

2012

Values-led education for sustainability: crossing boundaries

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<http://hdl.handle.net/10026.1/12325>

University of Plymouth

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PedRIO Research Fund Report Final report

The final report consists of a brief summary of the project and findings, together with detailed appendices providing ethics approval details and due to be published papers/ book chapter.

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Names of other staff involved: Julie Goodhew; Donna Aspinwall; Nina Hughes

Title of project Values-led education for sustainability: crossing boundaries

Type of project: Action Research/Development

Please provide some information about the project, in the format below: (1-2 pages)

Background to project

The drive to embed sustainability within higher education programmes has received increasing attention following the UN Declaration of 2005-2014 as the Decade for Education for Sustainable Development (ESD). This project seeks to move ESD forward by evaluating the impact of values-based ESD training pedagogies across two diverse undergraduate disciplines

Aims of project

To evaluate the extent to which values-based pedagogic techniques can motivate learners from different disciplines to engage with sustainable development.

Hypothesis

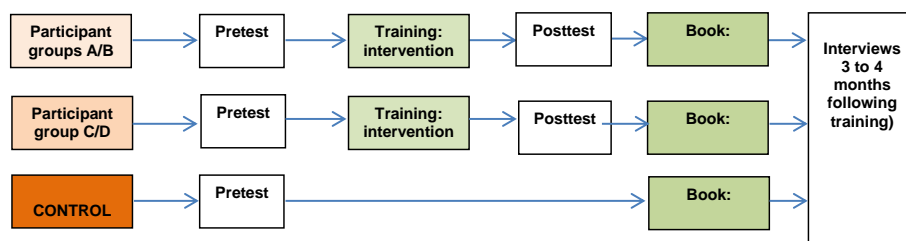
Specific pedagogic interventions can help learners clarify their personal values orientations in a sustainability context

Research objectives

1. Analyse preliminary data taken from prior work with the construction discipline at Plymouth and elsewhere to determine the impacts of values-based pedagogies
2. Devise *quantitative* research methodologies to assess the immediate effect of face-to-face and at-a-distance pedagogies across two diverse academic disciplines: design and engineering

3. Devise *qualitative* research methodologies (focus groups or interviews) to assess the longitudinal effect of the pedagogies
4. Deliver -based sustainability face-to-face training programmes to groups of 20 students from two diverse disciplines as the face-to-face pedagogic intervention (targeting 80 learners in all)
5. Collate and analyse collected pre-test/post-test and follow up survey data from the training groups and the control group using descriptive statistics (through SPSS) to identify sustainability awareness, values orientation and worldview shifts in the before and after training conditions and in the following condition (8-12 weeks on)
6. Undertake and analyse focus group discussions (or interviews) to identify any long term changes/shifts among participants and their views on the effectiveness of the training

Research design



Experimental variables

Exposure to training pedagogies
Use of book to supplement training

Dependent variables

Shifts in perceived values awareness using Schwartz orientations
Shifts in values orientations
Attitudinal/worldview shifts using NEP scale

Confounding variables/bias

Gender/age
Past experience of individuals (values/sustainability training)
Volunteer bias – prior interest
Teacher bias
For longitudinal aspects – intervening experience

Methods used:

Phase 1 Literature review: data sourced from pedagogic research and social psychology publications journals reviewed to update prior work carried out by the lead researcher (Murray and Murray 2007; Murray, and Cotgrave 2007; Murray, Brown and Murray 2007; Murray 2010). The review targeted new developments in ESD pedagogies, concentrating on developments in the delivery and evaluation values-centred education and training. The literature review was used to enhance pre-existing values-based learning activities developed by the lead researcher between 2006 and 2010.

Phase 2 Research methods: Finalise research methods

Phase 3 Training Delivery: 2 The enhanced values activities were delivered initially using a face-to-face learning format to 67 undergraduates in groups of 7-21 students, drawn from the two participating disciplines. Following the face-to-face events, participants will be provided with further opportunities to deepen their learning by using an interactive open learning format (a book).

Phase 4 Evaluation (April/May 2012) The evaluation took the form of survey questions delivered pre and post activity. The survey questions will be based on updated values research building on the work of Lynne Kahle's (1983, 2001) List of Values, and Schwartz's (1994, 2006) work on values orientations and universal values, Paul Maiteny's (2002) exploration of pro-sustainability learning and the NEP worldview survey. Shifts in participant perceptions of their core value orientations were analysed using quantitative techniques and were followed up approximately four months later with one-to-one interview sessions.

Results

The project was seriously hampered by external conditions affecting the lead researcher and the serious illness of a key project partner (Sheran Murray), who was unable to participate. As a result, significant delays were experienced in progressing the project. However, four full-day training sessions were provided to 40 Design students and 27 Engineering students and a control group of 22 students was also recruited.

The quantitative results indicated that values clarification did occur as a result of the training, particularly of Design students, who appear to be particularly receptive to change. The pre/post-test values survey also revealed a surprising result, where ALL the groups, including the control group showed a significant increase in the values scores for the value-type *universalism*, which the literature suggests is a key pro-sustainability value. It is difficult to explain this result, except that the sustainability awareness control group (which received no intervention training) may have been raised due the nature of the project, resulting in an element of private reflection. The NEP survey results showed clearly significant positive shifts in pro-ecological worldview resulting from the training. 11 interviews were undertaken as the qualitative element, less than was hoped for (due to the difficult timing – the interviews had to be scheduled in the summer revision/exam period). Nonetheless, the interviews revealed positive outcomes by way of providing substantial evidence of values reflection, mind-set change and in some cases behaviour changes arising from the training.

Associated publications (See appendices)

Murray P. Murray S., Douglas-Dunbar A. (2014 pending) Evaluating values-centred pedagogies in Education for Sustainable Development *International Journal of Sustainability in Higher Education*, (accepted July 2012)

Murray P (2013 pending) Leading by Design: cultivating self-leadership for sustainability, in Crocker and Steffman, *Behaviour Change, Consumption and Sustainable Design*, Earthscan, London

Murray P., Goodhew J. (2013 pending) The Heart of ESD: Personally engaging learners with sustainability (Being finalised; to be submitted to *Environmental Education Research*)

Keywords

Education for sustainability, values, engagement

Breakdown of project budget expenditure (approximate*)

A detailed official budget expenditure breakdown has been requested but has not yet been received. The following are approximations only.

Resource purchase (follow-up books/materials/images) £2440

Workshop materials/printing: £1012

Catering for workshops (five events) £670

Staff: RA support (Nina Hughes) £580

Staff: RA support (Julie Goodhew £2500 (awaiting final costs/2012 work input to finish)

Staff Project assistant support (Donna Aspinwall) £3750

Travel and subsistence £240

Conferences £2500 (extended to 2013)

Total £13492

Please forward the final report to pedrio@plymouth.ac.uk by the **31st October 2012**

APPENDICES

ETHICS APPROVAL

Pedagogic Research Institute and Observatory (PedRIO)

Project Leader Paul Murray

School / Faculty/ Directorate Architecture, Design and the Environment

Project Title: Values-led education for sustainability: crossing boundaries

ETHICS PROTOCOL

The University of Plymouth's *Principles for Research Involving Human Participant* have been consulted in producing the protocols below.

<p>Informed Consent: No children will be involved in this project.</p> <p>The research data being collected will not be of a 'sensitive' nature and no observations of the participants will be recorded in any way during the training events. A written consent form will be prepared to cover the aims, objectives and nature of the research, explaining how the data will be used, ethical principles, anonymity, the right to withdraw without penalty and when and how they can withdraw their data etc. Participants will sign the consent form prior to the first survey.</p>
<p>Openness and Honesty: The participants will be informed of the precise nature of the research being undertaken.</p> <p><i>Note that deception is permissible only where it can be shown that all three conditions specified in Section 2 of the University of Plymouth's Ethical Principles have been made in full. Proposers are required to provide a detailed justification and to supply the names of two independent assessors whom the Sub-Committee can approach for advice.</i></p>
<p>Right to Withdraw: Included in the signed consent form</p>
<p>Protection From Harm: Although not strictly required, the pedagogies to be used in this research were processed through the Faculty of technology Ethics committee in 2007, through which the teaching methods were not considered to place participants at psychological or other risk. This has been borne out by the 800 or so participants to date.</p> <p>The survey form (preliminary draft attached) has</p>
<p>Debriefing: A de-brief will be provided after the first post-test survey and the final survey/focus group</p>
<p>Confidentiality: Participants will be assured of confidentiality throughout. Coded personal identifiers will be used to ensure that participants complete the same pre-test/post-test survey forms, no names will be taken against any of the surveys or focus groups.</p>
<p>Professional Bodies Whose Ethical Policies Apply to this Research: British Psychological Society guidelines will be followed throughout the research:</p>

http://www.bps.org.uk/sites/default/files/documents/code_of_human_research_ethics.pdf

Ethic Approval letter

Project Title: Values-led education for sustainability: crossing boundaries
Project Leader Paul Murray

The proposal states: 'For this reason participants will sign a written consent form following a detailed briefing on the nature of the research'

I have to point out that there is no requirement by this University that such a form has to be filled out in every instance. The participants are volunteers, therefore assent can be assumed by their willingness to take part and can be gathered orally at the initial briefing. As the BPS guidelines state, 'The principle of proportionality should apply, such that the procedures for consent are proportional to the nature of participation and the risks involved.' (p 15). From the proposal it is clear that a full briefing will be given and the risks are minimal.

Another point: '...in the case of the focus group recording,... [data] will be destroyed (post analysis).' University rules require the storage of data for a period of 10 years (!) although this is apparently under review. I would suggest rephrasing this to: 'data will be stored in compliance with University guidelines.' This means locked cabinets and/or password protected PCs.

