Reducing carbon emissions in business through Responsible Management Education: Influence at the Micro-, Meso- and Macro-Levels

Abstract

There has long been an understanding that to achieve meaningful progress against sustainability challenges, action is required at multiple levels. With regards to education initiatives, these levels range from macro-level international agreements and activities such as the United Nations Sustainable Development Goals and the United Nations Principles of Responsible Management Education, meso-level influences such as the role of national bodies supporting sustainability in higher education, and micro-level influences such as the commitment of individual universities or departments. However, decision makers are individuals and the development and delivery of such initiatives requires action at the level of the individual. This paper explores the impact of working within and across these different levels and how jointly they help to work towards addressing carbon reductions in a partnership setting between a business school and various organisations. The paper explores the case of an educational initiative carried out in the United Kingdom where students conduct a carbon footprint of an organisation and recommend measures to reduce the company's greenhouse gas emissions. The total recommended greenhouse gas emissions savings from two years of the project were 507, 435 kg CO_2e, averaging over 10 tonnes per organisation and 2 tonnes per student. If this project was extended over 5 years and taken on by an additional educator, the potential reductions increase to 2,562,418 kg CO_2e. It demonstrates that action undertaken at the micro-level can result in significant impact at the macro-level when scaled up and provide significant benefits to actors across all levels from individuals though to all participating organisations.

1. Introduction

Transformation to a more sustainable society and adaptation to climate change requires action at different levels, from the international through local action right down to that of the individual (Adgar *et al*, 2005). In business terminology 'level' is usually expressed in micro-, meso- and macro- terms and the integration of sustainability and responsibility that effect social change proceed simultaneously across all three (Jeurissen 1997). The direction of influence takes place across and within all levels and in all directions. At the macro-level, the United Nations Sustainable Development Goals set out a framework to direct actions to meet sustainability challenges. Such International policy, through its effect on national to organisational governance, feeds down to have an impact on the actions of the individual. Broad societal paradigms such as neoliberalism, which influence cultural norms and expectations, as well as national and organisational governance also impact on the actions of the individual. However, individuals also have an influence at much broader, spatial, temporal and organisational levels. It is individuals at the micro-level who are key decision makers in government and business, it is individuals who communicate through the traditional and social medias and hence influence wider societal opinion, it is individuals who educate classes of students or direct educational policy. Yet, these individuals rarely work independently. They work in teams at the meso-level through sometimes informal, sometimes formal governance structures. As such it is important to recognise that action taken across multiple levels, or a set of interventions by different actors at micro-, meso- and macro-levels can be effective in addressing sustainable development challenges (van den Bosch, 2010).

When considering initiatives that result in carbon emission reduction, these take place at a range of different levels. At the macro-level, global agreements between nations such as the Kyoto Protocol dictate actions across international boundaries. Such international agreements translate to meso-level national or sub-regional actions such as legislation limiting carbon emissions by organisations operating within national boundaries or carbon mitigation activities such as energy policy which promotes renewable sources or energy. Action also takes place at the micro-level. Here, individual actors may undertake specific actions such as deciding to reduce personal flights, switch to a vegetarian diet or other such personal carbon reducing initiatives.

Understanding the relationships between the different levels of action has been advocated previously by multiple authors. Frynas and Yamahaki (2016) demonstrated the need for sustainability scholarship exploring multiple levels of analysis, in particular connecting the micro-level to the meso-level and to the macro-level. Doh and Quigley (2014) pointed out that more research is needed to understand the process through which responsible leaders, and leaders in general, manage the process of dealing with divergent stakeholders across all levels of activity. Similarly, Aguinis and Glavas (2012) asserted that micro-level theories should be used to improve our understanding of the underlying psychological processes associated with sustainability activities. Finally, it is understood that an accumulation of relatively small changes can add up to very large changes (Turner *et al*, 1990), however it is important that educators understand the relationship between macro-level driving forces and issues, the linkages between places, and the importance of access to resources to support effective actions.

This paper seeks to explore the relationships between macro-, meso- and micro-level actions within the fields of Education for Sustainable Development and Responsible Management Education. With reference to a case study taken from a UK Higher Education Institution, the paper examines an educational initiative where students conduct a carbon footprint of an organisation and recommend measures to reduce the company's greenhouse gas emissions. In line with the authors discussed above (Turner *et al,* 1990; Aguinis and Glavas 2012; Doh and Quigley, 2014; Frynas and Yamahaki, 2016) it explores the research question: 'How may micro level projects influence sustainable development across different levels?' The paper analyses the 'keystone' drivers at different levels for facilitating change within organisations through initiatives within higher education. We demonstrate that an analysis across all levels of influence is necessary to understand both the potential to create and resist change in organisations from educational initiatives. In addition, we argue that such an initiative undertaken at the micro-level may achieve significant carbon emissions when combined with similar initiatives from other educators. Scaling these initiatives up to meso- or macro-level interventions could achieve very significant carbon savings thus contributing to recent calls from the UK Government and others to act on the climate emergency (BBC, 2019).

2. Literature Review

An understanding of the role of level when considering interventions to achieve meaningful progress against sustainability challenges is essential as it is known that action is required at multiple levels (see for example: Jeurissen, 1997; Cash *et al*, 2006; Wilbanks, 2007). A key reason for this is that sustainable development involves the interaction between systems and processes, abilities to act, and potentials for multi-level analyses and actions (Wilbanks, 2007). A number of researchers point to the need for research that considers the relationships between sustainability initiatives and specific actions across and between different levels. Bies *et al* (2007) discern three different levels of analysis for corporate social responsibility research: micro-level (involving psychological bases among individuals), meso-level involving relational issues among organizations), and macro-level (involving wider political, economic and societal dynamics).

Business educators also need to develop an understanding of the role of examining and undertaking actions across difference levels. Frynas and Yamhaki (2016) suggest that a multi-level approach can enrich many areas of responsibility related scholarship pointing out that scholars need to make efforts to better understand the connections between the micro-, meso- and macro-levels.

