

## **CURRICULA DEVELOPMENT FOR GRADUATE STUDENTS**

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### **Summary**

Following a short introduction, discussion begins in this chapter by pointing out how firmly and inextricably sustainable development is rooted in the integrity and sustainability of the natural environment and nature's life support systems.

Based on the production and consumption of goods and services, formulation of a unique operational definition of sustainable development is then proposed. Discussion then moves on to argue that science and technology, however clever, can only help the process of global sustainable development in a limited way, but they cannot deliver it; and that moral education is needed to achieve global environmental sustainability by changing people's attitude to nature and the environment, from one of gross exploitation as at present to that of genuine respect.

To this end a generic syllabus, which includes essential elements of moral and ethical education, is proposed for the environmental education of undergraduate students.

## 1. Introduction

### 1.1. The Target Audience: Who is a Graduate Student?

“Graduate” students (also known as “postgraduate” students in many countries including the UK) are generally defined as individuals who have already earned the Bachelor’s degree and are studying for a higher degree, such as a Masters degree (MA, MSc, MS, etc.) or a Doctor of Philosophy degree (PhD) at a university or an equivalent institution. The Masters degree is intermediate between a Bachelor’s degree and a Doctorate and falls into one of the three broad categories described below:

- a) *The postgraduate Masters degree:* Suitably qualified candidates, who have already earned the Bachelor’s degree, are allowed to enroll in such degree programs. They may participate in such a program immediately after the Bachelor’s degree, or a little later, after having worked for a few years to gain practical experience. There are also the in-service professionals who enrol in such programs, usually on a part-time basis (or full-time if their employers permit them to), with a view to improving their career prospects.

Traditionally these degree programs have been entirely course-based, entirely research-based, or a mixture of the two. However, nowadays they are in the main “taught” degree courses of 1-2 years of full-time study (although many universities also offer part-time courses of longer duration) involving lectures, written (and sometimes oral) examinations, and a project which each student is required to do and to write a dissertation on. In general, these degree programs are intensive and focus on a specialized area of knowledge. Students who successfully complete the requirements of such a course and satisfy the examiners are awarded the Masters degree in the disciplinary area of that course; for example, MSc (Master of Science) in the case of Science; MA (Master of Arts) for the Arts, etc.

- b) *The undergraduate Masters degree:* Many of the universities in the United Kingdom and elsewhere now offer four- or five-year undergraduate degree courses in science, engineering and technology, in the final year of which students are required to do a project demonstrating an acceptable level of originality and to write a dissertation on it. Candidates who successfully complete such a course are awarded the Masters degree in the discipline of their study; for example, the MTech (Master of Technology) degree to those successfully completing a four- or five-year undergraduate course in Technology. Similarly, MMath in mathematics, MSci in science, etc. Although these degrees reflect a higher level of academic achievement than the traditional Bachelor’s degree, in general they are considered to rank below the postgraduate Masters degrees.
- c) *The professional Masters degree:* While the postgraduate and undergraduate Masters degrees are academic degrees in the sense that they reflect academic achievement, these degrees reflect professional competence, knowledge and to some extent practical experience (of managing a business enterprise for example) too. Typical examples are: MBA (Master of Business Administration), LL.M (Master of Laws), Med (Masters of Education), MEng (Master of Engineering), and so on.

Normally the department, school, or institution awarding such a degree is accredited by its professional body or organization. For example, in the UK a university department or faculty awarding MEng in civil engineering is accredited to do so by the Institution of Civil Engineers (ICE) responsible for maintaining the professional quality standards of its member institutions.

- d) *Higher degrees:* Having successfully completed the Masters degree, a suitably qualified individual may choose to undertake a Doctor of Philosophy (PhD) program at a university or an equivalent institution. It is the highest degree a graduate school can award. The duration of a PhD program varies widely from country to country, from three years in North American and English universities to five years or more in some of the European universities. Normally based on research and assessed on a thesis and its oral defense, such a degree is awarded to an individual who demonstrates his/her original contribution to knowledge. While PhD is the generic doctorate degree in science and engineering, the titles of such degrees differ in other disciplines. Typical examples are, DMus or MusD in music, DEd or EdD in Education, LLD in Laws, etc.

