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## Abstract

MMU has a number of institutional priorities and resources associated with embedding Education for Sustainable Development (ESD) within the curriculum. These include the University's Strategy for Learning, Teaching and Assessment, the Environmental Sustainability Strategy, professional development workshops and a designated ESD coordinator. In an effort to assess staff awareness and engagement with this agenda, semi-structured interviews were carried out with coordinators from 24 separate units in the School of Science and the Environment. The study examined both inter and intra disciplinary responses in the divisions of Biology, Chemistry and Forensics, and Environmental and Geographical Sciences. The findings suggest that there is a lack of awareness of internal drivers (for example the inclusion of requirements for ESD in University Strategies), resources; and additional external drivers (for example, HEFCE/QAA, REF, and TEF requirements). Whilst most agree that ESD is an important student employability metric, there is less uniformity in agreement concerning the subject specific relevance of ESD. The barriers to the uptake of ESD observed by this study are largely consistent with those presented in the literature. Recommendations from this study to increase engagement in ESD at MMU are mainly focused on awareness raising and professional development of staff in a sector/ subject specific context.

## Background

One of the most commonly used definitions for 'Sustainable Development' is that taken from the 1987 'World Commission on Environment and Development' report 'Our Common Future' (also known as the 'Brundtland report'). Sustainable development is defined in the report as "development which meets the needs of current generations without compromising the ability of future generations to meet their own needs" (WCED, 1987).

However, the fundamental principles have been a discursive for international priorities as far back as 1969. The Tenth General Assembly of the International Union for Conservation of Nature and Natural Resources (IUCN) called for the preservation of natural resources (including soils, water, vegetation, forests, wilderness and wildlife) and any future exploitation of said resources, to be carefully managed in a way that was "conducive to the future peace, progress and prosperity of mankind" ( IUCN, 1970, p84). It also recognised that both nature and natural resources have multidimensional value in environmental, social, cultural, educational and economic terms.

A commonality of international policies and declarations on Sustainable Development (SD) has been the recognition that education, especially of young people, has an integral role to play in the promotion of the ideals of SD; and the fostering of conservation and environmental protection (Lozano et al, 2015).

## Introduction

Education for Sustainable Development (ESD) was formally recognised as a pedagogical approach in Agenda 21, the official document of the 1992 Earth Summit in Rio (Barth and Rieckmann, 2012). Chapter 36 of the Agenda described the need to reorient education and embed the principles of sustainable development into mainstream curricula (UNCED, 1992). It stated the need to address socio-economic and human issues alongside that of the physical and biological environment (UNCED, 1992). Previous declarations and charters (e.g. the Talloires Declaration in 1990) had tended to focus on raising the awareness of environmental education, with less emphasis on the wider aspects associated with SD.

ESD has been defined by UNESCO (n.d.) as “ a learning process (or approach to teaching) based on the ideals and principles that underlie sustainability and is concerned with all levels and types of learning to provide quality education and foster sustainable human development – learning to know, learning to be, learning to live together, learning to do and learning to transform oneself and society”

There have been a large number of policy drivers, declarations and initiatives driving the ESD agenda, most notably The UN Decade of Education for Sustainable Development (DESD) - 2005-2014 (UNESCO, 2004). This was established as an outcome from the World Summit on Sustainable Development held in South Africa in 2002 (UN, 2002). The main aim of the DESD was to integrate both the principles and practice of ESD into all facets of learning and the education sector. The final report (UNESCO, 2014) states that whilst the DESD helped to lay a solid foundation for ESD, ESD has yet to be fully embedded in the education systems of most countries.

ESD policy in the UK is being led by the Quality Assurance Agency (QAA) and the Higher Education Academy (HEA). They have formed the ‘QAA/HEA Education for Sustainable Development Group’ with a view to incorporating ESD in UK Higher Education Curricula. They have produced a guidance document in which they set out a framework for curriculum design, delivery and review; with a focus on graduate outcomes and teaching, learning and assessment (QAA, 2014). The guidance is intended to support all educators attempting to embed the principles of SD in their discipline.