Hi. Here are my comments on Paul Murray's application -

I have no serious problems with it but....

I don't believe the written consent forms are necessary due to the nature of the project and its participants. I think a good briefing, debrief and clear explanation of how to withdraw (all of which are here) are enough. I don't think researchers should be made to jump through hoops.

One thing I'd like to see is that/where the students will be assured that participation in this project will not affect their grades in any way (positively or negatively).

I'm slightly concerned that there's an element of 'reward' for participants which might skew results (or nature of participants) but don't think this is very unusual. A sentence addressing this would be helpful for me.

Regards

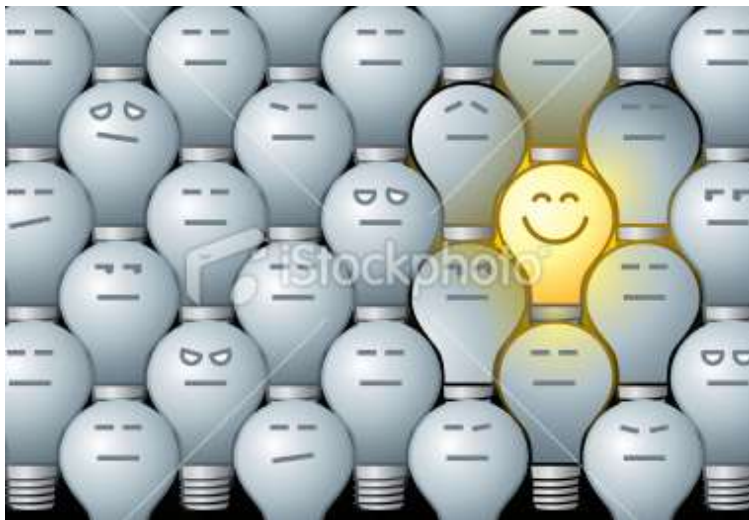
PUBLICATIONS: REFEREED BOOK CHAPTER (ACCEPTED AUGUST 2012)

LEADING BY DESIGN

Cultivating self-leadership for sustainability

Paul Murray

Invited book chapter in *Behaviour Change, Consumption and Sustainable Design*, Editors: Robert Crocker and Steffen Lehmann (Earthscan / Routledge, pending 2013)



"As often as the misdeeds of human beings pollute the elements, God will use human torments and calamities to purify them again, for God wants a clean Earth and will not allow it to be destroyed through human actions"

Hildegard of Bingen, (1098 – 1179)

(Source: Bowie, 1997, p19)

Introduction

The quest for sustainability is nothing new; for centuries visionaries such as the Christian, Hildegard of Bingen have been warning us about our destructive nature. In the past, it may not have mattered that these warnings went unheeded as however serious, the damage tended to be localised in nature. But in the 21st Century, with our burgeoning population and a seemingly unquenchable thirst for wealth and prosperity, the stakes have changed. The 1360 scientists who contributed to the 2005 Millennium Ecosystem Assessment express our current predicament well:

“Human activity is putting such strain on the natural functions of the Earth, that the ability of the planet’s ecosystems to sustain future generations can no longer be taken for granted”

(MEA,

2005, p5).

The MEA is implying is that the 21st Century quest for sustainability may be a quest for survival, not just of other species but our own. At the very least, sustainability is about fundamentally changing the way humanity operates in the world. These changes will, eventually, involve everyone, but change requires leadership and the people able to contribute most will be those who can carry others with them by demonstrating deep levels of integrity founded upon sincere personal engagement and a sound understanding of the territory involved. These people will embody qualities we can describe as ‘self-leadership for sustainability’, an idea which centres on a person’s ability to inspire themselves and others to think, and thereby act, differently. The concept of self-leadership for sustainability is particularly relevant to people working at a professional level because as professionals, they have the capacity to influence their clients, colleagues and, given their role and status in society, the public at large. As identified in Figure 1 below, design professionals have a great deal to offer because they can create the genuinely ‘sustainable’ solutions and products society needs. Designers are able to feed into most, if not all the strata of society that influence sustainability, however, from an ethical standpoint, sustainable design could go much further than the development of new widgets, a book cover or an eco-house. Susan Szenasy, design educator and editor of the Metropolis magazine described design as a responsibility *“to the planet, to the regions we live in, to the community, to the profession, to the client, and to the self.”* (Szenasy, 2003a). Szenasy points to the reality that sustainability is not just about our work outputs; a sustainable future will almost certainly prove elusive unless people in general, not just designers, accept a responsibility to cultivate sustainable ways of living and working. In other words, behaviour matters.

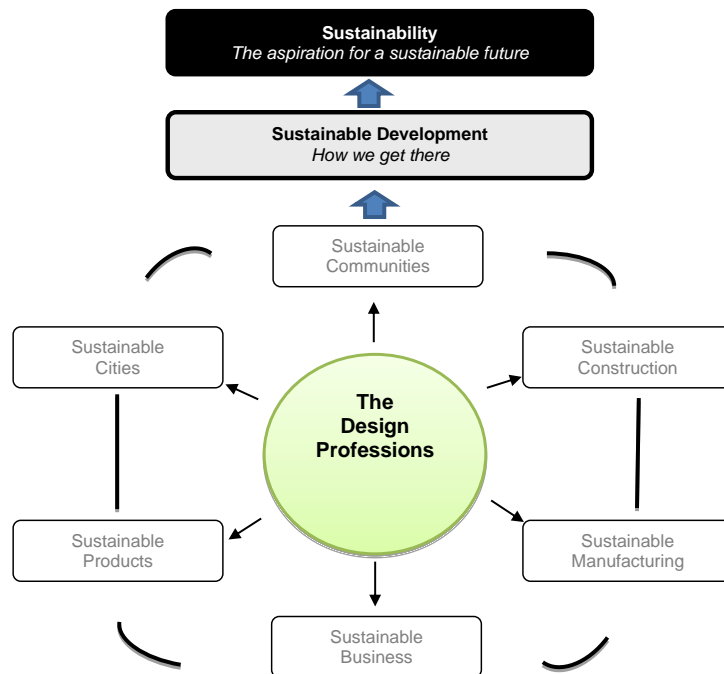


Figure 1 *The Design professions and sustainability*

Anthony Cortese, President of Second Nature, sees the path to sustainability “*as much one of culture and values as it is about scientific and technological development*” (Cortese, 2010, p8). WWF sees addressing today’s sustainability challenges as “*concerted change amongst government, business and citizens*” (WWF, 2008, p9). This where the concept of self-leadership for sustainability becomes useful. Self-leaders engage an inwardly-led process of self-influence, which they mobilise to achieve positive outcomes (Manz and Neck, 2004). Self-leadership is, in essence, about integrity. In demonstrating integrity, ‘self-leaders for sustainability’ will empower new and innovative behaviours in the pursuit of a common, sustainability-led vision (Waldman, Ramirez, House and Puranam, 2001) and mobilise changes in their own behaviour to enable that vision to become attainable (Northouse, 2007). In this way, professionals, design or otherwise, who cultivate self-leadership qualities will become powerful change agents in both their personal and professional capacities. It is with this in mind that this chapter examines an initiative developed at Plymouth University, England that seeks to promote self-leadership qualities

of through a process of structured reflection and thinking. The initiative centres on the delivery of an intensive face-to-face training programme, loosely called *Sustainability Training*, supported by a supplementary, interactive book, *The Sustainable Self* (Murray, 2011). The initiative is designed to deliver an inwardly-focused, values-led education for sustainability that focuses on the personal attributes that can motivate, empower and equip individuals to live and work more sustainably. This chapter reviews the initiative in terms of:

- The theoretical role of values in self-motivation and behaviour
- Embedding values within education and training programmes for sustainability
- The setting of the training, the delivery model and the activities included
- Feedback and research findings relating to the training
- The role of the supplementary book
- The future prospects for the Plymouth approach.

The significance of values

The premise underlying Plymouth's sustainability training is that moving towards sustainable behaviour is a long-term, value-driven process that takes time and practice, trial and error, to embody. Given this, the exploration of personal values in the context of sustainability and sustainable behaviour is a central feature of the initiative.

Social psychologists generally accept that our attitudes, values and beliefs influence our behaviour. From a psychology perspective, attitudes are our "*predisposition to respond or behave in a particular manner*" to what and whom we encounter in life (Gross, 2005, p350, Oskamp, 1991, p3). Beliefs, on the other hand, are our assessment of the parameters of our world and what is true about that world. Unlike attitudes, which are evaluative and judgement-based, beliefs tend to be neutral and perceived as personal 'facts'. For example, we either believe that 'God exists' or we do not; we either believe that we are too insignificant to make a difference in the world, or we do not. The third construct, values are our aspirational life-goals (like 'happiness') or societal conditions (e.g. 'freedom') that we might desire or wish to pursue (Oskamp, 1991). Figure 2 uses the example of racist behaviour to illustrate how values, attitudes and beliefs work together. A person who holds a value of 'racial superiority', supported by beliefs about particular races (particularly one's own) being superior to others, will also hold discriminatory attitudes about people who seem to be different to them. Together, these three mental constructs make it very likely

that, given the opportunity, the individual concerned will exhibit racist behaviours when encountering others of a different skin colour, creed or nationality. However, some psychologists believe that attitudes and other mental attributes can *follow* behaviour, in which case acting out racist behaviour itself will reinforce the attitudes, values and beliefs that support that behaviour (Bell, *et al* 1996, p33). Clearly, internal factors are not the only influence on behaviour, external factors such as peer pressure, social norms and laws also have some influence. But in the long term, if we want to change un-wanted behaviours and to realise positive ones, we would do well to foster positive values, attitudes and beliefs so that we (or they) no longer *want* to continue old, habitual behaviour patterns.

