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## EDUCATION AND SUSTAINABLE TRANSPORTATION

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**Abstract:** *The importance of creating sustainable transportation systems is widely acknowledged. Governments everywhere are working to minimize pollution and congestion and to enhance security and mobility choices for all. Such policies, while essential, must be complemented with an appropriate educational strategy because a sustainable transportation system requires the dissemination of a wide range of new skills, knowledge, and values to many groups including policy makers, practicing professionals, and graduate students, as well as the general public. This is a challenging task but work by scholars concerned with intermodalism and environmental education can be helpful in developing and implementing an appropriate educational strategy.*

**Key words:** *sustainable transport, knowledge, educational strategy.*

### Introduction

In today's era of globalization, transportation systems play a critical role in determining a country's economic and social wellbeing. Accordingly large investments have been and continue to be made throughout the world in railroads, highways, ports, and airports but these efforts have produced systems that yield numerous negative social, economic and environmental externalities in the form of pollution, health, equity, safety, congestion and efficiency. Accordingly, transportation professionals everywhere have begun to focus on the need to develop transportation systems that facilitate rather than hinder the achievement of sustainable development.

There is a growing international awareness of the need to move in this direction. Many regional and international meetings have been sponsored by international agencies including the UN Commission on Sustainable Development (CSD) and the Abu Dhabi Conference on Sustainable Transportation in Developing Countries (2005). In addition, various national organizations in England, Canada, the U.S., China and elsewhere

have issued reports dealing with various aspects of this topic, including education. NGOs and academics have also been active and a number of universities have, in the past decade, entered into various international agreements regarding their role in sustainable development. The Global Higher Education for Sustainability Partnership (GHESP), which was founded in 2000, brings together the International Association of Universities, University Leaders for a Sustainable Future, COPERNICUS (the cooperative European program), and UNESCO in order to "create a global learning environment for higher education for sustainable development" The importance of education was reaffirmed at the 2002 World Summit on Sustainable Development and the UN's General Assembly subsequently agreed to sponsor a Decade of Education for Sustainable Development which began on January 1, 2005. These activities have been accompanied by a large outpouring of scholarly literature on all aspects of this topic.<sup>1</sup>

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<sup>1</sup> For a detailed discussion of these activities, see my "Sustainable Transportation: The Educational Dimension", [Sustainable Transportation in Developing Countries](#), (Abu Dhabi, UAE, 2006)

## Education and Sustainable Transportation

Somewhat surprisingly, the important developments that have taken place in sustainability education among engineers and other professional groups have had little impact upon transportation. Engineering organizations in many countries, for example, have issued reports emphasizing the need to ensure that their members are aware of the role of the importance of sustainability as a guiding concept for their work and that engineering education provide students with the tools and methodologies to operate successfully in this new context. Yet such efforts do not seem to have penetrated the transportation community to any great extent. A Canadian study, for example, found that “Environmental and transportation education exist as two solitudes”<sup>2</sup>

This pattern exists almost everywhere even though the shortcomings of existing transportation educational programs have been widely discussed. There has been growing concern with the fact that few –if any – countries have yet developed the kind of education and training system that can prepare transport professionals to function in the new, rapidly changing environment. In the U.S., for example, numerous conferences and meetings have been held over the past ten years because of the concern that professionals were not acquiring the skills and knowledge to deal with the complex integrated systems that are emerging or with the new technologies such as Intelligent Transportation Systems, or with the growing public concern with the social and environmental impacts of transportation. All these reports agreed that future transportation professionals would need a range of skills that were not being provided by existing educational programs. Most programs are still modal in orientation and focus primarily on technical issues. Few programs, even in the advanced countries, provide the kind of total systems perspective that is required or such tools as environmental analysis and managerial, technological, and interpersonal skills. The situation was well summarized by the

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<sup>2</sup> Bates, Michael and Anthony Perl. "The Green Mile: Approaches and Attitudes Toward Environmental Sustainability Among Canadian Transport Faculty," in Waters, William G., ed. Canadian Transportation Research Forum: Proceedings of the 36th Annual Conference - 2001.

TRB’s “First Annual Forum on Transportation Education and Training: Responding to the Changing Needs of the Profession” which concluded that students were still being taught the “Old Transportation”<sup>3</sup>.

