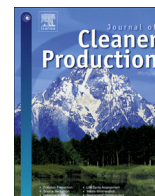




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Energy saving on campus: a comparison of students' attitudes and reported behaviours in the UK and Portugal

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ABSTRACT

Energy saving on campus is an increasingly important part of universities' responses to climate change, but can only be fully realised through a partnership between institutions and students. This study explores similarities and differences between students' energy-related attitudes and reported behaviours, as well as their perceptions of their institution's energy saving efforts using data from two universities in the United Kingdom (UK) and one in Portugal. The results indicate that there are differences between the students' responses at the selected universities which appear to reflect the national context and diverse institutional priorities. Key differences include the variation between students' perceptions of individual agency and their university's environmental practices (stronger in the UK) and students' sense of collective agency and trust in the government and business (stronger in Portugal). The study is the first to attempt a comparison between students from institutions in different countries in relation to energy saving. It provides a foundation to extend the comparison to other institutions and other countries, and to expand the research to encompass actual energy use, in relation to perceived energy use.

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1. Introduction

Energy efficiency has an increasingly important role to play in responses to climate change at both an individual and organisational level (IPCC, 2014). Personal consumption patterns (consumer behaviour, household energy use, dietary changes etc.) are identified as crucial elements in the move towards lower carbon emissions, thus efforts to promote energy-saving behaviour change form an important part of the policy agenda (Brounen et al., 2012; Geller et al., 2006). Unfortunately, even when people are motivated to change their behaviour with regard to energy saving, many lack sufficient understanding to make appropriate decisions (Gardner and Stern, 2008; Lorenzoni et al., 2007), or fail to change their habitual responses to similar situations even in the light of altered intentions (Kastner and Matthies, 2014).

Most energy saving activities are of the low-effort, low impact variety, and even more numerate individuals are only slightly more likely to gauge accurately the amount of energy saved by different actions (Attari et al., 2010). This suggests that enhancing energy literacy throughout all levels of education has an important role to

play in encouraging energy saving behaviour (Liu et al., 2015). As DeWaters and Powers (2013) argue: "a successful shift into a stable future will rely not only on qualified technical, scientific, and professional expertise, but also on the ability of the average citizen to make appropriate energy related choices that range from mode of transportation to consumer purchases and voting habits." (p. 38).

The role of education in ensuring a more sustainable future is not in doubt: the recent United Nations 'Decade of Education for Sustainable Development' (DESD) (UN 2005–2014) has provided a focus for the development of a range of educational initiatives with the overarching goal of integrating the values of sustainable development into all aspects of learning and, ultimately, encouraging behaviour change (UNESCO, 2005). Universities have a key role to play, as has been highlighted consistently in policy documents. However, despite a global movement that has repeatedly emphasised the role of universities through research, campus greening and education for sustainability (Sterling et al., 2013; Wals, 2014), there is less evidence of the impact of such endeavours on students' practical actions such as personal energy saving behaviours.

This may seem surprising as across Higher Education (HE), 'campus greening' initiatives (particularly energy-saving measures by university estates teams) have progressed rapidly (Leal Filho, 2000). Embedding education for sustainability (EfS) within the curriculum has been slower and more problematic and yet there is

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strong potential for universities to influence students' energy saving behaviour. In theory, sustainability across the campus and the curriculum are inter-related (students learn not just from the formal curriculum, but also from the informal and hidden curricula, through social experiences and the campus environment). In practice, however, sustainability work related to energy saving on campus is rarely integrated with teaching and learning, and the wider student experience (Winter and Cotton, 2012). Energy saving will continue to be as critical for universities as for businesses and households across the European Union, particularly in the UK where sector level carbon reduction targets exist for HE. Thus, the aim of this study is to begin to explore the perspectives of students in relation to energy saving and to understand whether responses vary depending on institutional and national contexts.

The objective of this research was to compare students' perceptions of their campus environmental practices, and to explore their attitudes and reported behaviours regarding energy saving, using data collected from three institutions: one from Portugal (PT) and two from the United Kingdom (UK). Piloting of the survey instrument in the UK has revealed a number of interesting insights into student energy literacy (Cotton et al., 2015a) which can be summarised as follows:

- Reported knowledge of energy was correlated with actual knowledge on a series of factual questions, and this differed by gender;
- The students surveyed had broadly positive environmental attitudes (measured using the NEP scale) and were concerned about energy issues;
- Respondents were very unclear about which activities were most effective in terms of energy saving, limiting the efficacy of their indicated behavioural choices;
- Nearly 50% of respondents cited formal education as their major source of information about energy saving.