The Higher Education Funding Council for England (HEFCE) have also published a framework outlining their support for ESD and how it will influence their future funding (HEFCE, 2014). In the report they state their intention to support further research on carbon reduction, the Revolving Green Fund, the Catalyst Fund for sustainability projects, and analyse the inclusion of SD in multi- and inter-disciplinary REF (Research Excellence Framework) submissions, and more specifically, how the REF has influenced research into ESD (HEFCE, 2014).

Notwithstanding the plethora of policies and frameworks in place to assist Higher Education Institutions (HEI) in the embedding of ESD in the curricula, uptake is not guaranteed or by any means uniform. Resistance or common barriers to the integration of ESD in HEI include a lack of knowledge or awareness of the principles of SD, a lack of senior management support, SD being seen as irrelevant in some disciplines, perceived threats to academic integrity or freedom, resistance to change, lack of resources (time, funding, information) and an already overcrowded curriculum (Lozano *et al*, 2013, Verhulst and Lambrechts, 2015).

## Research approach

In order to investigate institutional support and provision for ESD at MMU, a case study approach was adopted in the School of Science and the Environment. High level strategies and the availability of resources were documented. The uptake and awareness of these resources were then assessed through a series of semi-structured interviews. The School of Science and the Environment was chosen for this study as it provides a range of courses and staff in different disciplines: Chemistry and Forensics, Biology, Environmental Science, Environmental Management and Geography (including Physical and Human

Geography). This context provides the grounds to analyse a number of inter and intra disciplinary perspectives.

#### Mapping institutional policies, plans and programmes for ESD

An audit of the University's policies and strategies was carried out to identify support for the ESD agenda. In addition to this, the role and responsibilities of the University's ESD Coordinator was mapped as this is a specific resource provision in terms of ESD.

#### Semi-structured interviews

A series of semi-structured interviews were carried out with coordinators for 24 units in the three Divisions across the School: Chemistry and Forensics (n=7), Biology (n=6) and Environmental and Geographical Sciences (n=11). Of the 24 units analysed in the research, 11 were female led and 13 were male led.

Interviews were based on a set of predetermined questions with a Likert-type 5 scale response measurement, and additional open-ended questions to allow the conversation to unfold and issues to be explored (Longhurst, 2010). Likert-type scales represent a range of ordinal responses (Jamieson, 2004) from one extreme to another e.g. from strongly agree to strongly disagree (Robinson, 1998). Whilst simplistic in form, Likert-type scales have been shown to be an effective measure of self-efficacy (Maurer and Pierce, 1998).

#### Coding

Free-form responses from the semi-structured interviews were transcribed and analysed using thematic analysis through an inductive approach (Byrne, 2016). Codes were assigned to the data from the interview transcripts in order to develop themes and subthemes (Lincoln and Guba, 1985) using the QSR International's NVivo 10 software package.

## **Results and discussion**

#### Institutional support and provision for ESD

At Manchester Metropolitan University there are a number of strategic initiatives that support ESD. The University has a designated Centre for Excellence in Learning and Teaching (CELT). CELT offers a wide range of workshops, accredited units and bespoke support for staff in relation to the ESD agenda. The University also has a dedicated ESD coordinator whose primary role is to "provide support and act as a point of reference to academics across the University, and to co-ordinate activities for initiatives on Education for Sustainable Development (ESD)" (MMU, 2013).

The University's Strategy for Learning, Teaching and Assessment (MMU, 2014) states that: "All programmes must identify the ways in which their curriculum incorporates concepts of internationalisation, global citizenship, sustainability and social responsibility". One aim of the strategy is for it to act as a driver across the University to embed ESD within the curriculum.

MMU worked with the NUS and other selected Universities to develop the National Union of Students Responsible Futures accreditation mark. MMU were invited to consult, as they were perceived to be leaders in the field of ESD. MMU were awarded the Responsible Futures accreditation mark in 2015 and retained the award in 2016. One of the prerequisites of the award is 'a desire to develop a whole-institution approach to embedding sustainability and social responsibility across the curriculum'.

MMU also has an externally certified Environmental Management System (ISO14001:2015). There are commitments in the system, most notably in the Environmental Sustainability Strategy and Policy to support the ESD agenda in all areas relating to student experience (2014b).