## The APEC Project

Recognizing the need for a new approach to transportation education and the importance of providing transportation professional with new skills, The Intermodal Task Force of the Transportation Working Group of the Asia Pacific Economic Organization (APEC) sponsored a study to identify the kinds of knowledge that transportation professionals need to function effectively in the global economy. The result was a comprehensive multi phased analysis that included an extensive survey of the existing literature, stakeholder consultations in Australia, Malaysia, and Japan, expert focus groups in the U.S. and Singapore, a survey of existing transportation education programs across the globe, and in depth interviews with transportation educators and practitioners from a wide range of countries.<sup>4</sup>

Although the study focused on the intermodal dimension of sustainability, its findings are highly relevant for it recognized that economic efficiency (the goal of intermodalism) can not be considered in isolation from social and environmental dimensions. Accordingly, it defined intermodalism in a manner that is consonant with sustainability so that the specific skills and knowledge areas that it identified are fundamental to the creation, operation and maintenance of a sustainable transportation system. These fell into four categories:

1. **Foundational Knowledge** -- Available Transport Technology; Global Business Environment; Government Regulations & Policies

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<sup>3</sup> *Proceedings of the First Annual Forum on Transportation Education and Training: Responding to the Changing Needs of the Profession*, TRB Circular #495 (2000).

<sup>4</sup> “Identification of Needed Intermodal Skills and Development of Required Training Programs”, APEC-TPTWG:

2. **Interpersonal Skills** -- Labor Relations; Various Transport Modes and How Modes Interface; Identification & Understanding of Legal Issues; General Managerial Skills; Customer Service Skills; Communications Skills; Bargaining and Negotiation Skills; Leadership Skills
3. **Analytical Skills** -- Environmental Impact Analysis; Economic & Financial Analysis; Policy Analysis; Strategic Planning; Forecasting Skills; Futures Analysis; Systems Analysis; Ethical Analysis
4. **Technical Skills** – Computer Applications; Technology Management; Modeling Skills Logistics & Supply Chain Processes; Data Gathering, Analysis & Manipulation; Marketing Skills

It found that, though all these were available on many university campuses in North America, Oceania, and Asian developed economies (such as Japan and Hong Kong), few if any transportation education programs anywhere incorporated all of these dimensions. Interpersonal skills were particularly lacking even though any attempt to create an integrated transportation system obviously requires close and continuing cooperation among actors in many modes. Emerging economies, as might be anticipated, were characterized by an even greater failure to meeting future needs.

In order to test the degree to which such skills enhanced the capabilities of current transportation professionals and could be provided through in-service training, APEC's Intermodal Task Force commissioned the development of a week long training course. This course has been successfully delivered in Indonesia and the Philippines along with an intensive seminar for high officials in the Indonesian Ministry of Communications. The goal was not simply to conduct a short course but rather to help create an indigenous capability. By working with local experts, it was anticipated that they could teach the course themselves in the future and use it as a basis for further development of transportation education and training.

## **Towards Sustainable Transportation Education**

These activities demonstrated that such skills could be delivered, at least in a preliminary way, to working professionals. They also demonstrated the complexity of building an indigenous capacity because many different actors, institutions, and sectors are involved. Developing and implementing a sustainable system requires persons with appropriate skills to plan, design, manage, and operate such systems. Accordingly many different professions, occupations and levels, each with their own particular needs require attention.

The target populations can be divided roughly into two separate groups – professional staff and operating staff, each with its own hierarchy. Furthermore, each of these subdivides into those who are preparing for transportation careers and those presently working in transportation organizations. The former should acquire the necessary skills and knowledge while pursuing their studies in universities and technical schools. The latter can acquire the new skills through special in-service training programs along the lines of the APEC course described above. For high level executives and policy makers, short courses and intensive seminars are appropriate. However, developing and implementing such programs remains a challenge since most staff time is inevitably devoted to dealing with short term problems and operations of particular modes.