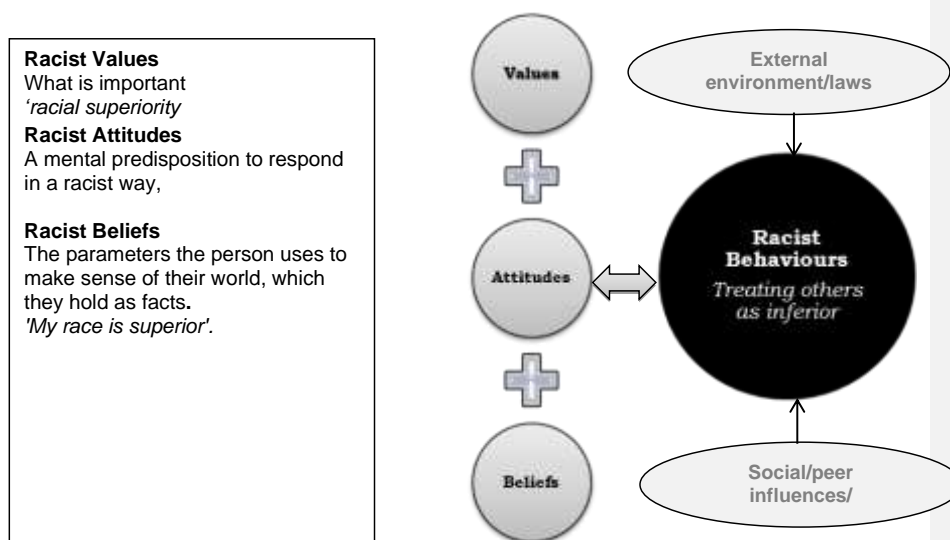


Figure 2 *The influence of values, attitudes and beliefs on racist behaviour*

Even if we accept that the need to promote behaviour change internally, it remains difficult to know where to start as the precise relationship between values, attitudes and beliefs is unclear. While much of the work in social psychology centres on the measurement of attitudes, our attitudes tend to be situation-specific, which is un-helpful in the context of broad lifestyle agendas such as sustainability. Also, we are not generally aware of our attitudes, they tend to arise automatically, making them difficult to observe and reflect. Beliefs are also difficult, mainly because we usually hold our beliefs factual for us, which makes them highly resistant to change. However, values do represent a potential starting point because they can be easily elicited and they influence peoples' motivations right

across situations; an attitude to dogs is unlikely to influence a decision about buying a new fridge, while holding values relating to care for the environment is likely to. Furthermore, one of the early pioneers of values research, Milton Rokeach, identifies values as imperatives for action (not simply a belief about what might be a preferable course of action, but a preference for taking that course (Rokeach, 1976). For these reasons, values theory is worthy of much deeper exploration.

Values theory

In the 1970's, Milton Rokeach defined a human value as "*an enduring belief that a specific mode of conduct or end-state of existence is personally and socially preferable*" (Rokeach, 1976 p159). Thus, values act as mental criteria, which guide actions and life direction (Rokeach, 1976; Schwartz, 1992, p.17) because they represent "*desirable ways of behaving or desirable goals*" (Feather and McKee 2008, p81). In terms of their influence on behaviour, values are associated with motivation (Brown and Kasser 2005; Kollmus and Agyman 2002), which is why values matter in education for sustainability: the motivations they embody have the potential to motivate positive changes in behaviour (Darnton and Kirk 2011).

Rokeach believed that people hold dozens of values, consciously and unconsciously, which he categorised as either *instrumental* or *terminal* (Rokeach, 1976, p160). Instrumental values relate to a particular conduct, or way of being that a person holds as preferable in all situations, whereas *terminal* values are based on the enduring belief that particular end-states are worth striving for. The award-winning psychologist Shalom Schwartz of Israel's Hebrew University questioned Rokeach's instrumental (means) and terminal (ends) classifications and developed his own theory of a universal, cross-cultural structure for human values. For Schwartz, individuals hold their values in a shifting and dynamic hierarchical continuum within which some are more important than others (Schwartz, 1992,). Schwartz defined ten value-types, derived from 57 individual values organised within four motivationally distinct domains (Figure 3).

In Schwartz's theory, depending on their domain, different values conflict with or complement each other. Values in the same or proximate domains complement each other (e.g. like tradition and conformity), while values in opposite domains contradict, such as benevolence and power. Schwartz's research indicates that the 57 values are universal, in

the sense that virtually all people and cultures recognise them. But, the importance that individuals place on particular values at particular times differs dramatically and it is the *relative* importance of values to each other that guides motivation and behaviour (Schwartz, 2009, Schwartz, 1992). This suggests that if the relative importance of specific values changes in an individual, behaviour changes could, in principle, follow (Schwartz, 2009, Darnton and Kirk 2011, p40).

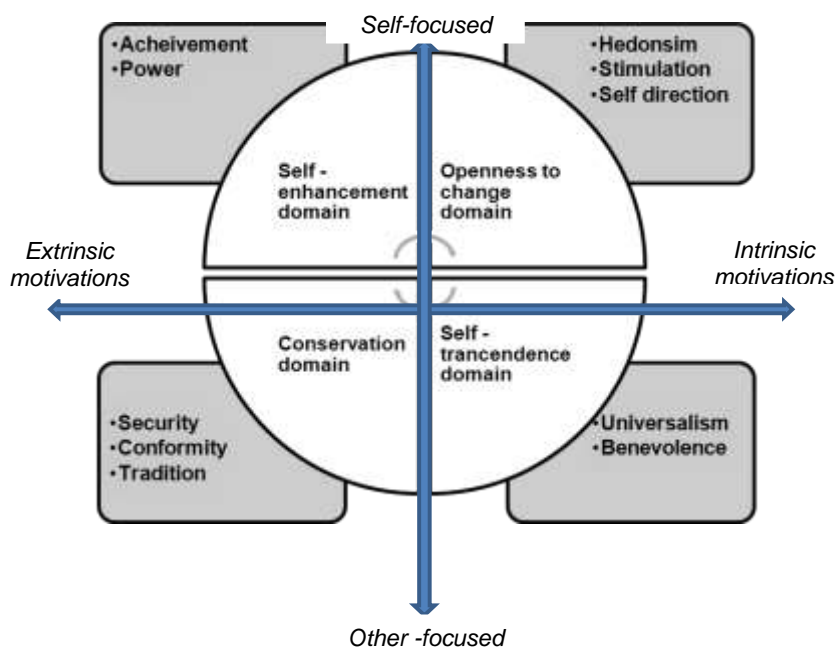


Figure 2 Schwartz's values structure (based on Schwartz, 2009 and Schwartz, 2010)

Richard Ryan and Edward Deci of the University of Rochester link values and motivation to what they describe as our intrinsic and extrinsic goals in life (Deci and Ryan 2000b). Intrinsic goals are concerned with the satisfaction of basic, human psychological needs, creating value orientations such as personal growth, relationships and community involvement (Deci and Ryan, 1985, p5) while extrinsic goals seek external rewards, reflecting values associated with status, image and success (Deci and Ryan 1985, Weinstein 2009). We will move towards intrinsic goals for the inherent fun, challenge or satisfaction involved rather than because of any external pressures but we will pursue extrinsic goals to attain a "*separable outcome*" such as payment, avoiding punishment or

approval from others (Deci and Ryan, 2000a, p71, Deci and Ryan, 2000b). Deci and Ryan identify intrinsic goals with the pursuit of positive human potential, a notion supported in studies exploring the links between values and environmentally responsible behaviour, which found that intrinsic values orientations tend to be associated with higher commitment to ecological stewardship (Brown and Kasser, 2005). In Figure 2, intrinsic motivations are represented by values located in the right hand domains (self-transcendence and openness to change), with extrinsic motivations being allied to the left hand domains (self-enhancement and conservation). Furthermore, the upper domains (openness to change and self-enhancement) are concerned with the expression of personal self-interests while the lower two are socially focused, being about relationships with others, (Schwartz, 2010). Interestingly, there is research supporting this showing that people who highly rank the value universalism (intrinsic value, bottom right domain) are more likely to express pro-human rights attitudes and are associated with the purchase of Fair trade products (See Darnton and Kirk, 2011). Furthermore, other studies exploring the connection between values and environmental awareness found positive correlations between socially-orientated (as against self-orientated) values and environmentally responsible behaviour (Pinto, *et al* 2011). Therefore, it would seem logical that the intrinsic, other-focused values found in the bottom/right self-transcendence domain may be the ones most likely to support pro-sustainability behaviour. Even so, life is not so simple, there is also evidence that intrinsic, pro-social and altruistic values can be over-ridden by more selective, situation-specific motivations based on meeting immediate needs, such as being comfortable, or saving money (Kollmus and Agyman, 2002). While this is undoubtedly a common experience for many, it has also been suggested that “*priming a set of values increases the behaviour that affirms those values and decreases behaviour affirming the opposite values*” (Miao, *et al* 2009, p712). Bearing all this in mind, it would appear that promoting pro-sustainability behaviour may be more about encouraging individuals to *mobilise* their pre-existing intrinsic, values than seeking to persuade them to adopt *new* values (Schwartz, 2009, Darnton and Kirk, 2011, p40). If so, if individuals become consciously aware of their deepest, most important values they could, theoretically, re-order their values hierarchy by consciously prioritising those values. While this is an important proposition for anyone interested education and training for sustainability, few of us will readily identify with abstract, value-type labels such as benevolence or universalism, which presents us with a question that values theory does not fully answer. What are sustainability values?

