Sustainable Campus Project: Potential for Energy Conservation and Carbon Reduction Education in Taiwan

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ABSTRACT
The reality of global warming, climate change and energy shortages has put all circles to the task of actively promoting education in energy conservation and carbon reduction. From 2004, the Ministry of Education has been promoting the Sustainable Campus Project, partially subsidizing hundreds of schools to implement hardware improvements and carry out related environmental education. This study explores whether the teachers and administrators of these schools are aware of Sustainable Campus Project facilities in their schools, whether they used the items, and whether they understand how these facilities work to conserve energy and reduce carbon emissions. The authors' study concludes with suggestions on how to use existing Sustainable Campus Project facilities to carry out energy conservation and carbon reduction education effectively.

Keywords: Carbon Reduction, Education, Energy Conservation, Facility, Sustainable Campus Project

INTRODUCTION
The multifaceted effects global warming and climate change have caught the attention of all nations and have prompted international meetings to discuss conventions and set timelines to reduce carbon emissions. Starting as early as 1980, many countries have been establishing government departments, organizations, policies and plans on energy conservation and carbon reduction to promote energy education and build literacy in “energy conservation and carbon reduction” (Wang & Huang, 2011).

Taiwan is also actively promoting comprehensive plans for energy conservation and carbon reduction.

The Ministry of Education has been steering the Sustainable Campus Project for several years. Hardware improvements have been implemented in various themes including resource recycling and reuse, rainwater harvesting and use, natural purification and cycling of water, renewable energy (wind, solar, etc.), energy conservation measures, and water conservation technology. These themes directly or indirectly benefit energy conservation and carbon reduction goals. The purpose of this study is to explore school staff and teachers’
cognition and use of these facilities to serve as a foundation for further research into how such facilities can assist education in energy conservation and carbon reduction.

LITERATURE REVIEW

Global warming and climate change have multiple impacts on the landscape, ecology, water resources, coastal areas, human health and economy. Climate change is typified by unpredictable fluctuations due to a myriad of complex factors, making it crucial for us not only to understand the causes of global warming and climate change, but even more importantly to educate people about how to adapt to climate change and take action to conserve energy and reduce carbon emissions.

What is Taiwan's role in global warming? Taiwan produces almost none of its own energy, and over half of all energy consumption is in the form of electricity (Yeh, 2010). Taiwan’s energy structure is thus responsible for relatively large amounts of greenhouse gas emissions.

Average per capita CO$_2$ emissions has increased from 1990 to 2007. According to IEA/OECD statistics published in September 2010, Taiwan’s energy related CO$_2$ emissions reached 264.29 million tonnes in 2008, accounting for 0.9% of global emissions and ranking Taiwan 22nd in the world. On a per capita basis, Taiwan’s CO$_2$ emissions are higher than Japan, Korea and the OECD average of 11.53 tonnes, just between Oman and Russia (Environmental Protection Administration Executive Yuan, R.O.C., 2011). Taiwan is a high-carbon society and is responsible for taking countermeasures.

Energy conservation and carbon reduction are new concepts in policy administration and are highlighted in the national Energy Conservation and Carbon Reduction Plan, which integrates different agencies and sets national conservation and reduction targets. Comprehensive planning is needed to promote low-carbon economic development and make the transformation to a society that conserves energy and reduces its carbon footprint (Executive Yuan, 2011). Policies have been set for each agency according to their role, function and area of specialization.

The Ministry of Education’s focal goal in the Energy Conservation and Carbon Reduction Plan is to establish a network of Sustainable Campuses as well as an evaluation system for education in energy conservation and carbon reduction. Since 1999 the Ministry of Education has promoted the Green School Partnership Project (Wang, 2009) and the Sustainable Campus Project. The Sustainable Campus Project has focused on green buildings and ecological improvements using environmental technology, so as to create campus environments that are sustainable, ecological, environmental, health, energy efficient, and resource efficient (Jiang, 2009). The idea is to create examples of campus sustainability that can serve as models for promoting related policy. The Bureau of Energy and the Water Resources Agency have also developed related plans to assist with the purchase of renewable energy technology, energy-saving lamps or water-saving technology (Ministry of Education, R.O.C., 2011). As a great investment has been made toward hardware, it is hoped that these energy and resource conservation facilities serve to provide both education and practical models that help people understand and experience how important and feasible it is to conserve energy. It is worth asking by what mechanisms these plans intend to achieve energy conservation and carbon reduction.

School electricity fees are often very high and have become a heavy burden for some schools (Huang, 2009). How to reduce electricity use is a pressing issue for many schools in Taiwan. Some school teachers and staff are addressing electricity usage on campus, which is mainly in the form of electric equipment, lighting, and air conditioning. Building design to suit the climate and environment, increased air circulation, and shading can be employed to maintain a comfortable environment without increasing energy consumption. According to the Sustainable Campus Project guidelines (Jiang, 2009), the theme of energy flow in-
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