2.1   *Levels of influence on Education for Sustainability in Higher Education*

Education for Sustainable Development, also referred to as Education for Sustainability, or Learning for Sustainability, has been defined by many authors but perhaps the most well used definition stems from the UK's Quality Assurance Agency for Higher Education (QAA). Here, Education for Sustainable Development is defined as the process of equipping students with knowledge and understanding, as well as the skills and attributes required to work and live in such a way that safeguards environmental, social and economic wellbeing both now and in the future (QAA, 2014). The project portrayed in this paper is following this definition captured in the 'Future Thinking Framework' used at XXX (Willats et al 2018). Much has been made of the importance of Education for Sustainable Development in a higher education setting, both because of the role of higher education institutions in preparing professionals who will influence society's institutions (Cortese, 2003), but also because of the potential to change behaviours as students are undergoing a major life course transition, making them more likely to shift behaviours (Verplanken *et al*, 2008).

There is strong support for addressing Education for Sustainable Development through the embedding of sustainability into the curricula of different disciplines (Dawe *et al*, 2005). In several institutions the business disciplines are at the vanguard of embedding sustainability, driven both by macro-level international educational initiatives such as the United Nations Principles of Responsible Management Education, and a micro-level appreciation by individual educators of the potential for business graduates to effect macro-level change throughout their careers (Parkes, 2017). In fact, business schools have long played an important role in social responsibility (Rive et al, 2017) and are increasingly seeking to influence the broader institutions within which many exist. In fact, the drivers for Education for Sustainable Development activities carried out within higher education institutions and more specifically business and management schools, take place across the macro-, meso- and micro-level. Some of these initiatives are summarised in Table 1

Table 1. Different level influences on Education for Sustainable Development in Business Education in the Higher Education sector.

Level	Description of level of analysis	Type of contribution to Education for Sustainable Development	Examples
Macro (International agreement)	International organisations e.g. World Commission on Environment and Development; United Nations	International agreement of the need for sustainability	WCED (1987) Our Common Futures. UN (1992) Agenda 21
Macro (International agreement)	International organisations e.g. United Nations	International agreement of the need for education to contribute to moving towards a more sustainable society, and international support for Education for	UN (1992) Agenda 21. UN (2005) UN Decade of Education for Sustainable Development 2005-2014 UN (2016) UN Sustainable Development

		Sustainable Development	Goals
Macro (International sector)	International higher education sector	International support for the role of higher education in moving towards a more sustainable education	ALSF (1990) Talloires Declaration UNEP (undated) Global University Partnership on Environment and Sustainability
Macro (international sector)	International business and management education in higher education sector	Internationally adopted framework for embedding sustainability in business education	UN Principles of Responsible Management Education
Meso (national-devolved government)	National higher education sector	Higher education strategy	HEFCE (2009) Sustainable development in higher education: 2008 update to strategic statement and action plan
Meso (national organisation)	National higher education sector	National organisation support for sustainability in higher education	HEA Education for Sustainable Development project Environmental Association for Universities and Colleges QAA (2014) Education for Sustainable development: A guidance for practitioners
Micro (organisation)	Higher Education Institution	Institutional commitment to and embedding of sustainability	University Strategy University Teaching and Learning strategy
Micro (sub-organisation)	Department	Departmental commitment to and embedding of sustainability	Signing up to Principles of Responsible Management Education Department Learning and Teaching strategy
Micro (sub-department)	Programme	Programme commitment to and embedding of sustainability	Programme aims
Micro (individual)	Staff	Staff commitment to and embedding of sustainability	Embedding in teaching
Micro (individual)	Student	Student engagement in sustainability action	Engagement in activity

2.2 Macro (International) Level

Sustainable Development by its very nature is a concept defined on the macro-level of society due to the interconnectedness and global nature of sustainability challenges such as climate change and other environmental issues (Baumgartner and Ebner, 2010). The essential role of education as a strategy for sustainable development, was given international recognition in 1992 at the 'Earth Summit' in Rio de Janeiro. Education was embedded as an enabling strategy in each of the 40 chapters, as well as being a path in its own right, of Agenda 21, a voluntary action plan for sustainable development, made public at the conference and voted on for adoption by 178 governments (Calder and Clugston, 2003). Following this, the

Johannesburg World Summit on Sustainable Development in 2002 proposed a UN Decade for Education for Sustainable Development which ran from 2005 to 2014 (Filho, Manolas and Pace, 2015). The Decade sought to mobilise educational resources worldwide as a means to create a more sustainable future (UNESCO, undated a). The Decade was followed up by the UN's Global Action Programme on Education for Sustainable Development which sought to generate definitive actions on Education for Sustainable Development (UNESCO, undated b). The initiatives outlined above culminated in 2015 with the advent of the development of the United Nations Sustainable Development Goals, 17 goals which build upon the Millennium Development Goals and act as a universal call to action to end poverty, protect the planet and ensure all people enjoy peace and prosperity (UNDP, 2019). The Sustainable Development Goals came into effect in January 2016 and guide UN policy and funding until 2030.

At the macro- (international) level there have also been Education for Sustainable Development initiatives relating to whole discipline areas. The United Nations Principles for Responsible Management Education is one such example, launched in 2007 at the UN Global Compact Leaders' Summit in Geneva (Forray and Leigh, 2012); this principle-based global engagement platform for academic institutions represents a relationship between the UN and business schools, with the mission of transforming management education, research and thought leadership at a global level (Storey *et al,* 2017). The aims of Responsible Management Education share many similarities with those of Education for Sustainable Development in equipping students with the requisite knowledge and understanding to deal with sustainability issues within business as well as contributing to progress against the Sustainable Development Goals though business activities (Parkes, 2017). Here Responsible Management Education can be defined as any teaching, research or enterprise activities in the areas of ethics, sustainability and responsible corporate practices, which business schools engage with in order to develop a more responsible strategic focus (Beddewela *et al,* 2017).