It is clear that at a strategic level, the University has aligned itself with the principles of ESD in line with the recommendations from the Quality Assurance Agency (QAA) and the Higher Education Academy (HEA). However, it is clear from the responses in Figures 1-3, that a high percentage of staff surveyed were unaware of either the University's strategic direction in this area, or of the resources available to them to support the embedding of ESD within their teaching.

### Staff awareness of MMU priorities and provision for ESD

The responses to the question ‘Manchester Metropolitan University has clear institutional priorities in respect to embedding ESD in the curriculum’ are shown in Figure 1. Staff opinions on this question were polarised with 37.5% agreeing or strongly agreeing, 25% disagreeing or strongly disagreeing, and 37.5% stating neither.

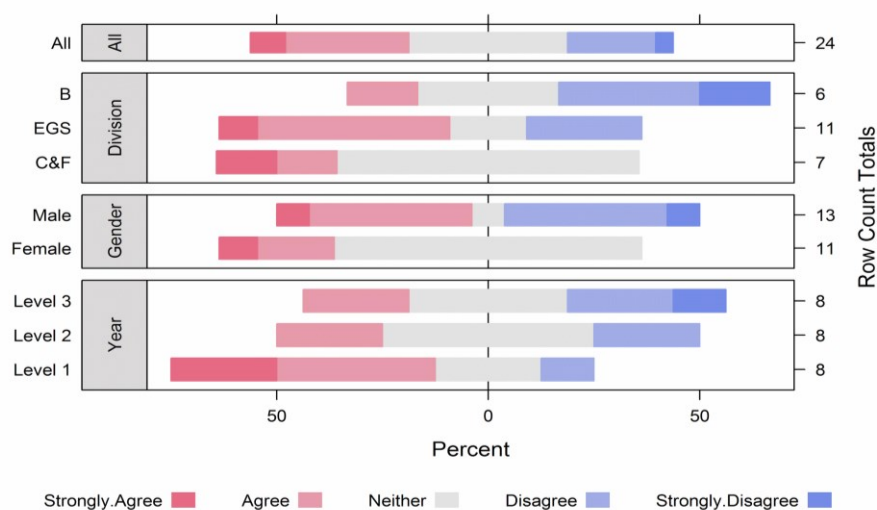


Figure 1: Response to the question - ‘Manchester Metropolitan University has clear institutional priorities in respect to embedding ESD in the curriculum’

By division, Biology were the least likely to agree to the statement in Figure 1 (83% either disagreed or stated neither, 17% agreed). Comments to support these findings included [the university should] “Inform staff more clearly that this is something the University tries to achieve” and also that [ESD is] “Not actively promoted anyway. I do incorporate it in the unit, it is part of what we teach but not because Manchester Metropolitan University says so.”

One unit coordinator in Environmental and Geographical Sciences suggested that academics “need to understand if it is a real priority of the university, so they can make time to do it... It is an already tight and cramped teaching scheme because of constructive alignment... Does it need to be in the learning outcomes? Clarity needs to be provided on that as well.” Another unit coordinator from Environmental and Geographical Sciences highlighted a potential issue with the communication of institutional priorities on this agenda: “It doesn't need improving. We have a free hand to do it if we think it enhances. I never had any line manager saying to me what needs to be in the curriculum and we have freedom over this.”

Similar opinions have also been expressed by unit coordinators in Chemistry and Forensics “Academics do [include ESD] but for it to be driven by the university that is not happening” and “if they don't make it compulsory, it's difficult because you don't have time to do it.”

Whilst the University does have both strategies and resources in this area (including the aforementioned ESD coordinator post), the barriers to uptake reported here that are similar to those reported in the wider literature. For instance, inefficient communication and shared information, an overcrowded curriculum, and a lack of time to make the necessary changes (Verhulst and Lambrechts, 2015).

There was a clear split in male responses to this question, with 46% agreeing (one strongly) and 46% disagreeing (one strongly). Only 8% stated neither as their preference. Conversely, none of the female interviewees either disagreed or strongly disagreed to this statement. The majority of female respondents reported neither (73%), with only 27% stating that they either agreed or strongly agreed with the statement.