Earth Charter	Forum for the Future	UN Millennium Goals	Oxfam	Bonn Declaration	BT Plc
Care and respect for life Ecological integrity Social and economic justice Democracy, non-violence and peace	Respect Integrity Commitment and cooperation Fairness Learning Openness Honesty Compassion Fun	Respect Freedom Equality Solidarity Nature Tolerance	Respect for diversity Concern for the environment Commitment to sustainable development, social justice and equity Sense of identity and self-esteem People can make a difference	Respect for all life Ecological integrity Gender equality Democracy Social cohesion Justice Security	Respect for equity Respect for the integrity of natural systems Recognition of the rights and interests of non-humans Self-determination Diversity Tolerance Compassion for others The interests of future generations (BT, 2003, p 24)
(ECI, 2006)	(Forum for the Future, 2005)	(Leiserowitz, et al 2004)	(Oxfam, 2003, p4)	(UNESCO, 2009)	

Table 1 Sustainability values cited by organisations (Adapted from Murray 2011)

Commentators on education for sustainability loosely talk about the need to promote 'appropriate' values (e.g. Cook, *et al* 2009, p314), yet rarely define what exactly 'appropriate' sustainability-related values might be. In the absence of a universally accepted authority on 'sustainability values', Table 1, which is derived from the values cited by organisations and institutions overtly committed to sustainable development, yields a number of candidates. Values such as *respect, compassion, tolerance integrity, fairness/equality/justice* and *nature/environment/life*, are well represented and largely fall within Schwartz's other-focused, self-transcendence domain. Most of these values can also be interpreted as being intrinsic in nature because they can be satisfied from within, through the way individuals choose to live their lives. These are the values explored during the sustainability training as part of Plymouth University's drive towards education for sustainability.

Values-led education for sustainability

One of the inspirations behind the Plymouth initiative is UNESCO's declaration of 2005 to 2014 as the *Decade for Education for Sustainable Development* (DESD), the purpose of which is to integrate the "*principles, values and practices of sustainable development*" into all aspects of education and learning (UNESCO, 2006, p.4). In effect, the DESD is a policy for equipping individuals to acquire, "*the values, behaviour and lifestyles required for a sustainable future*" (UNESCO, 2006, p.3). The intent of the DESD links strongly with the notion of self-leadership, which Carmeli, *et al*, (2006) describe as a process where individuals lead themselves towards desired behaviours using strategies such as self-observation, self-motivation, self-goal-setting and self-feedback. While ordinary leadership focuses on influencing others towards a common vision, self-leaders seek to lead by example by making changes in their own personal behaviour. In the context of sustainability, means that self-leaders will demonstrate high levels of integrity by modelling sustainability theoretically and practically (Roome and Bergin, 2006). Furthermore, education for sustainability and education for self-leadership both involve asking learners to consider issues of a profoundly personal nature, particularly in relation to personal values and behaviour change. Nonetheless, as well as cultivating what we might call a 'sustainability mind-set' professionals also have to acquire the technical and profession-specific knowledge and skills they need to operate competently within their fields of practice. For this reason, the more personalised approaches described in this chapter are best seen as a supplement to and not a replacement for the more traditional modes of professional education and training (Figure 3).

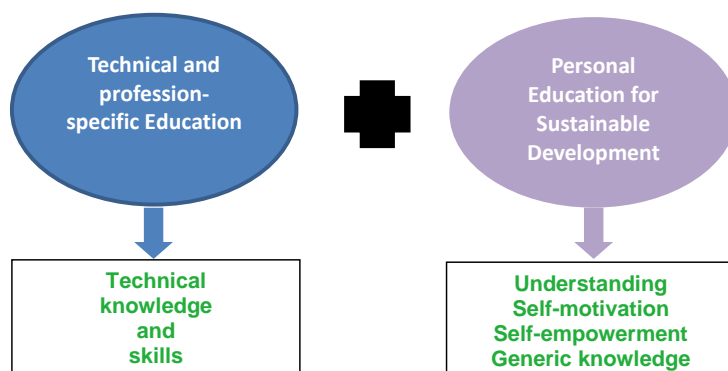


Figure 3 *The fundamentals of self-leadership education for sustainability*

Inwardly-focused and values-led approaches to education and training are potentially controversial and educators would be well advised not to endeavour to ‘teach’ people to adopt particular behaviours or values in the same way as they might seek to teach specific knowledge and skills. Such approaches would not only prove ineffective, they could lead to accusations of ideological indoctrination (Newman, 2010, Murray and Murray, 2007). Indeed, attempting to enforce any kind of pre-determined consensus on broad-ranging and potentially ambiguous issues such as sustainability has been described in the literature as “*undesirable... and essentially mis-educative*” (Jickling and Wals, 2008, p5). Therefore, prominent ESD commentators, such as Stephen Sterling advise moving away from ‘transmissive’ educational techniques towards more open-ended, ‘transformative’ delivery methods as outlined in Table 2 (Sterling, 2004). The approaches in Table 2 are geared to enabling learners to openly and neutrally explore their “*values, perspectives and aspirations*” (Tilbury, 2002, p19) rather than evangelically trying to persuade anyone to change their personal behaviour in particular ways or their values. Instead, the endeavour is to help individuals personalise their understanding of sustainability and explore how their values and other mental attributes affect their potential to act or behave sustainably should they wish to. These are the approaches underlying the Plymouth initiative.

<i>From transmissive</i>	<i>Toward transformative</i>
Passing on knowledge	<i>Understanding, getting to the root of the problem</i>
Teaching values and attitudes	<i>Encouraging values clarification</i>
Seeing people as the problem	<i>Seeing people as facilitators of change</i>
Sending messages	<i>Dialogue</i>
Behaving as an expert	<i>Acting as partner in the learning</i>
Raising awareness	<i>Changing mental models that influence actions</i>

Table 2 *Moving from transmissive towards transformative learning in ESD*
(adapted from Tilbury 20011)

The Plymouth initiative

The setting:
Plymouth’s sustainability training was conceived in 2005 as a response to a curriculum audit undertaken on a series of professionally-focused construction degree programmes. Unusually for such courses, the curriculum was overtly themed on the environment from its

inception in the early 1990s. Initially, the curriculum focused on delivering technical and profession-specific aspects of environmental design, and eco construction. However, by 2005 the agenda had shifted from environment to sustainability and in light of the emergence of ESD, a curriculum audit was undertaken to identify gaps in the delivery of sustainability-related knowledge, skills and values themes, both profession-specific and generic (for details see Murray, *et al* 2007). The audit results indicated a high level of delivery of knowledge and skills themes relating to environmental sustainability and discipline-specific issues such as energy efficiency in buildings, waste management, etc. However, the audit also revealed two important shortfalls:

1. No consideration was given to developing students' values
2. Very little focus was provided on the socio-economic and cultural aspects of sustainability.

In light of the audit findings, a decision was taken to create a suite of values-focused, extra-curricular 'sustainability training' activities to help fill the delivery gaps. The training was trialled over a seven month period with 63 volunteer students and a number of academics, following which the training was made a core aspect of the 'building' curriculum as a direct response to student recommendations (See Murray and Murray, 2007). Since 2006, the training has been disseminated widely and has been undertaken by around 1000 individuals.

The training model

The over-arching aim of the Plymouth training is to engage learners with sustainability at a personal and professional level by provoking deep thought and reflection. The training is based on a model that identifies six personal attributes related to self-leadership that taken together will motivate, empower and equip individuals to meaningfully engage with the notion of sustainability (Figure 4). The intention is to help training participants connect more with the complexities of the big issues facing humankind and to inwardly motivate them to acquire greater knowledge and skills for themselves, either through self-study and/or by personal enquiry. For this reason, the face-to-face training focuses on the *awareness, motivation and self-empowerment* attributes of self-leadership in Figure 4, with the remaining three attributes, *knowledge, skills and practice* being covered in the supplementary book, *The Sustainable Self*.

The following strategic objectives were observed when developing the training:

1. The activities should have potential for use with a variety of audiences
2. The exercises included should be inherently engaging and motivational
3. No prior preparation should be required of the participants

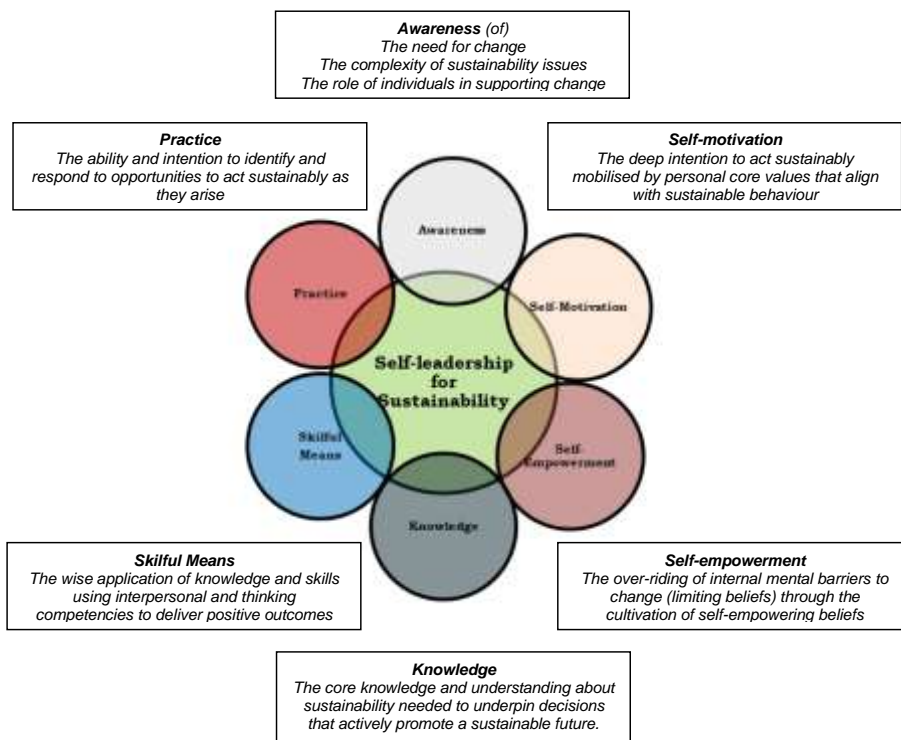


Figure 4: The Plymouth Sustainability Training model: cultivating attributes of self-leaders for sustainability (adapted from Murray 2011)

The training workshops are designed as intensive, activity-led sessions lasting between three and six hours. Overall, the pedagogic approach embraces enquiry rather than outcome based learning that draws upon a range of techniques designed to trigger responses from learners identified as good ESD practice.