Finally, business school accreditation bodies such as Association to Advance Collegiate Schools of Business (AACSB), European Foundation for Management Development (EFMD) and the Association of MBAs (AMBA) also have a high influence on business schools. For example, through their EQUIS accreditation scheme, the EFMD is influencing business schools by putting a higher emphasis on Education for Sustainable Development. Their EQUIS standard states that expanded coverage of Ethics, Responsibility and Sustainability reflects the need of business schools to contribute to the resolution of societal challenges and to act as 'good citizens' in the environment in which they operate (EQUIS, 2016). All three business accreditation bodies played a part in the conception of the United Nations Principles for Responsible Management Education Initiative and continue to actively support and promote HEI involvement in it.

Whilst macro-level action is important in setting the agenda for sustainable development and indicating where policy makers should focus their attention, such as carbon emission reduction, the sheer complexity of working at this level requires that interventions are devolved down to the meso- and micro- levels. For example, the UN Sustainable Development Goals are referred to as global goals, however the UN is simply a forum for nation states to debate policy at the global level whilst retaining their national sovereignty. As such actions that result in impact globally takes place at the meso-level via national or regional activities.

2.3 Meso (National) Level

The macro-level activity discussed above, cascades down to action at a smaller level - the national level. At the national level, different countries will respond to the drivers above them in different ways. The role of policy in promoting sustainability within higher education institution has been key in the UK. In 2005, a national level strategy underpinning sustainability in higher education was the focus of the Higher

Education Funding Council for England's Report and action plan on Sustainable Development in Higher Education (HEFCE, 2005). HEFCE's support for Education for Sustainable Development was further affirmed in its 2009 report (HEFCE 2009). Alongside the Higher Education Academy (HEA), which supports teaching quality across the United Kingdom, has also been a key meso-level influence. In 2005, the HEA initiated Education for Sustainable Development as a special theme within the Academy's overall programme which was effective in driving the embedding of sustainability within programmes and institutions, often through engaging with individual 'champions' within institutions (Sterling and Witham, 2008). Finally the UK's Quality Assurance Agency (QAA), an independent body with the remit of monitoring and advising on standards and quality in UK higher education, published a 'guidance document for practitioners' on Education for Sustainable Development. The guidance has provided a useful benchmarking of a definition of Education for Sustainable Development (Shephard and Dulgar, 2015).

Meso-level influences also include national, independent organisations. The Environmental Association of Universities and Colleges (EAUC) was launched in 1996 as a membership organisation aiming to be the environmental and sustainability champion within Further and Higher Education in the UK (EAUC, 2016). The EAUC originally had a focus on environmental performance issues in the Estates operations of Universities and Colleges, but increasingly engage in activities relating to Education for Sustainable Development and has now become an important influence on the adoption of Responsible Management Education in business schools as well (Storey et al, 2017). Another meso-level influence in the UK is the National Union of Students (NUS). Sustainability is only one part of the activity of the NUS, but has grown in size and scope, with an increasing focus on Education for Sustainable Development-related initiatives, including in their activities working to get sustainable development into the curriculum of every student across every discipline (NUS, undated).

League tables are important to UK higher education institutions and as such sustainability focused league tables and awards have a major influence on Education for Sustainable Development activities. These meso-level initiatives include the Green Gown awards, which are run by the EAUC, and the Green League (now University League) run by the national student sustainability organisation, People and Planet, and published annually in the Guardian newspaper (Lightfoot, 2016). The Times Higher Education (THE) rankings, published by the corporate media company Times International, has become a central part of government policies around global competitiveness that have had a profound influence on Higher Education Institutions (Stack, 2013). In 2019 the organisation introduced the Times Higher Education University Impact Rankings, a league table based on the United Nations' Sustainable Development Goals (THE, 2019). Whilst the impact of this initiative remains to be seen, the introduction of a new sustainability ranking from one of the most influential organisations demonstrates the importance of considering sustainability in the sector.

As indicated in section 2.1, some macro-level international organisations have devolved some of their actions and influences down to the meso-level and as such it is appropriate to consider these institutions as important actors at this level. In business, the United Nations Principles for Responsible Management Education initiative relies heavily on its regional and national level Chapters to carry out activities and build influence locally. United Nations Principles of Responsible Management Education Chapters develop their own internal arrangements and activities whilst committing to the broader aims of providing a platform for dialogue, learning and action on responsible management and leadership education and research (UNPRME, 2019a). As such the Chapters compliment the macro-level influences and activities of the United Nations Principles for Responsible Management Education initiative at the meso-level.

There are challenges associated relying solely on meso-level activities to generate impact for sustainability within higher education institutions. As many of the initiatives are developed within quasi-governmental organisations, they are susceptible to political change. For example, a change in government and a change in leadership, and departure of specific 'champion' individuals, within HEFCE led to a significant reduction in the visible support for Education for Sustainable Development from the organisation (Chalkley and Stirling, 2011). Similarly, a reduction in central government funding of the HEA saw a decline in its activity in relation to Education for Sustainable Development (Fiselier and Longhurst, 2018). Within the UK, the meso-level is further complicated by the devolution of educational powers to the four constituent countries that make up the United Kingdom, with Wales and Scotland having notably greater continued commitment to Education for Sustainable Development (Martin *et al*, 2013). Finally, despite the fact that the initiatives above all occur at the meso-level, it is at the level of the individual that the implementation of such initiatives actually takes place.

2.4 Micro-level (Institution and individual)

The micro-level can range from the individual to the organisational, which within the educational sphere could be a Higher Education Institution (HEI). HEIs can respond to Education for Sustainable Development drivers, through adoption of institution-wide strategies, either holistically, covering all of the activities of an institution, or through just one element, for example the Teaching and Learning Strategy. Embedding of Sustainability at this level may then influence activity at other micro-levels from decisions to embed Education for Sustainable Development considerations at a programme level, to the choices that an individual educator makes to their own curriculum design. The latter is made possible within HEIs due to the high level of autonomy that individual educators often have over their teaching (Holmberg *et al*, 2008). The adoption of Education for Sustainable Development at an organisational or programme level may be influenced by competition at a higher-level level, whether competition between universities (supported by meso-level instruments such as awards and league tables), or competition within institutions. In this respect, some HEIs are beginning to develop institutionally wide policies around Education for Sustainable Development such as embedding the UN Sustainable Development Goals into their organisational strategies (Fleacă *et al*, 2018; Willats *et al*, 2018).