Unlike in the divisions of Biology or Environmental and Geographical Sciences, no negative responses were recorded in Figure 1. from Chemistry and Forensics. This could be an artefact of the interviewees all being female from this division. However, the literature suggests that there is little evidence to support a significant difference regarding attitudes towards organisational change (in this instance, strategic decisions to incorporate ESD within the curriculum) based purely upon gender (Iverson, 1996; Cordery et al., 1993; Vakola et al., 2004). In order to determine if there is a correlation with gender, this pilot study would have to be extended across other Schools within the University.

From the results of the coding, it became apparent that a top down (n=17) approach was preferred in the School when it came to establishing and communicating ESD as an institutional priority (Table 1.). Less support for a bottom up approach was recorded (n=3). Chemistry and Forensics demonstrated the greatest preference for a top down approach of any of the divisions (n=12). Lozano (2010) recommends top-down managerialism as one solution to overcoming a slow adoption of ESD. However, it has been noted by Hoover and Harder (2015) that in order for a top-down approach to work, the message needs to be streamlined. Too many policies and strategies can add to confusion and dilution of strategic principles.

The responses to the question ‘Academic staff are sufficiently supported in respect to embedding ESD within their units’ are shown in Figure 2. Overall, staff were almost equally split in their response to this statement. 25% strongly agreed, 29% agreed, 42% disagreed and 4% strongly disagreed. No interviewees reported neither.

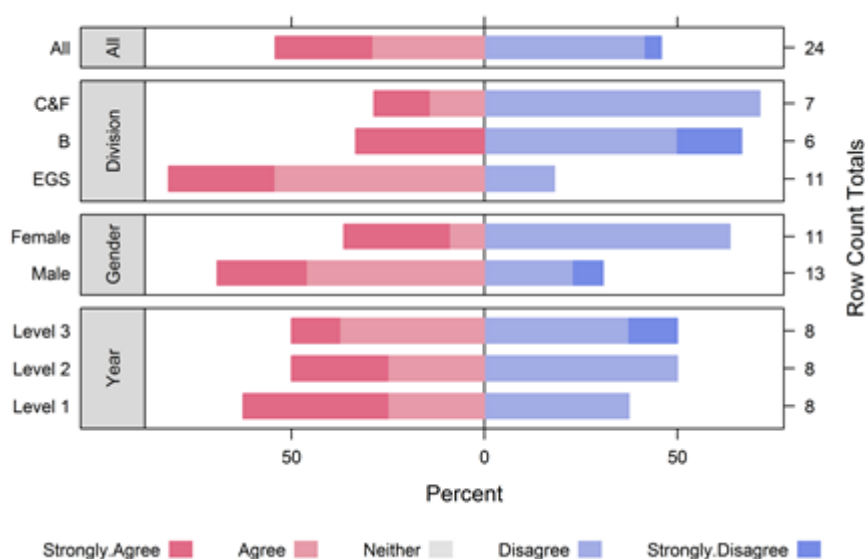


Figure 2: Response to the question - ‘Academic staff are sufficiently supported in respect to embedding ESD within their units’

However, there was less uniformity when the responses were considered at divisional level. The patterns of agreement and disagreement were similar in the division of Biology and in Chemistry and Forensics, with the majority disagreeing (or strongly disagreeing) (n=67%, n=71% respectively). Unit coordinators in Chemistry and Forensics also made more references to a lack of available resources in this area (Table 1.),

double that from colleagues in Environmental and Geographical Sciences (n= 6 to 3). Interestingly, there were no references to a lack of resources in Biology, despite the perceived lack of support recorded in Figure 2.

There was a marked contrast in the division of Environmental and Geographical Sciences, with 82% broadly in agreement as opposed to 18% in disagreement. This result is in part supported by the findings in Figure 3, where staff from the division of Environmental and Geographical Sciences are more likely to be aware of the resources available to fulfil this agenda.

The responses to the question ‘I am aware of the resources available to me to fulfil this agenda’ are shown in Figure 3. Overall, responses were fairly even split with 42% either agreeing or strongly agreeing, as opposed to 50% disagreeing or strongly disagreeing (8% neither).