- *Role play:* to gain insights of the perspective of others
- *Discussion:* to enable varying perspectives to be aired and to encourage listening and self-reflection

- *Stimulus activities*: using prompts such as images to initiate reflection and discussion
- *Group analysis*: sharing different perspectives on issues
- *Reflexive accounts*: to reflect upon personal roles/positions and attitudes in relation to sustainability issues

(Source: Cotton and Winter, 2009 and Shephard, 2008)

The activities

Depending on the setting and audience, the workshops involve up to nine elements organised within the three activity themes shown in Table 3 and described below.

ACTIVITY THEME 1 AWARENESS

<i>Personalising sustainability</i>	<i>Participants review 'authoritative' definitions of sustainability highlighting words that particularly resonate with them.</i>
<i>Metaphors</i>	<i>Learners discuss their interpretation of different images representing human progress</i>
<i>Connecting with sustainability</i>	<i>Participants use images to explore the underlying connectivity and complexity of sustainability issues through peer learning and the sharing of individual perspectives.</i>

ACTIVITY THEME 2 MOTIVATION

<i>Psychology of behaviour</i>	<i>Discussion on the roles of values, attitudes and beliefs in personal behaviour</i>
<i>Core values</i>	<i>Learners contrast their core values with 'sustainability' values and relate them to personal behaviour</i>
<i>Attitudes exploration</i>	<i>Individuals use photographs to explore and reflect on their attitudes to specific sustainability issues</i>
<i>Sustainability attitudes</i>	<i>Pro-sustainability attitudes: a discussion on pro-sustainability attitudes such as caring, compassion, respect.</i>

ACTIVITY THEME 3 SELF EMPOWERMENT

<i>Beliefs</i>	<i>Briefing on the significance of beliefs and the impact of self-limiting beliefs on personal behaviour</i>
<i>Self-empowerment</i>	<i>Individuals identify their internal barriers to change use the concept of 'circles of influence to overcome them by reframing them as self-empowering beliefs</i>

Table 3 Sustainability Training activity programme

1. *Personalising sustainability*: Many people find sustainability terminology to be confusing, abstract and disorientating (Filho, 1999). This activity helps participants personalise sustainability through the examination of eight 'authoritative definitions of sustainability/sustainable development, identifying the words and phrases that resonate with them and choosing a preferred definition. Participants then discuss their choices and use their highlighted words to articulate their own 'personalised' definition of sustainability to help them ground them within the agenda.

2. *Metaphors*: This activity uses imagery to broaden understanding of sustainability, bearing in mind that "*sustainability....still lacks a defining, vivid image*" (Leiserowitz 2004, p38). This is an open-forum exercise where participants comment upon two projected photographs (a super-tanker and a speeding car in a desert) as metaphors for humanity's current direction.

3. *Making Connections*: This element draws upon Oxfam's observations about the benefits of using photographs in educational settings to help learners "*gain knowledge and critical understanding of the wider world*" (Oxfam 2005, p1). Small groups evaluate ten images portraying different sustainability issues and rank them by order of significance to sustainable development, whatever that might mean to each group. Group members draw upon their values, knowledge and understanding to interpret the images and to agree a means of prioritising the issues they feel they represent. The outcomes are then openly displayed, contrasted and discussed in the context of the nature, complexity and inter-connectedness of the issues portrayed.

4. *Psychology of behaviour*: This is a short discussion on the nature and significance of values, attitudes and beliefs and their potential influence on personal behaviour.

5. *Core Values*: Psychologists such as Bem (1971) and Mawdsby and Williams (2004, p2) advise us that we are mostly unaware of our values and attitudes and need to elicit them in order to become conscious of them. Once we become 'self-aware' about our deeply held values, we are in position to mobilise or prioritise them if we wish to. The aim here is for individuals to explore how their personal core values can influence actions of daily life. The methodology builds on Wisconsin University's Business School's work on eliciting values with learners (Eggert, 2004) and begins with participants identifying their core values, using a prompt sheet if necessary, and exploring their source. Whole group feedback is taken on the core values elicited and the result is contrasted with the sustainability ideals (as illustrated in Table 2), demonstrating that most people already possess the values they need to support sustainability.

6. *Attitudes exploration:* Bem (1971) suggests that we perceive our attitudes by subconsciously observing our overt behaviours. This activity draws on this premise using a Neuro Linguistic Programming (NLP) principle called Perceptual Positions. NLP is a practical discipline that aims to change the way people perceive and make meaning of the world they live in (Young, 2004, pv). The idea behind perceptual positions is that we habitually form attitudes about other people and situations by judging them from our own narrow and limited perspective. By putting ourselves in another's shoes, we gain additional information, which can lead to a broader, more rounded perception of the person/situation. This can result in adjustments to our attitude towards that particular situation or person. If that arises, the new attitudes are likely to stick as "*attitudes formed through direct experience are stronger than attitudes formed from listening to others*" Bell, *et al*, 1996, p31). In NLP, Perceptual Positions is used to help individuals approach problems or relationships more creatively. Here, a photograph depicting a particular sustainability-related issue is used so participants can identify and explore their attitudes and feelings towards that issue.

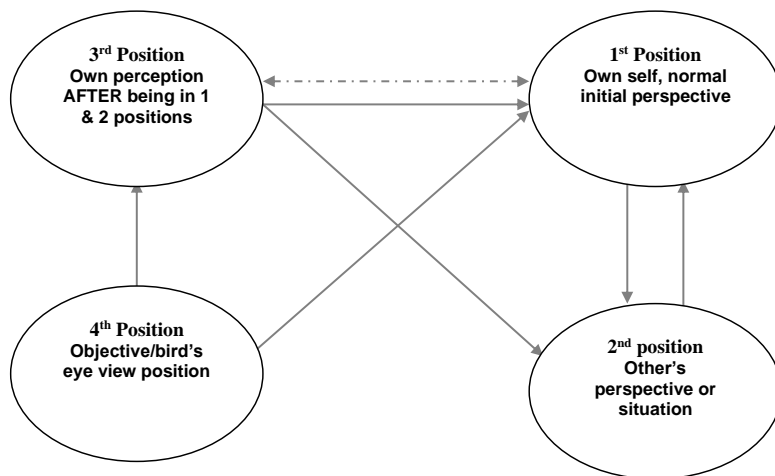


Figure 5 *The Perceptual Positions Process*

(Based on by Hoag, 2005, p2 and O'Connor, 2001, p34)

The technique involves setting out four physically distinct numbered locations to represent different *perceptual positions* (Figure 5) as described below. Participants work in pairs, with one acting as the 'Explorer' (the one going through the exercise), the other as the

'Guide', who steers the Explorer through the positions as set out below, using step-by-step instructions provided by the facilitator.

First Position: This is the Explorer's self-perspective position where they consider their feelings about the person/situation portrayed in the photograph placed at position 2.

Second position: The other's position; the person in the photograph. By stepping onto position 2, literally in their mind, the Explorer becomes the person in the image looking back at their former selves visualised in position 1. From this standpoint, they gain insights into how it *feels* to be the person in position 2.

Third position: Here, the Explorer observes from a detached standpoint their experiences in the first and second positions. This often leads to a recognition that the feelings and attitudes evoked in position 1 were based on limited information, which can result in a broader, more inclusive and empathetic attitude towards the issue/person portrayed in the photograph.

Fourth position: In this wholly detached position as taken by an independent observer, the Explorer clarifies what they learned in the other three positions and decides whether to embed the broader perspective gained in position 3 as the outcome of the exercise.

The activity typically takes around 15 minutes, following which the Explorer and Guide exchange roles. A whole-group discussion concludes the activity, exploring the feelings and challenges arising during the exercise and the link, often absent, between the Explorers' initial attitudes and their core values.

Activity 7 Pro-sustainability attitudes: The American educator David Orr notes that people need to 'caring' attitudes if they are to move towards more sustainable ways of living (Orr, 1992, p92). This exercise explores our capacity to care and whether sustainability is less about personal sacrifice than about promoting the wellbeing of all, including the self. Starting with a discussion on the significance of attitudes such as openness, respect and compassion, participants then write in concentric circles projected onto a whiteboard what they care about most in life, with the persons or issues closest to them being the most central. The discussion that follows explores our capacity to care about issues that are distant and/or not directly related to us (as occurred after the Boxing Day Tsunami

disaster) and that the attitudes we hold towards ourselves and our own wellbeing are an important component of forging a sustainable future.