Degrees such as DSc (Doctor of Science) and DLitt (Doctor of Literature) are higher than PhD or equivalent degrees. Recipients of such degrees earn them by making significant contribution to knowledge through original publications as judged by acknowledged experts in the field. Such degrees, as well as *Doctor honoris causa*, are also awarded as honorary degrees by universities to honor eminent individuals.

Masters students, and those engaged in PhD and equivalent programs, constitute the target audience of our discussion.

## **1.2. Why it is Important for Graduate Students to know about Environmental Protection and Sustainable Development?**

The main reason why graduate students should have a fairly deep knowledge and understanding of the central issues of environmental protection and sustainable development is this: Arguably they represent the intellectual “cream” of any society, and in due course they become politicians, decision-makers, research scientists, leaders of business and industry, and so on. In these capacities they would be expected to discharge their professional responsibility in ways that protect the environment, promote sustainable development and improve people’s quality of life, without irreversibly degrading the natural environment and/or profligately depleting earth’s limited natural resources and thereby compromising the ability of future generations to meet their own needs. Clearly, in order to be able to do so, they must have a good grounding in environmental protection and sustainable development. Unfortunately, at present education in such topics appears to be almost entirely absent in non-environmental graduate programs, as an examination of the web pages of a randomly selected sample of such programs would confirm.

Of particular concern is the absence of such topics in graduate programs in Law, Economics and Business Management, because in most countries these are the backgrounds of by far the majority of politicians and decision-makers. Typically, topics

in environmental protection or sustainable development appear to be absent in MBA programs. For example, students in the 21-month MBA program at the London Business School of the University of London, which is ranked in the top ten business schools in the world by the *Financial Times*, are required to take 16 core courses, followed by 12 elective courses to be chosen from around 70 on offer. Yet, not a single one of these courses appears to be remotely concerned with environmental protection or sustainable development. Another example is provided by the MBA program of the prestigious Vlerick Leuven Gent Management School in Belgium. Once again no subject on offer is remotely concerned with these topics. This state of affairs is a little strange, considering that increasingly MBA graduates are responsible for managing and leading business and industrial concerns, and that these concerns have been generating increasing amounts of air, water and soil pollution as well as industrial solid waste, and are also responsible for generating ever-increasing quantities of post-consumption waste. Of course, one could argue that a major business or production facility will have its own Environmental Manager whose job is to ensure that the organization complies with relevant environmental regulations in force. But then, major corporate policy is made by the Executive Directors of an enterprise, not by its Environmental Manager, and policy is always concerned with improving the enterprise's "bottom line" and seldom with achieving or promoting sustainable development. It is hard to see how they could make corporate policy conducive to environmental sustainability or sustainable development without at least having a working knowledge of these issues. Not surprisingly, experience shows that although there are exceptions, corporate policy generally tends to comply as minimally with environmental standards and regulations in force as they can get away with. Indeed, the total neglect of these subjects in MBA programs, as it appears to be the case, is indicative of the very low priority (or perhaps disdain) which the business and industrial communities appear to attach to environmental protection and sustainable development.

This deficiency is to be found in graduate programs in Law and Economics, too, but not in Environmental Law or Environmental Economics programs which appear to address the issues of environmental protection and sustainable development adequately.

In what follows we will discuss how and why the issues of environmental protection and sustainable development ought to be incorporated into graduate programs, and draw attention to the following germane issues which all graduate students should be aware of:

- a) Lack of progress towards Agenda 21 objectives
- b) Confusion between sustainable development and environmental sustainability
- c) Proposal for a unique operational definition of sustainable development
- d) Can we rely on science and technology alone to deliver environmental sustainability?