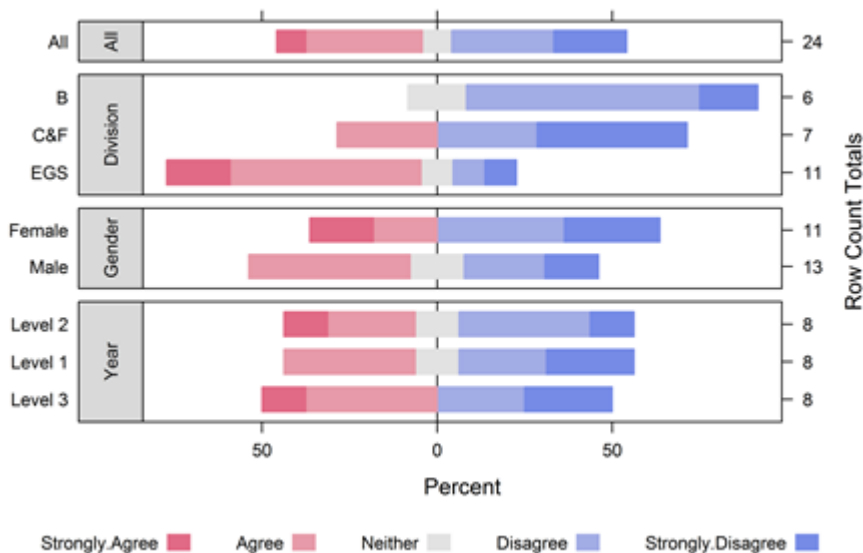


Figure 3: Response to the question - ‘I am aware of the resources available to me to fulfil this agenda’

There are however noticeable differences between the three divisions. In Biology, no staff members stated that they were aware of the resources available to them to fulfil the ESD agenda. Whilst 17% stated neither, the remaining interviewees all disagreed or strongly disagreed with the statement (83%). Whilst there was some support for this statement in Chemistry and Forensics (29%), the majority were also opposed (71%).

Table 1. suggests that many of the types of resources requested by staff are already available in the organisation. However, a lack of communication or knowledge of staff of these resources has presented a barrier to uptake. More effective communication of available ESD resources at School level is therefore recommended. There is an opportunity to incorporate ESD in the School’s curriculum review, as lecture materials for the new units have yet to be written. One member of staff commented however that “this has to be an action plan with necessary support and examples. Not just a tick box exercise”.

### ESD as a multi-disciplinary approach

The responses to the question ‘ESD is relevant to my subject area’ is shown in Figure 4. Many of the staff interviewed either agreed or strongly agreed that ESD was relevant to their subject area (88%). All staff members were decisive on their feelings for this issue, with no instances of ‘neither’ elected. The findings from the coding (Table 1.) also recorded more references (n=13) concerning the relevance of ESD to units, than a perceived lack of relevance (n=7). This indicates that if a more targeted approach was taken in the School, there would broadly be cross divisional support to include ESD in all disciplines.



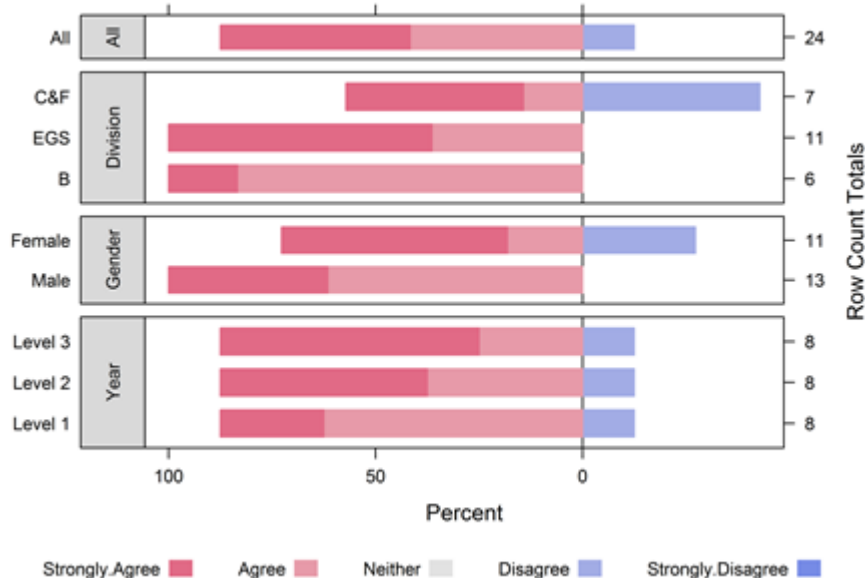


Figure 4: Response to the question - 'ESD is relevant to my subject area'.