Furthermore, it is also necessary to generate public awareness and understanding of the problem and the need for change for it is not feasible to expect that significant steps towards achieving a sustainable transportation system can be taken unless the public is educated to its promise and potential and accepts the importance of engaging in the kinds of behaviors that are required to ensure the efficient and effective functioning of such a system. The importance of this topic has been recognized by the GTZ which has published a module on how to organize and carry out a campaign to raise public awareness for sustainable urban transportation.<sup>5</sup>

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<sup>5</sup> Available for downloading from [www.gtz.de](http://www.gtz.de)

**Accordingly, educational programs have to:**

Generate information about all the costs associated with traditional approaches to transportation, the direct and indirect causes, and possible remedies, including technology

- Assist in creating a new culture in many organizations that goes beyond traditional modal patterns and promotes sustainability goals

Provide appropriate information to top level executives and administrators about the significance of sustainable transportation and the kinds of policies that are required

- Provide in service training to a wide range of transportation professionals in both the private and the public sector that adds new sustainability skills to their existing expertise through the use of innovative approaches such as modules, short courses, and on line education
- Analyze the adequacy of existing decision making structures and approaches at relevant governmental agencies and levels with a commitment to promoting sustainability
- Provide the public with the information necessary to understand the importance of sustainability and to engage in supportive behaviors
- Provide future transportation professionals with the skills needed to plan, design, manage, and operate sustainable systems. New teaching methods and instructional materials need to be developed

Any effort to create such programs requires political and other key decision makers who understand the issues and are willing to enact the policies and commit the necessary resources. They are the ones who shape societal values and cultures and who must provide the leadership that is required if a sustainable transportation paradigm is to be translated into practice. Accordingly, strong and committed leadership becomes a priority. Unfortunately, in many countries, few political or transportation policy

makers are knowledgeable about sustainable transportation so it is necessary to identify and implement strategies to ensure that they share the new vision..

Even with committed leadership, developing an appropriate educational system must overcome difficult obstacles because it requires creating a new culture in many existing university level transportation programs, especially engineering faculties. It is widely accepted that engineers are especially important actors who can play a leadership role in promoting sustainable development but that significant issues remain to be dealt with including “a paradigm change for sustainability in the education of all engineers....”<sup>6</sup>

Fortunately, efforts at introducing new skills and concepts into the education of transportation engineers and other professionals can be informed by what is already known. As noted earlier, considerable knowledge and experience has been accumulated in the fields of environmental and sustainability education that can be of great value to transportation educators in engineering and other areas.

### **Conclusion**

Education and training are of fundamental importance in any effort to create a sustainable transportation system. Present and future professionals (engineers, planners, operators, administrators) require the kind of knowledge and skills necessary for the application of sustainability principles, leaders and decision makers must understand the issues and kinds of policies that are required, and the public must be supportive of any effort to shift to more sustainable modes. Thus any country wishing to move towards a sustainable transportation system much create a supportive educational and training system.

This is a challenging task because it involves all educational levels, particularly universities and training institutes as well as public education generally. Furthermore, an interdisciplinary social science approach that emphasizes problem-solving must be introduced into traditionally

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<sup>6</sup> R. Donnelly and C. Boyle, “The Catch-22 of Engineering Sustainable Development”, Journal of Environmental Engineering, February 2006.

oriented faculties. This is no easy matter. However, any country seeking to make its transportation system more sustainable, a task that is becoming ever more essential given the

high costs that transportation systems impose upon their societies, must strive to overcome such obstacles.

## ОБРАЗОВАНИЕ И УСТОЙЧИВ ТРАНСПОРТ

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**Резюме:** *Значимостта от създаването на устойчиви транспортни системи е общопризната. Навсякъде правителствата работят за минимизиране на замърсяването на въздуха и задръстванията и за повишаване на сигурността и възможностите за мобилност на всички. Такива политики в своята същност следва да бъдат допълнени с подходяща образователна стратегия, защото една устойчива транспортна система изисква разпространението на широк обхват от умения, знания и ценности на много групи, включително на управляващите, професионалистите в практиката и студентите, както и обществеността като цяло. Това е задача, която е предизвикателство, но работата на учените, свързана с образованието за интермодален транспорт и екологията може да съдейства при развитието на съответна образователна стратегия.*

**Ключови думи:** *устойчив транспорт, знания, образователна стратегия.*