Figure 6A/6B Activity 7: typical images used in Perceptual Positions representing homelessness (6A) and oil polluted farmland in Nigeria (6B) (© Panos Pictures and Mark Henley)

8. Beliefs: This aspect consists of a short review of the power of beliefs as mental constructs, their ability to influence life direction and how certain beliefs can serve to limit or empower action.

9. Self-empowerment: This is a series of exercises that draw upon the work of Stephen Covey, who developed the idea of *circles of influence* and *circles of concern* to represent empowered and disempowered mental states (Covey, 2004). Participants start by identifying the barriers they believe prevent them from living and working more sustainably, such as having insufficient time to make changes or not being in a position to make any significant difference to the world. After questioning whether these 'barriers' are factual or mere perception, a major problem is considered such as air pollution or world poverty using an adaptation of Covey's circles to demonstrate that by reframing our thinking from the negative towards the constructive, it is possible to unlock considerable potential for empowered action (Figure 7). Firstly, using the circle of concern, the dis-empowering impact of dwelling on enormity of the problem is explored, after which the participants write within the circles of influence the numerous actions that are open to them to help reduce problem.

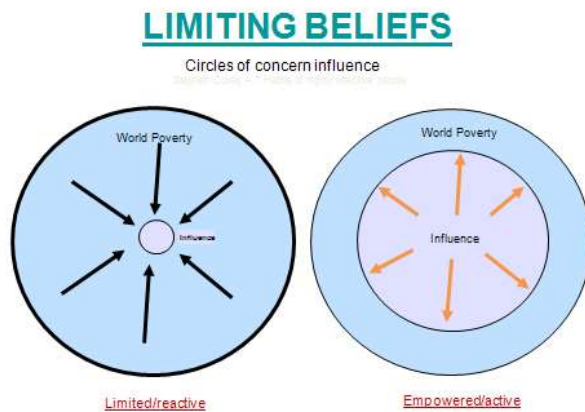


Figure 7 *Cultivating self-empowerment using Covey's Circles* (adapted from Covey, 2004 and Murray, 2011)

Depending on the nature of the audience, further exercises follow using the same technique to identify pro-sustainability actions available at the personal, professional and/or organisational level .

The training sessions wind up with a summary of what has been learned and a briefing on the use of *The Sustainable Self* book as a follow up the sessions.

Responses to the training

By February 2012, approximately 1000 individuals had undertaken part or all of the training through 56 separate events (Figure 8). The students were mostly Plymouth University based undergraduates in design, civil engineering, the sciences and environmental building/construction. The academics taking the training came from five disciplines (built environment, engineering, science, real estate and design) and five institutions. The professional participants consisted of local authority planning professionals, surveyors, engineers ,construction managers, publishers, and human resources professionals as well as 43 members of staff from the *Higher Education Funding Council for England* (HEFCE). Most of the sessions took the form of five to six hour 'away days' in group sizes ranging from 10 to 30 although some events were split into two, sometimes three, three-hour sessions.

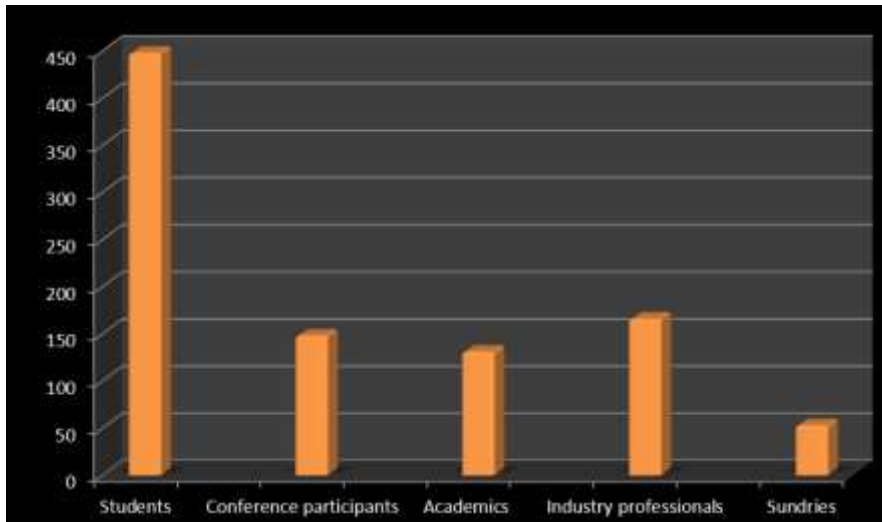


Figure 8 *Sustainability training recipients November 2005 - April 2012*

No records were taken of the discussions or activity outcomes, as these are treated as confidential to the participants. However, generalised feedback on the training is normally obtained using structured questionnaires using Likert scales to rate the achievement of seven specific training outcomes, ranging from the provoking of deep thought to feeling more empowered about sustainability (in the workplace for professionals and generally for students). Figure 9 provides a comparison between the feedback ratings from a series of compulsory 2010 undergraduate workshops (n = 110) and a 2011 Away Day provided for 21 professional staff from a global property development company.

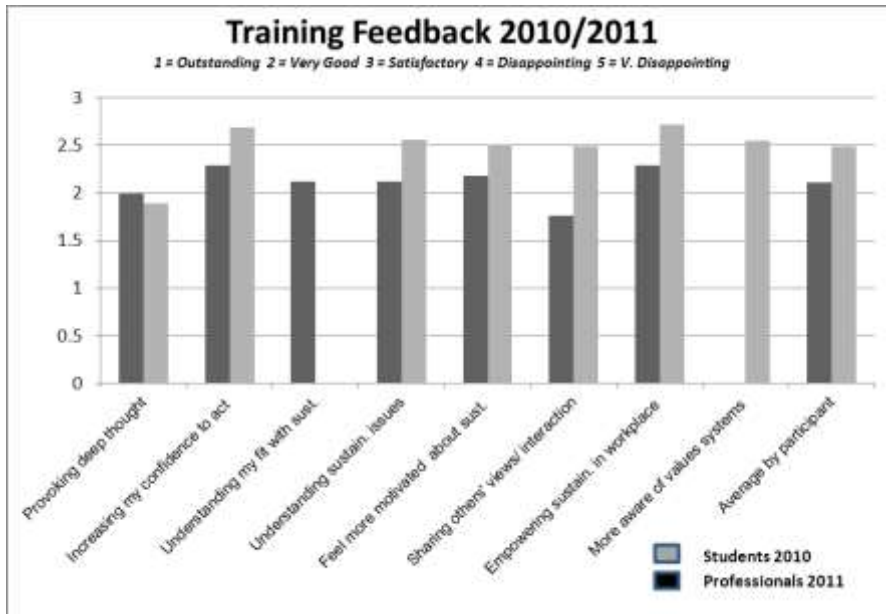


Figure 9 Summary training outcome ratings for 110 students and 21 professionals

In Figure 9, the average student rating across the seven outcomes was 2.48 compared to 2.04 for the professionals, which indicates that while close to 'very good' outcomes were achieved for both audiences, the professional group, all of whom had specific sustainability-related roles within their organisation, appear more receptive to the inwardly-focused approaches taken in the training. It could be argued that this would be because the away day training was 'preaching to the already converted', however this is not reflected in the open comments received from the professionals, which are summarised in Table 4.

Professional Group
21 respondents

"Greatly enjoyed the approach, in particular the Perceptual Positions exercise." "Perceptual Positions was very insightful."

"Interesting take on sustainability. Not a run-of-the-mill session at all. Good tools like the Covey Circles and Perceptual Positions, which had some strong emotion – unexpected"

"Going back to basics and understanding our beliefs will help us move the debate forward."

"Very interesting exercises and session."

"Challenging traditional perceptions"

"Very thought provoking" (x 2); "Inspirational learning". "Useful to understand others views; v engaging." "Reached the deeper layers of values/beliefs".

"Very good. A PERSONAL approach to sustainability; not a mention of facts or figures which can scare people off"

"Present to as many people as possible" ; "Would be of great value at CEO/Executive Team level"

Building students
110 respondents in six groups

Best aspects?

Image ranking(Connecting with sustainability) (x11)

Attitudes/Perceptual Positions (x7)

Values element(x6)

Beliefs/empowering sustainability (x4)

Sustainability definitions exercise (x3)

Discussion (x3);

Sharing; learning from others; listening; the debates; group activities; "appreciating others' interpretations" (x2)

"The way it made you think;

informality of the session";

"Focusing on attitudes"

"Very informative; opened my mind."

"Some discussion points can lead off and inspire thoughts"

Worst aspects?

Perceptual Positions (x5);

Empowering sustainability (x3)

"Probably values"

"Length of session; tired at end; time flew by!"

"Personal side of it – but this training wouldn't be possible without the personal aspect"

Table 4 Open comments from sustainability training events

In general, the feedback comments indicate that the training does offer the intended safe and open environment within which individuals from varying backgrounds can explore their values systems in the context of sustainability. The most popular activity is usually the 'Making Connections' exercise, which is delivered early to get the participants working together and thinking differently. The most controversial exercise is the NLP-based perceptual positions activity, which is unusual in that it involves attempting to 'step into the shoes' of another person. However, in a typical group most individuals appear to gain benefit from the exercise as it provokes thought about our capacity to empathise with others and our tendency to jump to narrow, stereotypical judgements of others and their

situation. The values activity is rarely mentioned in the feedback but as few people are aware of their core values, bringing these to conscious awareness may well provoke long-term reflection and can provide valuable insights into our most fundamental aspirations in life and how we most want to live. In effect, the values element is best treated as an experiment as no one can predict the core values that participants will elicit. However, experiences thus far with 1000 people from highly diverse suggest that we tend to elicit remarkably similar, altruistic core values such as family, trust, respect, love/care/compassion, justice, freedom, integrity and security. While these align well with the so-called 'sustainability' values (see Table 2) and reinforce Schwartz's belief that we all hold similar values, it may well be that these expressed values are simply what the individuals concerned feel they *should* have. For this reason the values activity theme includes a brief exploration of the elicited values in terms of where they have come and how often we align our actions with those values. Participants are then directed to the detailed activities available in the follow-up book, which they can use to interrogate and explore their values more deeply.