The smallest micro-level is the individual; however micro-level clearly has influences on all other levels, just as they are also influenced by all other levels. In an Education for Sustainable Development context, the influence of the individual does not remain at an individual level, as the very point of Education for Sustainable Development is to have a large impact. The individual sustainability educator aims to influence students, from individual students to entire cohorts over several years. These students may then go on to drive other activity in the University through student organisations and activism, or to have influences on sustainability in their future professional careers.

The activities and assessment devised by individual educators may directly influence at other levels of activity outside the university. For example, community-based educational assignments are a common feature of Education for Sustainable Development, where students in some way work within the local community to make positive change (Zachariou and Symeou, 2009). Likewise, educational assignments in businesses may see students positively influencing the sustainability of an organisation's operations (Stubbs and Cocklin, 2008). Thus, the impact at the micro-level in the form of the individual educator has the potential to influence directly the organisational level. The educator might also exert impact on the other levels by occupying positions within organisations such as the local United Nations Principles for Responsible Management Education chapter as well as publishing scholarly textbooks and articles. Through the sharing and adoption of best practice, often facilitated through meso-level organisations, the actions of

these micro-level individual educators may have an impact on the meso-level sector, and potentially, where individuals become involved in macro-level activities such as through the UN more broadly can have an impact on this macro-level. In addition to individual educators, there is increasingly a shift amongst traditional Environmental and Facilities Managers in HEIs towards a broader sustainability remit which often includes some responsibility for Education for Sustainable Development at the institutional level (Mcmillin, and Dyball, 2009; Wright and Wilton, 2012). Such roles tend to emerge through a combination of micro-level influences, driven by personal values and interests, and micro-level organisational influences, driving the support of such positions.

These different levels of influence are used in the analysis of a case study of an Education for Sustainable Development initiative at one business school in one University in England, in order to explore the importance of different level influences on such an initiative, as well as to identify the different levels that such an initiative can have influence on. This particular initiative focuses specifically on greenhouse gas emissions from organisations.

3. Methodology

This paper adopts a single holistic case study design as a means to better understand the relationships between micro-, meso- and macro- level impacts. As Yin (2003) describes, a case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. In this respect this micro-level perspective offers the opportunity to investigate the way in which small level educational interventions may result in macro-level impact. The case study explored in this paper is a 'Greenhouse Gas Management Project' undertaken by XXX at XXX. This study details how the project is carried out and explores both the results of the project at different levels, and the different levels of influence on the project, hence both the context and the phenomenon under investigation are of equal importance. Whilst the case study provides insight on a single initiative in a single HEI, case study research such as this can provide generalisations to theory and practice where theoretical explanations of the data observed may also be applicable to similar cases where similar conditions prevail (Yin, 2003). Such generalisations are likely to be possible in this research given the similar conditions within which many HEIs operate internationally.

This paper is based on the analysis of 43 individual student reports from projects completed in academic years 2014/15 and 2015/16. Elo *et al* (2014) argue that content analysis of secondary data can be utilised both inductively or deductively, with the inductive approach, including open coding, creating categories, and abstraction, whist in deductive content analysis the organization phase involves categorisation matrix development whereby all the data are reviewed for content and coded for correspondence to or exemplification of the identified categories. Despite the open coding approach adopted in this study, creating categories, and abstraction process, which Elo *et al* (2014) would argue is an inductive method, we contend that there is more than just 'either inductive or deductive approach' to content analysis. The analysis was facilitated through the use of NVivo software to develop hierarchical themes. In the following section, more detail about the actual project is provided to give the background for the analysis methods used in this paper.

3.1 Case Study: The Greenhouse Gas Management Project

The Greenhouse Gas Management Project was founded in 2010 by one of the authors as part of a final year undergraduate option module available to Business students. In its first iteration it was undertaken as a desk-based exercise to identify areas of potential greenhouse gas reduction in companies. In 2011 it

became part of the core curriculum of an undergraduate degree at XXXX. Parallel to this, the educator contacted the XXX 'Future Factory' project, part funded by the European Regional Development Fund, and with their financial support the first small and medium enterprises (SMEs) took part directly in the project, with the students acting as consultants to local businesses to help them to reduce greenhouse gas emissions. Most of the organisations involved were small and medium-sized enterprises and local companies, which were part of national or international chains. In these first years (2011-2013) over 200 students and 50 companies ranging from shopping centres to Indian restaurants took part.

The students act as consultants to these companies. At the beginning of the autumn term, students in group of 4 or 5 get a company/organisation and a first set of data. They have three further points of contacts with the organisation: After having worked with the data provided by and about the company and having an introduction to GHG management by their lecturers, they visit their company on their own. A few weeks later they send and email with further questions and then prepare the final poster. The company approves the poster for a public low carbon event, where all students present their calculations and recommendations to their own company and all the other visitors. The presentation is part of the assessment, the other parts relate to the poster and the written report. Generally, students learn about GHG management in lectures and then apply the theory to 'their' company getting support from their tutors when needed. Broadly, the lectures follow the steps Lingl *et al* (2010) outlines which is also used as a guide for the students while they are working on the report and the poster.

In 2013, the educator - with the financial help of Future Factory - enlisted an external environmental consultant from Nottingham Energy Partnership to give further advice to the students through lectures and seminars, and to form a higher-level strategic partnership. Part of this new strategic partnership was to link the student projects to the Investor in the Environment (iiE) network. The network is run as a franchise, owned in Nottinghamshire and Derbyshire by NetPositive Ltd, while nationally the network is run by Peterborough Environment City Trust. It offers a three-part environmental management accreditation scheme (bronze, silver or green) and a local low-carbon business network. Members are supported to implement an Environmental Management System and are encouraged to network and trade amongst themselves. The key barriers to small business taking on an environmental accreditation are usually cost, time and expertise. By working with the Nottingham Energy Partnership to build the accreditation into the curriculum as a student project, all three of these issues have been addressed while at the same time XXX has offered students the chance to also gain the practical skills, understanding and experience to engage with the low carbon economy in their careers beyond graduation. Since 2014, the students have worked in groups with companies, and increasingly organisations from the public sector, in order to reduce carbon emissions and associated costs while at the same time encouraging them to achieve Investor in the Environment accreditation. As a result of this collaboration, XXX and Nottingham Energy Partnership (now NetPositive Ltd) received the Guardian University Award for Business Partnership in 2015 (Thomas, 2015).

