include topics on environmentalism management.
- 5-Courses on environmentalism management similar to the one sponsored by the Department of Environmentalism at the staff college, should be offered at each college to train administrators, policy makers and other target groups.
- 6-It is recommended that the term “Environmentalism” should be regarded as a functional in all courses in engineering and explanation should be in functional term in the engineering courses.
- 7-Conservation education should be expanded to all regions of India; specific programs need to be developed for each geographical area in India as each has its own environmentalism characteristics

**Suggestions for Iran**

- 1-The curricula should be more flexible in Associate degree level as environmentalism program in all its aspect has a close relationship to technicians’ living environment.
- 2-The technicians need to receive training on various aspects of environmentalism problems. It should be

ensured that the future recruits have the required knowledge of environmentalism aspects.

**3-**Environmentalism laboratories to measure and monitor environmental pollution may be established technical institutions.

**4-**To organize industrial training to teachers and technical staff, to conduct survey of industries and prepare directions on consultancy services to people.

**5-**Constant Monitoring and evaluating the effectiveness of environmentalism program is recommended.

**6-**To establish mechanism for reviewing and updating curriculum periodically and implement the same as well as solving overlaps and clashes in timetables the time

**7-**To visit industry to become familiar with the latest technology and techniques, developing instructional materials on new technology and techniques, coordinating development activities of curriculum in Environmentalism.

**8-**To consult experts in industries and professional areas for the purpose of curriculum design and development is recommended.

## REFERENCES

- Andonora, B. L. (2003). Openness and the environment in central and eastern india: Can trade and foreign investment stimulate better environmental management in enterprises? *The Journal of Environment and Development*.
- Bandyopadhyay, J. (2002). *Environmentalism in India: Between local and global responsibilities*. Everyman's Science. Research paper.
- Bauer, D. (2001). *The Development process for an institutional pollution prevention program*.
- Best, J. W., and Khan, J. V. (2002). *Research in education*. New Delhi: Prentice –Hall of India.
- Billings, W. D. (2004). *Plants and ecosystem*. London: MacMillan and Co.
- Blaikie, N. (2000). *Designing social research*. USA: Black Well Publishers Inc., pp.12-58, 128-277.
- Blunden J. and Reddish R. (2001). *Energy, resources and environment*. London: Hodder and Stoughton/Open University Press.
- Bradott, R. (2003). *The environment and sustainable development*, London: Zed books.
- Brady, D. (2006). *Values, the environment and technical education*. In M. Narayana Rao et al., (Etd). Proceedings of the National Seminar on Better World Environment through Engineering Education and Management. Chennai: TTTI
- Chandra, R. (2004). *Need for Environmental Education in Colledges*, paper presented at workshop on health, Diseable and Environment, New Delhi.

Halwagi, M. (1999), *Biogas technology, transfer and Diffusion*, Elsevier Applied Science Publishers London and New York.

Kulanthaivel, Gand Sivakumar, P. (2005). *Current trends in teaching ecological engineering*. Proceedings of National Conference on Ecological Engineering. MIT, Manipal.

Macdonald, G. J. (2003). *Environment: Evolution of a concept*. The Journal Of Environment and Development.

Muthiah, P.N. (2005). *Imperative environmental education*. Proceedings of the National Seminar on Better World . Environment through Engineering Education and Management.

Rao, A. (2006). Environmentalising Indian school education. *The Journal of Progressive Educational Herald*

Reidel, Carl. Education. (2003). *interdisciplinary Environmental approaches*, research paper, Costa Mesa: California, Education Media Press.

Schawartz, J. (2003). *The impact of state capacity on environment of environmental policies: The case of India*. *The Journal of Environment and development*.

Vincent, L. (2008). *Civic hygiene initiative Proceedings of the National Seminar on Better World Environment through Engineering Education and Management*.