An important question the feedback does not address is whether participant understanding of their values and their motivations changes as a result of the sessions. Research is currently underway to explore this, involving participants completing pre and post training surveys designed around Schwartz's ten values types (Figure 2) to identify shifts in personal values orientations that arise out of the sessions. The research is being conducted with over 200 undergraduates in 'building', engineering and product design. While the results are not due to be published until 2013, early indications are that for the building students at least, small but statistically significant shifts in personal values orientations and values awareness do result from the training. Bearing in mind that the aim is to provoke deep thought and reflection about values, rather than to change them, these levels of shift, while not spectacular, seem appropriate.

The book

The Sustainable Self sets out to be a comprehensive resource for lecturers, trainers, students and professionals of any discipline who need, or wish, to teach or learn about sustainability. It is also used as a follow-up to face-to-face training. Containing ten chapters, the content blends information and case examples with 49 interactive exercises to engage readers and to deepen learning. The first six chapters cover similar ground to

the training but in more depth with the remaining chapters focusing on the three self-leadership attributes not covered in the training: *knowledge, skilful means and practice*. The book is supported by online resources hosted on the publisher's website including A4 size downloadable worksheets covering every activity in the book and a directory of over 260 sustainability organisations in 14 categories such as Art and Design, Architecture, engineering etc. (see www.earthscan.co.uk/self).

First published in 2011, the early response to the book has been enthusiastic, with a number of institutions in Australia, the USA and UK are making use of the content to establish sustainability training programmes for their staff and for students. At Plymouth, the book is provided as a supplement to training provided for staff and is a set book for undergraduates and postgraduates in environmental building..

THE SUSTAINABLE SELF: KEY CHAPTER FOCUS

1. Introduction: ***The need for change; the significance of the individual in delivering change; the role and limitations of technology, government, NGOs and business; the personal, professional and business benefits of sustainability***
2. Awareness. Personalizing sustainability: ***Humanity's current (un-sustainable) direction; personalizing sustainability terminology; connecting with sustainability issues***
3. Motivation. Values matter: ***Introducing the psychology of values; core values and their elicitation; the complexity of values; values conflicts; happiness as a core value; morals and ethics***
4. Attitudes Matter: ***Attitudes that support sustainability: care, compassion, openness and respect; self-evaluating personal attitudes using NLP Perceptual Positions***
5. Empowerment – beliefs matter: ***The significance of beliefs; pro-sustainability beliefs; beliefs and change; understanding and identifying self-limiting beliefs***
6. Self-empowerment: ***Personal belief change strategies – persuasion; Cognitive Behavioural Therapy, NLP and Covey's circles reframe techniques; reinforcing empowering beliefs through conscious practice, self-observation and mindfulness***
7. Knowledge principles: ***History of sustainability; the Brundtland Report; the 'three E's' model; the Five Capitals model; guidelines for sustainable***

development

8. Knowledge themes: **Review of knowledge themes relating to natural capital/core ecological principles and human, social, manufacturing and financial capitals; integrating the Five Capitals**

9. Skills – skilful means: **Examination of thinking and inter-personal sustainability competencies including systems thinking, futures thinking, mindfulness, enquiry; communication, working with others; and leadership.**

10. Practice: **Aligning personal and professional practice with sustainability; case studies; review of tools including ecological foot-printing; One Planet Living; Voluntary Simplicity; Transition Towns; Natural Capitalism. Dealing with resistance.**

Table 5 *The Sustainable Self content*

The future

This initiative, initially developed at Plymouth is proving itself as a popular and useful vehicle for students and professionals to think differently about themselves and about the potentially abstract notion of sustainability. While all the indications are that the techniques transfer will across professional disciplines including the design-based disciplines, the training can only be considered a starting point. In essence this initiative is an attempt to blend personal development into sustainable development. As both are long term developmental issues, further work is needed to translate the training, and the use of the book and similar resources, into tools that can support the long-term changes in individual and collective thinking that will make the difference to our future. Nonetheless, even if the initiative only begins the process cultivating of self-leadership for sustainability, it seems a worthwhile exercise.

For further information on any aspect of the training or book and their applications, please feel free to contact the author on pmurray@plymouth.ac.uk.

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PUBLICATIONS: PRELIMINARY JOURNAL PAPER

This paper was completed using the outcomes of the PEDRIO literature review and formed one of the stated proposed outputs

International Journal of Sustainability in Higher Education

Evaluating values-centred pedagogies in Education for Sustainable Development

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Submitted 05-Mar-2012, revised 21-May-2012, accepted 02-Jul-2012

Abstract

Purpose The purpose of this paper is to report an attempt to quantitatively evaluate pedagogies that aim to help learners clarify their personal values systems in a sustainability context.

Methodology A pre-test/post-test survey was used to assess shifts in values orientations among 113 undergraduates from the same discipline following the completion of intensive values-based sustainability training workshops.

Findings The results indicate that small but statistically significant shifts in participant perceptions of their personal values orientations occurred, particularly in relation to values correlating with sustainability.

Research limitations The survey data was collated in six separate groups, potentially introducing unforeseen variables. Furthermore, as value-types rather than individual values were used as the basis of the survey, there could be variations in participant perception and understanding of the value-type labels

Practical limitations No control group was possible because the training intervention was a compulsory element of the participants' degree programme. In addition, the surveys were administered by the participants' tutor, potentially leading to 'teacher' bias.

Social Implications This study evaluates pedagogies aiming to allow individuals to clarify their values and better understand the motivational role these have in influencing 'sustainable' behaviour. The research can inform the design and execution of 'holistic' educational and training programmes seeking to help individuals understand their personal role in creating a more sustainable future.

Originality/value The originality of this research lies in the quantitative analysis of values-specific ESD pedagogies. Findings point to the benefits of undertaking further research to assess the application of the pedagogies across different disciplines.

Introduction and context

In 2004, the United Nations Educational, Social and Cultural Organisation (UNESCO) declared 2005-2014 the *United Nations Decade for Education for Sustainable Development* (UNDESD) with the intention of integrating the “*principles, values and practices of sustainable development*” into all aspects of education and learning (UNESCO, 2006, p.4). For UNESCO, the purpose of Education for Sustainable Development (ESD) is to enable learners to acquire, “*the values, behaviour and lifestyles required for a sustainable future*” (UNESCO, 2006, p.3), which, in principle, means that all students on all courses should have access to curricula and pedagogies that promote sustainability-related knowledge, skills and values. The research reported in this paper evaluates an initiative inspired by the UNDESD that seeks to respond to the values element of ESD within a professionally-focused undergraduate discipline at a University in England.

Universities offer an increasing number of sustainability-specific degree programmes (Elder and Dyer, 2011) and progress is also being made embedding sustainability within mainstream disciplines (see Hopkinson and James, 2010; Jones *et al.*, 2009; Blewitt and Cullingford, 2004). Nonetheless, while UNESCO (2007, p.2) may wish to “*integrate the values inherent in sustainable development into all aspects of learning*”, values cannot be treated normatively as, according to the Western psychology tradition, they are cognitive concepts tied to emotion (Schwartz, 2009). Consequently, it is unlikely and no doubt undesirable that educators should attempt to ‘teach’ them in the same way as they might knowledge and skills. Given this, educators who wish to integrate values education within their programmes would benefit from an understanding of the psychology of values.

The psychology of values

Milton Rokeach, a pioneer of modern values research, defines a human value as “*an enduring belief that a specific mode of conduct or end-state of existence is personally and socially preferable*” (Rokeach, 1976, p.159). Rokeach sees values as mental criteria that guide actions, which can be held both consciously and unconsciously (Rokeach, 1976, p.160). This interpretation is endorsed by other psychologists such as Shalom Schwartz, for whom values are “*guiding*

principles in an individual's life" (1992, p.17) and in a seminal paper on pro-environment behaviour, Kollmus and Agyman (2002, p.301) point out that "*values shape intrinsic motivation*".

According to Rokeach (1976, p.160) individuals hold dozens of values categorised as either *instrumental*, where a particular conduct or way of being is preferable in all situations or *terminal*, where there is an enduring belief that particular end-states are worth striving for. Both categories represent values as aspirational goals that individuals consider important in their lives. However, Schwartz and Bilsky (1987) question the benefit of the instrumental (means) and terminal (ends) classification, offering a theory of a universal, cross-cultural structure for human values. For Schwartz, rather than being distinct from one another, values are *identifiable points* positioned in a shifting continuum within which some are more important than others (Schwartz, 1992, p.878; Darnton and Kirk, 2011, p.41). Schwartz identifies four motivational domains containing ten value-types, which are derived from 57 individual values that, according to Schwartz (2009), people in virtually all cultures recognise (Figure 1).