The project is ongoing; however in our analysis for this paper we focus on the student reports detailing GHG reduction strategies, produced by the students in 2014/2015 and in 2015/2016. The purpose of using these reports is two-fold: 1) to measure, on a micro-level, any positive impact undergraduate work can have on company's overall GHG emissions, and 2) to analyse how a company can influence the sector itself, in relation to addressing GHG emissions.

Students were introduced to the concept of carbon foot-printing at an organisational level. A carbon footprint at this level is the measure of an organisation's direct or indirect greenhouse gas emissions, these are a combination of the six emissions covered by the Kyoto protocol. It is measured in tonnes of CO_2 equivalent (tCO_2e). The simplest way for a business to calculate their carbon footprint is to collect monthly

data on the following areas: Gas, Electricity, Water, Waste, Paper and Organisational Travel. There are other emissions-related data that could be included, such as refrigeration, oil, differentiated waste streams such as wood, cardboard, plastic, batteries and printer ink cartridges. The UK government recommends that this primary information is collected from the organisation over a 12-month period from which to calculate carbon emissions (Defra, 2013). The emissions data for each resource is then multiplied by the correct carbon conversion factor supplied by the UK Government. These factors are updated every year to reflect any changes in emissions from changes in various production processes. The factors are based on recommendations made by the internationally agreed greenhouse gas protocol corporate standard (WRI and WBCSD, 2004). These calculations result in a final carbon equivalent output associated with each area of activity or resource use.

The emissions are divided into different Scopes; Scope 1: Direct Emissions from organisational activities such as Gas for heat and Fuel for travel; Scope 2: Indirect Emissions from electricity, heat and steam; Scope 3: Other indirect emissions beyond the control of the company or where the company has limited control such as waste disposal, employee commuting, transport and distribution, leased assets, purchased goods and services. An organisational boundary is then established to determine which area of operations or resources used have the greatest environmental impact.

Primary resource data was provided to the students by the participating businesses from either manual meter readings or utility bills, and students also visited the organisations as mentioned above. These were then used to measure the emitted carbon along with calculations based on observations and questions to the company such as how much waste is generated. There are 43 student reports from the projects completed in academic years 2014/15 and 2015/16. The reports contain a full carbon calculation of the businesses' use of resources over the preceding year and recommendations to reduce the carbon output through a number of various efficiency measures to be implemented by the companies involved. Students then calculated the likely reduction in carbon emissions after the improvements had been made. Although the students were given different companies each, some of the companies may be similar in terms of the sector they belong to. The names of the companies involved are not used in this paper due to ethical and confidentiality reasons. As part of the consultancy project, students sign a confidentiality agreement that the name of companies will be only disclosed with their explicit permissions.

3.2 Analysis of reports

When analysing the reports, our first research question was what would be the extent of carbon savings if the organisations were to follow the recommendations. We also wanted to analyse whether the recommendations in the report were mainly focusing on one functional area of business or whether they would include various functions. Our teaching had covered all functions of an organisation, however when setting the assessment it was made clear to the students that their recommendations could be linked to any functional area, so there may have been a preference for one function such as marketing. Each report was analysed to calculate the total amount of possible greenhouse gas savings for each business within the following categories: Gas, Electricity, Water, Waste, Paper and Fuel. The overall potential savings were then calculated for all of the businesses each year.

Through NVivo, we used hierarchical themes first looking at the different functions of companies that, based on students' analyses, have been involved (directly or indirectly) in addressing the greenhouse gas emissions of the companies, through the companies' business processes, such as marketing, accounting, operations, and human resources, and secondly through recommendations made by the students in the two-year period. Here we analysed whether the recommendations given by students was directed towards

operations, marketing or any other business function. Due to the fact that most of the companies involved in this project are small or medium enterprises, some no bigger than 5 employees, we were analysing the functions of companies instead of departments. However, the role of these functions does not differ from that of departments within big organisations. Additionally, the process of how the companies communicate with their internal and external stakeholders about their climate change management programme was analysed, as companies involved in this project have highlighted that students have discovered that *what* and *how* the companies communicate their carbon emission initiatives can have a positive impact on their branding.

To analyse the different levels that have motivated the companies to be involved in this project, we examined for individuals who, on a micro-level, have played a part in getting their companies to be part of the project. We also explored for any micro-level possibilities of companies working collaboratively to collectively reduce their emissions. We also compared 2014/15 companies with 2015/16 companies, to look for any meso-level of influence, for example, was there a company that participated in 2015/16 whose competitors had already participated in 2014/15. The factors that acted as drivers to encourage companies to participate in the project were also considered. For example, did a company participate in the project due to an individual employee or because the company as a whole believed there was a need to play a part in addressing their carbon footprint (both Micro – individual and company), or did the company participate because reporting their emissions was mandatory (Meso – National policy).

All students completed the assessment successfully and provided standardised feedback in the form of module evaluations. Feedback indicated that the project did have a big impact. We also had emails from students post-graduation communicating that they found the project extremely valuable for their employers, some of which had asked the graduates to initiate a greenhouse gas management project in their new roles. Finally, we analysed the Investor in the Environment documents of companies/organisations that had taken part in the student project and then had moved on to acquire the accreditation. Here we were interested in finding out whether and then how many of the recommendations given by the students the organisations had actually taken up and implemented.

4. Results: The impacts on greenhouse gas reductions

Over the two years of data analysed, there were 50 Organisations that took part in total. 34 were from the private sector, 8 from the third sector and 8 from the public sector. Recommendations amounted to a potential of 507 tonnes of carbon equivalent savings. The majority of this was within the private sector with an average potential saving of around 9 tonnes each. The majority of these savings were identified through the potential reduction of electricity usage (189,788 kg CO_2e). For both the public and third sector the largest reductions were seen through more efficient use of alternatives to natural gas (125,301 kg CO_2e). Given that the organisations involved operate a number of business facilities with a focus on warmth rather than production this was to be expected. Over the two years a total of 219 students were educated in the systematic operation of conducting an organisational audit and carbon footprint to identify potential resource reductions. The average carbon equivalent saving per student was 2.42 tonnes. The potential greenhouse gas savings identified by the project are shown in Table 2.