There were differences in opinions between the divisions, with all staff from Biology and Environment and Geographical Sciences in general agreement with the statement (Figure 4.). An Environmental and Geographical Sciences unit coordinator stated that “sustainable development is at the core of all we teach”. In Biology, one unit coordinator reported that “sustainable development is essential for education in general for society, it is however irrelevant to this unit - but not to the field”.

In Chemistry and Forensics, attitudes were more divisive (43% strongly agree, 14% agree, 43% disagree). A comment from one unit coordinator was that “I can see how it's important, but it's not what I would emphasise to my students”. There is a perception amongst some that embedding education for sustainable development in the curriculum depends upon the context. However, the subject benchmark statement for Chemistry includes a requirement that BSc (Hons) degrees must equip their students to “develop knowledge and understanding of ethics, societal responsibilities, environmental impact and sustainability, in the context of chemistry” (QAA, 2014b).

Borg *et al* (2012) suggest that collaborative work between staff from different disciplines has the potential to help overcome this barrier as some disciplines tend to integrate ESD more easily than others. This is something that may become more common due to a greater focus on this area in the REF (for example, support for the inclusion of SD/ ESD in multi- and interdisciplinary submissions). Inter-disciplinary work related to this area might also provide an approach to explore and promote the relevance of ESD in all programmes (and units) across the School.

Although inter or multidisciplinary teaching can present a range of challenges (for example, it can take longer to plan and write materials), Pharo *et al* (2012) states that a multidisciplinary approach has the potential to enhance teaching for real life applications. In addition, education focusing on one discipline only, is becoming less appropriate to address the complexities of sustainable development (Schmitz *et al*, 2010).

The responses to the question 'Teaching students about ESD will help to meet requirements of future employers' is shown in Figure 5. There was a general consensus in support of this statement as the majority of staff either agreed or strongly agreed (92%) with the remaining stating neither (8%). No negative responses were recorded.

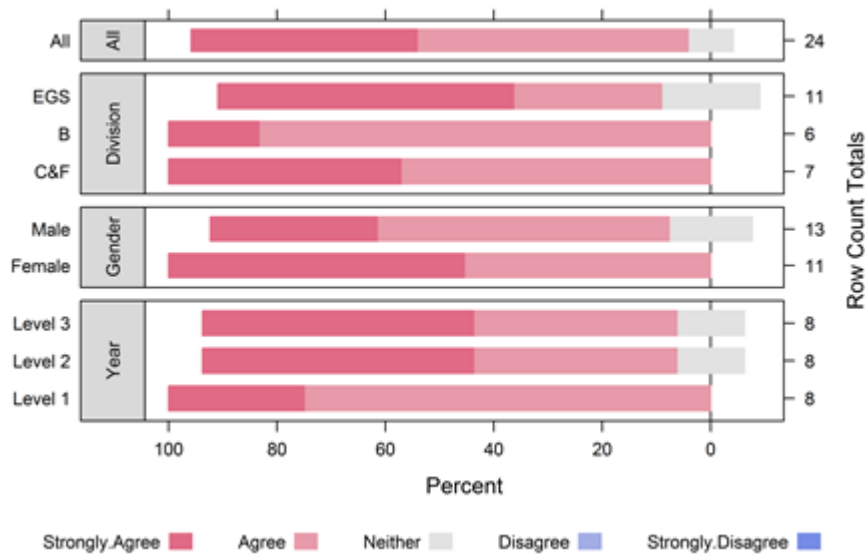


Figure 5: Response to the question - 'Teaching students about ESD will help to meet requirements of future employers'

All of the responses from the Chemistry and Forensics division either agreed or strongly agreed that a student's knowledge of ESD would help to meet the requirements of future employers; this is despite a proportion previously stating that ESD was not relevant to their subject area (Figure 4.). The teaching of ESD as a key employability skill was in some cases disassociated from the teaching of core subject materials "if careers can embed it in their training it would be quite useful." Research undertaken into employers' expectations of graduates, found that employers consider not only a candidate's core knowledge, skills and values; but also their awareness of sustainable development (Cade, 2008). SD as a key employability knowledge metric, can and should be taught in the context of the discipline; something that should also be considered in response to the Teaching Excellence Framework (TEF).