## **2. Lack of Progress towards Agenda 21 Objectives**

A disturbing question, which pervaded deliberations at the World Summit on Sustainable Development (WSSD) held in Johannesburg during 26 August and 4 September 2002, was this: why, in spite of all the money and effort expended during the ten-year period from Rio (1992) to Johannesburg (2002), the world of 2002 was

environmentally less sustainable than in 1992? What went wrong? The response to this question was, and is, predictable. While the poor developing countries argued that their efforts to meet Agenda 21 objectives had been seriously thwarted by lack of financial and skilled manpower resources, in general the rich developed countries appeared to be reasonably content with the progress they had made notwithstanding the refusal of the USA to ratify the Kyoto Protocol.

However, this “progress” warrants close scrutiny. We argue that it is suspect and misleading too. Because, whatever progress the developed countries have made so far towards meeting the Agenda 21 objectives has largely been achieved with systematic relocation of their “dirty” manufacturing facilities in poor developing countries that have little or no bargaining power, where labor is cheap and abundant, and the regime for enforcing environmental standards and regulations is lax or can be manipulated with inducements. Largely as a result of relocation today the manufacturing sector of the US or the UK economy, for example, accounts for only about 20 percent of their respective GDPs and shrinking. If this trend continues — and it is more likely than not to, given the gathering pace of globalization — in about 20 years from now these macroeconomies are likely to be based almost entirely on the service sector. However, relocation of manufacturing facilities in this way cannot address the growing problem of global anthropogenic pollution — it merely changes the jurisdiction of the pollution, from the “rich” world to the “poor” world. And, as regional or national environmental pollution often becomes, or contributes to, global pollution affecting all, this state of affairs does not augur well for the long-term integrity of the global environment or for nature’s life support systems without which life on earth would cease.

In pluralistic democratic societies pressure for social, economic or environmental change usually comes from the people themselves in the “bottom-up” fashion. It follows, therefore, that in order for the democratic process to deliver an acceptable level of global environmental sustainability, the citizenry must be empowered with essential knowledge and information, for it is only then that they would be equipped to exert pressure on their elected representatives to develop and implement policies for securing environmental sustainability.

In addition, the environmental community must discharge its collective professional responsibility in ways that are consistent with the core requirements of sustainable development and global environmental sustainability. Thus, in its widest sense dissemination of environmental education has two essential components: (i) dissemination to the public at large, alerting them to the need to achieve global sustainable development and the likely consequences of failing to do so; and (ii) integration of know-how and skills, as well as the moral imperatives, for achieving global sustainable development into formal curricula at all levels of education, especially at the graduate level for the reason given in Section 1.2.

As we will demonstrate in Section 3 of *Need for Environmental Research*, relentlessly increasing production and consumption of goods and services to satisfy the demands of profligacy and increasingly hedonistic lifestyles of the affluent is the root cause of the mounting environmental predicament confronting us. Therefore, the focus of (i) and (ii) above must be to seek ways of reducing consumption, especially by the affluent.

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### **Biographical Sketch**

**Professor Bhaskar Nath** received his Bachelor's degree in Civil Engineering from the Indian Institute of Technology, Kharagpur, India, in 1960, followed by the Ph.D. degree from the University of Wales, UK, in 1964. In 1983 he was awarded the D.Sc. degree by the University of London for his outstanding original research (according to citation) in numerical mathematics. In 2001 he was awarded the *Doctor Honoris Causa* (Dr.H.C.) by the University of Chemical Technology and Metallurgy, Sofia, Bulgaria, for his contribution to environmental education.

After having taught at the University of London for more than 27 years, currently Professor Nath is Director of the European Centre for Pollution Research, London; Executive Director of International Centre for Technical Research, London; Editor of *Environment, Development and Sustainability* published by Springer; visiting professor to several European universities, and consultant to a number of international companies and organizations. Professor Nath's research interests include Numerical Mathematics, Elasto-Hydrodynamics, Philosophy, Environmental Economics, Sustainable Development, and Environmental Education. He has more than 100 scientific publications in these and related areas including 13 books.