Students recommended basic improvements to the buildings such as insulation and window films to stop heat loss. However, they also looked at more unusual improvements such as inserting balloons in chimneys in a listed building or investing into a new incinerator to turn the residues of the beer brewing process into energy. Recommendations included technological and behavioural changes. For example, one student group recommended a competition for students in a privately owned student accommodation along with

individual meters to be installed in the flats in order to run the competition. In addition, they designed the posters to be distributed in student accommodations. Generally, the students were asked to give two recommendations based on their calculations and one 'free' recommendation. This could be for example a marketing campaign, designing signs or advertisements on cars how to promote their carbon savings to the customers.

In addition to potential GHG reductions, the students identified savings opportunities, and some organisations were very quick to recognise the potential savings to be made. For example, the potential monetary savings from the recommended reductions in electricity usage within the private sector alone, amount to approximately £60,000 with an average saving of £1,200 per business.

Table 2 Potential carbon savings through the Greenhouse Gas Management Project

Sector	Resource Measured	Potential CO_2e Saving Per Resource Measured	Total kg CO_2e Reduction Recommendations	Potential kg CO_2e Savings Per Student	Potential kg CO_2e Savings per Organisation
Private Sector	Gas	21,279	326,418	2,743	9,601
	Electricity	189,789			
	Water	101			
	Waste	7,361			
	Paper	8,513			
	Fuel	84,332			
	Other	15,044			
Third Sector	Gas	90,317	110,314	3,245	13,789
	Electricity	13,816			
	Water	20			
	Waste	6,161			
	Paper	0			
	Fuel	0			
	Other	0			
Public Sector	Gas	34,985	70,703	2,080	8,838
	Electricity	10,219			
	Water	0			
	Waste	495			
	Paper	4,531			
	Fuel	20,473			
	Other	0			
Total			507,435	2,428	10,149

One of the key issues identified by the students in their reports, was how important it was for companies to have a full set of data, in order to measure and recommend effective steps that their companies can take to reduce their emissions. Consequently, for this to happen, different functions of companies need to collaborate, to ensure that there is clear understanding of what the functions need to do in order to meet the greenhouse gas target set. For example, the analysis denotes that about 80% of the companies in the Private, 87% in the Public, and 71% of the Third Sector respectively, would benefit from these functions working together should they decide to take up the recommendations developed by their student groups. For instance, such recommendations include investing in IT facilities that would enable the companies to have video conferencing to reduce business travel, or to change their packaging so that they can communicate their emission goals to their stakeholders. This highlights the importance of collaboration between the different functions of companies, to address how emissions are being reduced by business. Therefore, our findings indicate that from the different functions in a company, Operations (including Estate Facilities), Accounting, and Communicating with both internal and external stakeholders (under the theme of Marketing) are the main three that need to be heavily involved when working to reduce greenhouse gas emissions.

Table 3 indicates that before the projects, not many functions of the companies were involved, either collaboratively or separately, in reducing their emissions. However, after the projects and based on the students' recommendations, there has been an increase in the company functions involved in this, including Innovation, Human Resources, and collaborations with other companies. Innovation is a theme included based on students' recommendations such as looking at alternative types of packaging, human resource is a function that encompass training of staff about the process to reduce their emissions, whilst collaborations include elements of companies looking for suppliers with similar environmental accreditations, for example, so as to enable them to build on their existing branding.

Table 3: Number of functions involved in addressing greenhouse gas emissions before and after the project

Functions	Number of organisations					
	Before			After		
	Private Sector	Public Sector	Third Sector	Private Sector	Public Sector	Third Sector
Marketing (branding and communicating)	10	0	1	35	8	7
Accounting	28	8	5	35	8	7
Operations (including supply chain and estate facilities)	18	4	1	30	8	7
Human Resource	15	3	3	21	7	3
Innovation	10	0	0	18	3	4
Logistics	0	0	0	15	4	2
Collaborating with other companies	0	0	0	35	8	7

26 of the 50 organisations involved went on to achieve the Investors in the Environment Accreditation. As a result of their continued involvement, it is realistic to say that of the original 500 kg of CO_2e savings

recommended around one third of those savings have the potential to be realised. Although there was limited capital available for efficiency improvements in the beginning, the recommendations of the students were taken very seriously, and a number of budgetary measures were implemented by senior management the following financial year. Developments stemming from the project and in particular Investors in the Environment members, include a knowledge transfer partnership with a local university to develop less resource intensive processes, and recommendations to six businesses within their network to take part in the student project, four of which took part in following year's programme.

Anecdotal evidence suggests that there was some sector level impact as a result of the project. For example, one company took part in 2015/2016 because one of their competitors had taken part the year before. Students had recommended steps to become a carbon neutral business and to market themselves accordingly; which in turn had led to this company winning an important series of contracts in the local area. Furthermore, there is some suggestion that larger organisations have picked up the recommendations of the students applied at the local level and scaled this up to their national operations. Table 4 summarises the different level of impact that the greenhouse gas project has had, and the level of the major influencer.

Table 4: Summary of the level of impact of the greenhouse gas management project and the level of influencer

Level of impact	Entity impacted	Type of impact	Impact	Major influencer and level
Micro (Individual)	Student	Student engagement	Increased understanding of sustainability; increased capacity to drive change	Individual staff member (micro)
Micro (individual)	Staff	Staff engagement with student work	Recommendations made by student; Reporting recommendations to senior management	Individual student (micro)
Micro (organisation)	Office	Staff adoption of student recommendations	Changes made at one office	Individual student (micro) Individual organisation decision maker (micro)
Micro (organisation)	Organisation	Communication of recommendations across organisations	Changes adopted across organisation	Individual organisation decision maker (micro)
Meso (sector)	Sector	Communication	Positive publicity of changes leading to sector wide change	Individual organisation (micro)

5. Discussion

5.1 Influences of the micro-level individual educator's actions

This paper set out to address the research question 'How may micro level projects influence sustainable development across different levels?'. Through the course of the study we have attempted to demonstrate how the actions of one sustainability educator can have an influence at different levels both directly and indirectly. The individual member of staff has a direct influence on each individual student that they teach. This may have a direct impact on the student in terms of their own immediate carbon-producing actions and decisions. Each of these students has their own sphere of influence and may influence their own peer network, or friends, family, and current work colleagues. Each of these individuals own carbon-producing actions and decisions may also be influenced. These influences may also not be immediate but may carry on into the future lives of the student, through their life choices, and potential application to their future work places.