Theme	Subtheme	Detail	Number of staff				Number of references				
			C&F	EGS	B	Total	C&F	EGS	B	Total	
coverage	covered in the unit		3	8	0	11	4	37	0	41	
	not covered in the unit		2	0	0	2	2	0	0	2	
	partially covered		0	3	1	4	0	3	1	4	
relevance	relevant to the unit		2	3	1	6	3	7	3	13	
	irrelevant to the unit		2	1	1	4	3	3	1	7	
preferred approach	top down approach		1	2	1	4	12	1	3	17	
	bottom up approach		1	1	1	3	1	1	1	3	
Willingness	will to change units		3	5	0	8	7	7	0	14	
	not willing to change units		1	3	0	4	1	5	0	6	
resources	resource presence		2	4	1	7	2	15	2	19	
	lack of resources		3	2	0	5	6	3	0	9	
	lack of use of resources		0	2	0	2	0	2	0	2	
	use of resources		0	1	0	1	0	1	0	1	
	resource types	bespoke support*†		0	2	0	2	0	6	0	6
		support for unit design*†		0	2	0	2	0	7	0	7
		support for assessment*†		0	2	0	2	0	6	0	6
		peer learning*		0	2	0	2	0	5	0	5
		advice sheet*†		1	1	0	2	1	4	0	5
		case studies‡		1	2	0	3	2	6	0	8
run the tool on units†			0	2	0	2	0	5	0	5	
staff development sessions*		2	2	1	5	5	8	3	16		
short courses*		1	1	0	2	1	5	0	6		

\*offered centrally

†offered at School level

‡partially offered centrally

Table 1. Thematic (coding) analysis of semi-structured interviews in the School of Science and the Environment ( C&F= Chemistry and Forensics, B= Biology, EGS= Environmental and Geographical Sciences).

## Conclusion

Despite University wide strategies and support for the ESD agenda, this study has found that ESD is currently far from being embedded in the curriculum across the School of Science and the Environment.

The barriers to uptake include a lack of knowledge of institutional priorities and resources, lack of knowledge and skills to deliver subject specific ESD, and a perceived lack of relevance in some disciplines.

External factors including the requirements of employers, and also those of the HEFCE, QAA, TEF and the REF may go some way in providing extra incentives to further promote ESD across the School.

The resources for ESD available to teaching staff need to be clearly identified and effectively communicated, preferably via senior management. Furthermore, training for individual staff, needs to be in a sector specific context to bypass any concerns regarding the relevance of ESD to the subject material.

## References

- Barth, M. Rieckmann, M. 2012. Academic staff development as a catalyst for curriculum change towards education for sustainable development: an output perspective. *Journal of Cleaner Production*. 26. 28-36.
- Borg, C., Gericke, N., Höglund, H. O., & Bergman, E. 2012. The barriers encountered by teachers implementing education for sustainable development: discipline bound differences and teaching traditions. *Research in Science & Technological Education*, 30(2), 185-207.
- Byrne, D 2016. 'Data analysis and interpretation', *Project Planner* [online]. , [Accessed 27 February 2017], doi: 10.4135/9781526408570.
- Cade, A. 2008. Employable graduates for responsible employers: *Report to the Higher Education Academy* [online] [accessed on 02/03/17] <https://www.heacademy.ac.uk/system/files/esd-employable-graduates-responsible-employers.pdf>
- Cordery, J., Sevastos, P., Mueller, W. and Parker, S. 1993, "Correlates of employee attitudes toward functional flexibility", *Human Relations*, Vol. 46, pp. 705- 23.
- HEFCE, 2014. Sustainable development in higher education: HEFCE's role to date and a framework for its future actions. HEFCE. England.
- Hoover, E., Harder, M.K. 2015. What lies beneath the surface? The hidden complexities of organisation change for sustainability in Higher Education. *Journal of Cleaner Production*. 106. 175-188.
- IUCN, 1970. Tenth General Assembly Report Volume II: Proceedings and Summary of Business. IUCN Publications. New Delhi.
- Iverson, R.D. 1996, "Employee acceptance of organizational change: the role of organizational commitment", *The International Journal of Human Resource Management*, Vol. 7, pp. 122- 49.
- Jamieson, S. 2004. Likert scales: how to (ab)use them. *Medical Education*. 38. 1217-1218.
- Lincoln, Y. S., Guba, E. G. 1985. *Naturalistic inquiry*. Sage. London.
- Longhurst, R., 2010. Semi-structured Interviews and Focus Groups. In Clifford, N. French, S. and Valentine, G. (ed). *Key Methods in Geography*. 2nd Eds. Sage. London. pp103-115.
- Lozano, R. 2010. Diffusion of sustainable development in universities' curricula: an empirical example from Cardiff University. *Journal of Cleaner Production*, 18(7), 637-644.
- Lozano, R. Ceulemans, K. Alonso-Almeida, M. Huisingh, D. Lozano, F. Waas, T. Lambrechts, W. Lukman, R. Hüge, J., 2015. A review of commitment and implementation of sustainable development in higher education: results from a worldwide survey. *Journal of Cleaner Production*. 108 Part A, 1-18.

