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An overview of university level sustainable transportation curricula in North America and Europe

Yen-Chun J Wu [a], Chung-Cheng J Lu [b], Taih-Cherng Lirn [c,*], Chih-Hung Yuan [a]

[a] Department of Business Administration, National Sun Yat-Sen University, 70 Lienhai Rd., Kaohsiung 80424, Taiwan
[b] Graduate Institue of Information and Logistics Management, 1, Sec. 3, Chung-Hsiao E. Rd., Taipei 106, National Taipei University of Technology, Taiwan
[c] Department of Shipping and Transportation Management, National Taiwan Ocean University, 2 Pei-Ning Road, Keelung 20224, Taiwan

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ABSTRACT

This paper analyzes the public content on the websites of targeted universities in North America and English speaking-Europe to examine their commitment to education in sustainable transportation. Analyzing about 5000 shows that most of them were worth three credits, more sustainable transportation courses were offered to graduate students than to undergraduates, lecturing was the most common teaching method, and, on average, North American universities offered more sustainable transport courses than did their European counterparts. Finally, the environmental issue was emphasized and discussed far more than the economic and social issues in the sustainable transport context.

1. Introduction

The purpose of this study is to analyze the public content on the websites of targeted universities in North America and English speaking-Europ to determine their commitment to educating the world about sustainable transportation.[1] There are many ways in which education can influence the sustainability debate, ranging from developing enhanced understanding of the nature of the challenges involved, through teaching of relevant technologies, and policies, to the efficiency of different actions to encouraging individuals to incorporate sustainability considerations into their everyday, micro decisions. The subject is diverse and multidisciplinary, and thus its incorporation into courses can take many forms. Education regarding sustainability can, however, help address environmental questions and help form a vision to shape the future (Rauch, 2002). Here we are concerned about the extent to which education on these topics, and in what ways, are included in the curricula of universities, focusing mainly in US institutions.

2. Methodology

Our primary objective is to provide a picture of the current state of transportation education for sustainability, based on an exploratory empirical content analysis of the world's major transportation-related departments and programs. To this end we

* Corresponding author. Tel.: +886 963017156; fax: +886 224631903.
E-mail addresses: tedlirn@hotmail.com, tedlirn@mail.ntou.edu.tw (T.-C. Lirn).

[1] Strictly the term "sustainable transportation" has little academic meaning following the World Commission on Environment and Development Commission's (Brundtland) Report that initially defined the parameters of sustainable development and that highlights as its main theme the interconnectivity of all forms of activity. Here we use the term "sustainable transportation" in the more popular, journalist sense of reducing the environmental impacts of transportation.

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Table 1
Sustainable transport-related terms.

Access (Accessibility)	Health and safety
Affordability	Land use
Air pollution (Air quality)	Natural resources
Bike (Biking, Bicycling)	Noise pollution
Biodiversity	Pollutant
Car-sharing (Car-pooling)	Public transportation (Public transport)
Community development	Renewable resources
Climate change	Sustainable mobility
Ecology	Telecommunication
Economic development	Traffic congestion
Economic efficiency	Traffic efficiency
Ecosystem	Transport infrastructure (Facility)
Employment	Transport (Transportation) planning
Emission	Urban planning (Development)
Equity/Fairness	Urban sprawl
Fuel efficiency (Energy efficiency)	Walking
GHG (Greenhouse gas)	Waste management
Global warming	Water resources
Green (Greening)	Water pollution

- Identify the major transportation-related programs and their universities that offer sustainability-related curricula at different degree levels among geographic regions.
- Collect and analyze the sustainability-related transportation courses offered by the programs and universities identified.

Initially, to determine which programs and universities to include we generated a list by mining the compendium of papers from the US Transportation Research Board's (TRB) 2012 annual meeting. Over the past 90 years, TRB has been at the center of US initiatives to share and exchanging researchers' and practitioners' information on transportation-related subjects. More than 7000 experts from various sectors contribute their expertise to expanding our understanding in the field of transportation. While the vast majority of attendees are from the federal and state departments of transportation or are consultants, there are also large numbers of academics at the meeting. It is somewhat biased towards the engineering side of transportation with the Transportation Research Forum being the main organization covering economics and logistics. The TRB, while having foreign contributors, is also very much a US oriented organization, with bodies such as the European Transport Conference, covering their particular areas in other parts of the world. The 2012 TRB annual meeting paper compendium consists of 2518 papers.

To narrow the list of target schools, all papers were checked and more than 4789 authors and organizations identified; deleting duplicate organizations left 947, of which 717 were North American or European. University departments or research units without websites were eliminated. Further, we deleted all organizations that were not clearly affiliated with a university, as were non-English speaking units. This left about 580 university organizations. Finally, to avoid any individual university having more than the expected number of departments or research organizations included in our research, we chose the department or research unit with the most abundant information to represent each university. This allowed us to avoid emphasizing the performance of any single university, leaving 280 schools.

To assess "sustainable transportation", we adopted some of the 39 practical terms developed in Wu et al. (2010), and combine them with vocabulary from seemingly sustainable transport-related documents on the United Nations' website and various academic and governmental reports and papers. This gives 38 terms seen in Table 1. We also make allowance for recent trend in sustainable development thinking and suggest that the society, environment, and economy, are not separate but interrelated.[2]

The curricula of the units were downloaded from the university websites; a university with more than one related units has all units downloaded. Of the 280 universities, 126 had curriculum information on their websites, and seven had more than one related academic unit.[3] After choosing one academic unit to represent each university, the result of the coding showed 4084 courses offered at 119 North American and European universities. After deleting courses unrelated to sustainable transport according to our 38 terms, and choosing one academic unit to represent each of the seven universities with more than one related unit, a list of 925 courses from 119 universities was formed (Table 2).[4]

[2] For instance, the program Teaching and Learning for a Sustainable Future, established by the Education, Science and Cultural Organization of United Nations (2013), highlights the importance of education and stresses that sustainability is a paradigm for thinking about the future in which environmental, societal and economic considerations are balanced in the pursuit of an improved quality of life.

[3] In these cases a representative unit for each university was chosen as the one which showed the greatest amount of sustainable transport-related information.

[4] Two groups of graduate students were assigned to carry out the coding. They were encouraged to contact and confer with each other whenever they encountered an uncertain situation. Once the coding process had been completed, the coders were requested to exchange their results and to perform a pair inter-rater reliability check. The inter-rater reliability in terms of agreement percent for the two teams was 95.8%, and the alpha coefficient was 0.978.