The aim of this educational initiative is to have a direct influence on reducing greenhouse gas emissions from the organisation with which the students work. Therefore, it could be suggested that the student will have an impact on the particular department or office in which they work directly. The student working in the organisation has a direct influence on the decision makers through the communication of their recommendations, and also through other staff. Yet whether these recommendations are taken up and the potential emissions reductions are realised is largely dependent on the actions of the decision makers within the organisation. The type of organisation and the remit of the student's project will determine the level of *potential* impact within an organisation. The direct influence of the student during their project may only be restricted to a specific department or branch in one geographic area. However, there is the *potential* for these recommendations to be taken forward at an organisational level (depending on the size of the organisation). Yet the potential for this take up is mediated by the key decision makers who interact directly or indirectly with the recommendations of the student.

To increase the level of influence, successes in one organisation can have an influence on the entire sector, through demonstrating the competitive advantage that this can gain organisations. This may be mediated through meso-level national policy or networks and organisations, themselves influenced by macro-level international agreements or bodies, such as those requiring reporting on greenhouse gas emissions. Such changes may be also driven by consumer demand, a collective of individual responses to the imperatives of tackling climate change and sustainability. The educational initiative does not *directly* lead to emission reductions, however as the size of the potential impact increases, the probability of greenhouse gas reduction reduces. Therefore to increase the likely emission reductions resulting from the educational initiative, either the level at which the intervention occurs needs to be increased, for example a focus on working in the headquarters of an organisation, or work carried out where there is more direct influence on the senior decision makers within an organisation.

In calculating the size of the impact of such an educational initiative, it is important to consider the scaling up of such an activity. Table 5 shows the potential greenhouse gas reductions associated with different levels of activity from one student to multiple cohorts as the educational initiative is repeated. With scaling up the calculation of impact on emission reductions, both the direct impact increases, as does the probability of impact at a higher level. The impact can be significantly further increased if the initiative is adopted by other educators at other institutions.

Table 5: Estimated cumulative impacts of the greenhouse gas educational initiative over years of operation (est = estimate). 3rd, 4th and 5th cohort estimates based on an average from the first and second cohort data.

	Potential kg CO_2e Savings	No. of Organisations influenced (estimate)
One Student	2,475	1
Student Group	10,149	1
1st Year Cohort	340,086	30
2nd Year Cohort	167,349	20
3rd Year Cohort (est)	253,717	30
4th Year Cohort (est)	253,717	30
5th Year Cohort (est)	253,717	30
TOTAL	1,281,209	140
If teaching adopted by one other educator over 5 years	1,281,209	140
Total Potential CO_2e Savings, from two educators at different institutions	2,562,418	280

5.2. Different influences <u>on</u> the micro-level individual educator's actions

Figure 1 summarises the different level influences and influencers on the educational initiative.
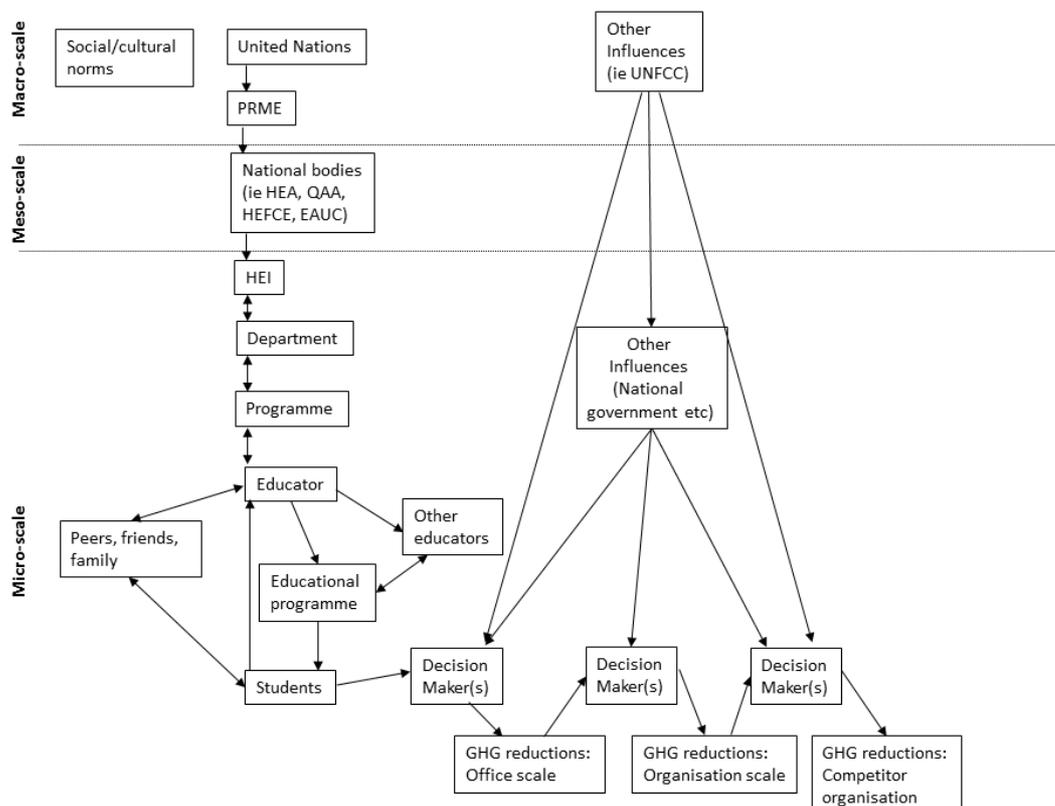
Figure 1: Summary of the different level influences on the educational initiative and the key drivers in the impacts of the educational initiative.