In order to explore whether these findings were specific to the pilot study students, the survey is also being conducted in other institutions in the UK and internationally. The rationale for including an international dimension was to investigate any variation in responses in a different cultural and policy context.

In Portugal, discussion around the role of universities in relation to sustainable development has been almost non-existent, and the few events organised have been limited to an environmental perspective (Shiel and Paço, 2012). In contrast, within the UK, universities across the sector have engaged in 'campus greening', sought to develop education for sustainability, and initiated a range of projects to enhance awareness of and action for sustainable development. The increase in engagement in the UK has in part been driven by the Higher Education Funding Council for England policies (HEFCE, 2005, 2009), sector targets for carbon reduction (HEFCE, 2010), and also by the People and Planet Green League, launched in 2007. The latter, with high profile rankings published in the *Times Higher Education* initially and later the newspaper *The Guardian*, has been a critical driver in raising the profile of sustainable development with senior staff (Shiel and Williams, 2015). However, in both contexts there is currently little research literature concerning the extent to which campus greening and Efs impact on students' behaviours in relation to energy consumption.

2. Literature review

2.1. Greening the campus and curriculum

Energy saving issues are assuming increasing relevance internationally: Aside from having a direct impact on monthly costs for

individuals and organisations, energy saving is considered to be the fastest, most effective and profitable way of reducing carbon dioxide emissions and thus mitigating the impacts of climate change. In this context, public institutions are being asked (and increasingly incentivised) to participate in energy conservation. For universities, the responsibility goes beyond direct energy saving in buildings and extends to the potential influence that Education for Sustainability (Efs) in formal and informal learning environments might have on students' attitudes and conservation behaviours. Whilst it is clear that there are substantial differences in universities' responses to the sustainability imperative there are, as yet, very few studies that compare attitudes towards the environment (and subsequent behaviours), of students from different European countries.

Approaches to campus greening in HE have varied over time. In the late 1990s, solid waste and energy management were seen as two of the most popular areas of environmental management (Creighton, 1999), with the suggestion that the effective management of both demonstrates for students the practical application of environmental conservation principles. Since then, campus greening has extended to embrace a broader range of concerns; however, energy saving continues to be a significant component. Many institutions now showcase innovative approaches to sustainability on campus through energy projects such as renewable energy installations, wind turbines, geothermal projects, biomass production, conservation retrofits (Thomashow, 2014). Universities around the world have sought to adapt and innovate in order to save energy; they have been less successful at integrating the sustainable management of their estates with the curriculum (Leal Filho et al., 2015).

There is an increasing interest in the relationship between campus sustainability and education (Jones et al., 2010), particularly as evidence grows which indicates that what happens outside the classroom either reinforces, or challenges, what students learn in the formal curriculum (Cotton et al., 2013). If universities conduct their estates management in an unsustainable manner, for instance through poor energy management in buildings, this may negate the effectiveness of efforts to teach about sustainability in general, and energy saving in particular. On the other hand, a university may be engaging with exceptional energy-saving measures on campus but efforts go unseen by students, or 'mixed messages' may undermine efficacy (Cotton et al., 2013). This tension between campus and curriculum has been used to advocate for a more holistic approach as part of a 'sustainable university' (Sterling et al., 2013), where 'integrative approaches' (Leal Filho et al., 2015) ensure that sustainability permeates all aspects of university business and synergies are created.

2.2. Knowledge, attitudes and behaviour – a thorny issue

The relationship between environmental knowledge, attitudes and behaviour is complex and there is considerable disagreement about whether they are related, and about the direction of any causal links (Hines et al., 1987). A number of advanced models have been developed to test the mediating and moderating influence of particular variables on the attitude–behaviour link, and to explore the specific conditions whereby an attitude may impact upon behaviour (e.g. Bamberg and Möser, 2007; Barr, 2007). However, results have been mixed: Cleveland et al. (2005) state that general environmental attitudes tend to be poor predictors of behaviour; in contrast, Balderjahn (1988) concluded that individuals who had a positive attitude towards the environment were more likely to purchase and consume green products. Laroche et al. (2001) lend further support for this argument suggesting that attitudes, as opposed to knowledge, are the most significant predictors of

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