- Lozano, R. Lukman, R. Lozano, F. Huisingh, D. Lambrechts, W., 2013. Declarations for sustainability in higher education: becoming better leaders, through addressing the university system. *Journal of Cleaner Production*. 48. 10-19.
- Maurer, T., Pierce, H., 1998. A comparison of Likert scale and traditional measures of self-efficacy. *Journal of Applied Psychology*, Vol 83(2), 324-329.
- MMU, 2014, Strategy for learning, teaching and assessment, Manchester Metropolitan University, Manchester [online] [accessed on 20/02/17] <http://www.celt.mmu.ac.uk/ltstrategy/index.php>
- MMU, 2013.ESD Coordinator Job Description. Manchester Metropolitan University, Manchester.
- MMU, 2014b, Environmental Sustainability Strategy, Manchester Metropolitan University, Manchester [online] [accessed on 20/02/17] <http://www.mmu.ac.uk/environment/ems/index.php>
- National Environmental Policy Act of 1969, 1970. Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970. Senate and House of Representatives of the United States of America in Congress. Washington.
- Pharo, E. , Davison, A., Warr, K., Nursey-Bray, M., Beswick, K., Wapstra, E., & Jones, C. 2012. Can teacher collaboration overcome barriers to interdisciplinary learning in a disciplinary university? A case study using climate change. *Teaching in Higher Education*, 17(5), 497-507.
- QAA, 2014. Education for sustainable development: Guidance for UK higher education providers. The Quality Assurance Agency for Higher Education. Gloucester.
- QAA, 2014b. Subject Benchmark Statement: Chemistry. QAA. England.
- Robinson, G. 1998. *Methods and Techniques in Human Geography*. Wiley. New York.
- Schmitz, C.L., C.H. Stinson, and C.D. James. 2010. Community and environmental sustainability: Collaboration and interdisciplinary education. *Critical Social Work* 11: 3.
- UN, 2002. World Summit on Sustainable Development in Johannesburg. A/CONF.199/20. South Africa.
- UNCED, 1992. Report of the United Nations Conference on Environment and Development. Agenda Item 21, UN Doc A/Conf. 151/26. Rio
- UNESCO, 2004. United Nations Decade of Education for Sustainable Development 2005- 2014. Paris
- UNESCO, 2014. Shaping the Future We Want. UN Decade of Education for Sustainable Development 2005- 2014 Final Report. UNESCO. France.
- UNESCO, n.d. Education for Sustainable Development Unit [online] [accessed on 15/02/17] <http://www.unescobkk.org/education/esd-unit/definition-of-esd/>
- Vakola, M., Tsaousis, I., & Nikolaou, I. 2004. The role of emotional intelligence and personality variables on attitudes toward organisational change. *Journal of managerial psychology*, 19(2), 88-110.
- Verhulst, E. Lambrechts, W. 2015. Fostering the incorporation of sustainable development in higher education. Lessons learned from a change management perspective. *Journal of Cleaner Production*. 106. 189-204.

WCED, 1987. *Our Common Future*. Oxford University Press. Oxford.