It is clear from the case study that such an educational initiative can have real impacts on greenhouse reduction (which due to its long life-span mixes globally, and therefore has global-level impact). Therefore, it is desirable that the number of such initiatives aiming to drive change within organisations should be increased. Figure 1 identifies the different levels of influence on the individual educator who drives such initiatives. At the micro- level, other individuals in the sphere of the educator have an influence; this may include colleagues, or friends and family who have an influence on the personal values of the individual educator encouraging them to bring their personal values into their professional lives. Other micro-level influences include the particular department in which an individual educator sits, where there may be a recognised commitment to Education for Sustainable Development, or the institution with a recognised commitment to Education for Sustainable Development which may influence the educator directly, or through its influence on the departmental level. This can also work the other way around, where through such an initiative the educator might influence his/her department and institution, and other colleagues might be inspired to do similar projects. Student demand may also have an influence, both from the individual student, who may have heard about the initiative in former years or at other universities and want to have similar opportunities, or from wider student demand often represented by meso-level national organisations such as the National Union of Students.

Other meso-level national influences include national organisations such as the Higher Education Academy, which ran an institutional change programme to support the embedding of sustainability within higher education institutions. Similarly meso-level influences include the role of national awards and league tables which institutions can use to build their legitimacy with regard to sustainability and responsible business. The initiative described in the case study was awarded a national 'Sustainability Professional' award by a national (Meso-level) organisation, assisting the participating University in its performance in the National sustainability 'University League' run by People and Planet.

There are also indirect macro-level influences on the work of individual educators. The International acceptance of Sustainable Development, articulated by the Our Common Futures report in 1987 (WCED, 1987), led the way to increased activity and emphasis on Education for Sustainable Development through the UN's Decade on Education for Sustainable Development. This in turn influenced the establishment of the UN Principles of Responsible Management Education, which through Department-level decisions, driven by individual educators have been signed up to, and underpin the curriculum in these Departments. XXX at XXX signed up to the United Nations Principles of Responsible Management Education in 2015 and become a United Nations Principles of Responsible Management Education Champion school in 2018. Champion schools undertake advanced tasks and projects that respond to systemic challenges faced by the PRME community, as well as to key issues identified by the United Nations and the UN Global Compact (UN PRME (2019b). The membership of PRME provides direct support for the establishment and continuation of activities of individuals. Through this channel, the individual educator might then have input on the macro-level. For example, authors of this case study are now involved in the United Nations Principles for Responsible Management Education working group on climate change and environment and have authored textbooks for business educators supporting sustainability teaching and learning activities.

5.3 Key levels of influence: implications to practice

Figure 1 highlights the role of the micro-level individual decision maker, making it clear that the keystone to the impact of such an initiative is at this individual level. In order to embed climate mitigation tools to

reduce emissions, it is the individual, who needs to be influenced. As such it is important to increase the ability of students to make a solid case based on robust research and to communicate effectively. The educational initiative itself is again dependent on an actor at the micro- level, the individual educator. Although action may be driven by personal values, outside of any direct influences within the higher education sector, it is clear that macro-level influences have an important role to play in supporting the individual educator. A 'prime' example is the macro- international level UN initiative Principles of Responsible Management Education, which requires Business Schools to sign up to and adhere to its six principles. Through this, the institution signals departmental support for educators wanting to develop initiatives in line with the Principles, as well as generating an international support network of individuals with similar aspirations.

By analysing the role of different levels in enacting change in an educational initiative, the importance of focusing on particular skills is necessary in order to influence the micro- level individual decision makers. It also highlights that although these initiatives can be seen as 'bottom up' stemming from micro-level activity, there is an important role to play in terms of support at higher levels of influence, right through to the macro- international level. However, again it may come down to the individual educator to make these arguments to make institutional decision makers aware of these international level influences.

Rather than abandoning the notion of level altogether (Martson *et al,* 2005) we argue that consideration of level in education can bring insights into what determines the greatest impact on educational initiatives and the impact that these can have on business management. As Jonas (2006) argues, to reject the influence of level is to miss out on an important dimension of thinking about and acting upon contemporary economic, political, social and environmental change. Instead we need to recognise the importance of 'in-betweenness of levels' and thinking through multiple levels, rather than a pre-occupation with global-local binaries. This 'in-betweenness' of level is emphasised by the complexities of the different levels and direction of influences explored through this case study. As Adgar *et al* (2005) suggests, adaptation is made up of actions throughout society by individuals, groups and governments within hierarchical structures in which the levels interact with each other. They emphasise that individual adaptation actions are not autonomous, rather they are constrained by institutional processes, social norms, and 'cascading decisions' covering local, regional, national and international levels. However, the education initiative outlined in this paper is as much about mitigation, and identifies a route for mitigation, which although at the micro-level, has the potential to be continuous, to be levelled up and to be impactful.

6. Conclusion

Consideration of level is not something that is commonly applied to the analysis of educational initiatives and has not been considered explicitly in terms of Education for Sustainable Development and RME in business education in higher education. Such an analysis highlights that there are many different levels of influence on educational initiatives in specific programmes. These include the macro-level in terms of international agreements and international agencies such as the intergovernmental agreement through the United Nations and their role in educating towards a more sustainable world, to the establishment of a United Nations Decade for Education for Sustainable Development. At the meso- (national) level, there are many influences from how sustainable development is treated by the Higher Education Funding Councils, to the role of national organisations focussing on sustainability in higher education. However, it is the micro-level in the form of the individual, which in many ways provide the keystones for such initiatives. The individual educator makes the designs and delivers the initiatives, while the individual decision maker within an organisation decides whether recommendations are implemented or not. Such a focus on the importance of different actors at different levels can influence the approach to Education for Sustainable

Development, and particular highlights the importance of providing support for the individual, both the individual educator, and also developing the communication and persuasion skills of students, in order to influence the individual decision makers in organisations that the students engage with to take on their recommendations.

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