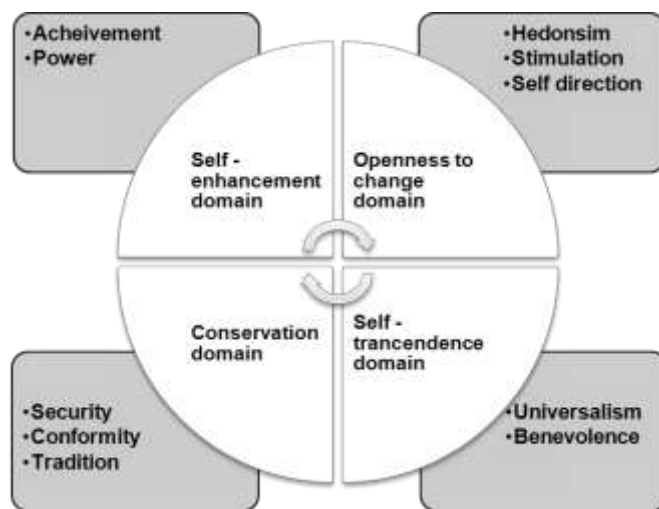


Figure 1 Schwartz's values structure (Based on Schwartz, 2009)

Schwartz proposes that individuals hold all values all of the time and because their *relative* importance to each other guides motivated behaviour, values conflicts can arise (Schwartz, 2009; Schwartz, 1992). In Figure 1, values within adjacent domains tend to be compatible, while values in opposite domains tend to conflict. Thus, the influence of *benevolence* in the self-transcendence

domain will conflict with *achievement* in the self-enhancement domain opposite, and the resultant behaviour will depend on which value is dominant at the time. The inference here is that should the relative importance of specific values change in an individual, behaviours changes could, in principle, follow.

Lynn Kahle and colleagues at the University of Michigan address the role of values differently through Social Adaptation Theory (SAT), which hypothesises that “*individuals adapt to various life roles, in part, through value fulfilment*” (Kahle, 1996, p.135). Kahle developed the List of Values (LOV), consisting of nine value orientations that closely relate to major life roles such as parenting, leisure, work, and consumption (Table 1).

Sense of belonging	<i>Being accepted; needed by friends, family and community</i>
Being well respected	<i>To be admired by others; recognition</i>
Security	<i>To be safe, protected from misfortune/attack</i>
Warm relationships	<i>To have companionship/intimate relationships gaining</i>
Fun/enjoyment	<i>To live a pleasurable, happy life</i>
Excitement	<i>To experience thrills, stimulation</i>
Self-fulfilment	<i>Finding peace of mind; making best use of one's talents</i>
Self-respect	<i>To be proud of oneself; confident in who one is</i>
Accomplishment	<i>Succeeding at what one can do</i>

Table 1 Kahle's List of Values (Adapted from Kahle, 1996 and Kopanidis, 2009)

Kahle's research on consumer values and behaviour affirms the link between values and actions, finding that people who highly value *accomplishment* tend to have high incomes while, those who have high regard for *warm relationships* often have many friends and those who value *belonging* often like group activities (Kahle *et al.*, 1986, p.406). In a different vein, Kasser and Ryan (1996) link values to peoples' *intrinsic* and *extrinsic* motivations or goals. Intrinsic goals relate to the satisfaction of basic, human psychological needs (Deci and Ryan, 1985, p.5), involving values orientations to do with personal growth, relationships and community involvement. Extrinsic goals concern the seeking of external rewards or regard from others through the pursuit of image, status and success (Weinstein *et al.*, 2009). Significantly, investigations into environmentally responsible behaviour suggest that intrinsic orientations can predict higher commitment to ecological stewardship (Kasser and Sheldon, 2000 cited in Brown and Kasser, 2005). Linking this with Schwartz's theory that the relative, hierarchical position of values in relation to each other

influences behaviour, it seems that promoting pro-sustainability behaviour may be more about *mobilising* pre-existing, largely intrinsic, values rather than seeking to persuade people to adopt or create *new* values (Schwartz, 2009; Darnton and Kirk, 2011, p.41).

Taken together, values theories affirm that values play a role in influencing lifestyle and motivated behaviour and that intrinsically oriented values can be linked with environmentally responsible, or sustainable, behaviours. Furthermore, values research also points to the possibility that if individuals can mobilise already-held intrinsically orientated values, behaviour changes may follow; a potentially important idea for ESD practitioners. However, any attempt to link values with sustainability produces questions about which specific values are most relevant. Commentators may loosely discuss the need to promote ‘*appropriate personal values*’ in curricula (e.g. Cook *et al.*, 2009, p.314), but what, specifically, are ‘appropriate’ values? What are sustainability values? While there is, as yet, no accepted authority on what constitutes ‘sustainability values’, clues may be found by looking for commonality in the declared values of organisations and institutions that demonstrate an overt commitment to sustainability. In such a comparison, Murray and Murray (2007, p.288) suggests a number of potential ‘sustainability-oriented’ values, such as *respect, compassion, justice/fairness, integrity, fairness* and *nature /life*, which can be interpreted as being intrinsic in nature as they can be satisfied from within through the way individuals choose to live. Nonetheless, it could be argued that some of these also have extrinsic overtones if, for example the value *respect* relies on being respected by others to be fulfilled.

Values and ESD

Values matter in ESD because the motivations they embody have the potential to influence behaviour (Darnton and Kirk, 2011). However, given the personal nature of values, educators need to exercise caution as those who seek to ‘teach’ learners to adopt particular values are likely to incur accusations of ideological indoctrination (Newman, 2010; Murray and Murray, 2007). Indeed commentators such as Jickling and Wals (2008) question the appropriateness of applying policy driven, transmissive, authority-driven delivery methods to this agenda: “*Forcing consensus about an ambiguous issue such as sustainable development is undesirable... and essentially mis-educative*” (Jickling and Wals, 2008, p.5). Such objections point towards the use of more ‘transformative’ pedagogies in ESD that can enable learners to openly and neutrally explore their “*values, perspectives and aspirations*” (Tilbury, 2002, p.19). With this in mind, Cotton and Winter (2009) reviewed a range of pedagogic techniques with potential applications in ESD including:

- Role playing: to gain insights of the perspective of others
- Discussion: to enable varying perspectives to be aired and to encourage listening and self-reflection
- Stimulus activities: using prompts such as images to initiate reflection and discussion
- Reflexive accounts: to reflect upon personal roles/positions and attitudes in relation to Sustainability issues

These pedagogies are open-ended in nature, which according to Jackson (2003) is important to support a personalised exploration of complex issues such as sustainability. Certainly these techniques are very different to the type of education often used in some fact-based disciplines such as construction, the discipline which is the focus of the research described in this paper.

The research setting

The research described here was set in an Engineering School within a large provincial university in the west of England. The study was conducted with undergraduates of a single discipline, construction, the content of which is strongly influenced by accrediting professional bodies. Unusually for such courses, the curriculum in question is overtly themed on the environment, mainly expressed through the delivery of technical and profession-specific aspects of sustainability such as sustainable design, and sustainable construction. However, following a sustainability-in-the-curriculum audit reported in Murray, *et al* (2007), gaps were identified in relation to the big picture generic aspects of sustainability and values. As a result, a series of open-ended learning activities, loosely branded as *Sustainability Training*, was devised to fill these gaps. Despite the ‘training’ label, the activities draw upon well-established ESD pedagogic techniques (Table 2) and are best seen as an attempt to deliver the values component of ESD. The over-arching aim of training is to promote the personal engagement of learners with sustainability by making use of enquiry-based exercises that provoke thought and encourage participants to clarify, reflect upon their personal values in a sustainability context, as prompted by Tilbury *et al* (2002). There is no intention to persuade learners to change either their behaviour or their values. Instead, the activities seek to help participants explore their values and the influence these might have on their potential to act or behave sustainably.

Description	Values relevance
Personalising sustainability: Reflexive, stimulus, discussion activity in which learners reflect upon different definitions of sustainability highlighting words that resonate with them.	Participant choices likely to be values-based
Making connections: Stimulus, discussion activity where small groups ‘rank’ ten photographs depicting different sustainability issues (e.g. consumption, poverty, pollution, biodiversity loss).	Participant interpretations likely to be value-laden
Core values: Reflexive discussion activity. Learners elicit their core values, contrasting them with potential ‘sustainability’ values and exploring their relationship to personal behaviour	Explores links between core values and sustainability
Perceptual Positions: Role play, reflexive, stimulus, discussion activity where individuals observe an image depicting the human impact of un-sustainability, reflect on their initial feelings and attitudes, then ‘step into’ the image to gain insights into the perspective of those depicted.	Explores the limitations of initial attitudes and their relationship to core values.

Table 2 Values-specific pedagogies used in Sustainability Training (Further detail on the activities is available in Murray and Murray, 2007 and Murray *et al.*, 2007).

In addition to the activities outlined in Table 2, the sessions include short explanations on the psychology of values, attitudes and beliefs, together with exercises focusing on the development of empowering beliefs to support sustainable behaviours. The training is typically delivered to small groups (<25), providing a setting where both students and lecturers “*feel able to express their views in a supportive environment, but one where self-reflection and change of viewpoint is encouraged*” (Cotton and Winter, 2009, p.50) and to facilitate transformative learning (Warburton, 2003). The sessions last around six hours, reflecting that ESD pedagogies cannot be rushed (Cotton and Winter, 2009).

Methodology

The research aim is to evaluate to what extent specific pedagogic interventions (the *Sustainability Training* workshops) help learners clarify their personal values in the context of sustainable behaviour.

The methodology adopted is quantitative. Quantitative research methods in ‘environment-oriented’ education have been criticised as ‘unreflective’ (Robottom, 2005, p.63) but the intent here was to complement an earlier reflective study on the same training techniques (Murray and Murray, 2007) and to use the outcomes of this research to inform a future longitudinal study on the training.

The participants comprise 113 first and second year undergraduate students in construction. The intervention consisted of the ‘sustainability training’ activities, which the students undertook as a compulsory core element of their studies. In view of the length of the training sessions, participants were incentivised with free catering. The sessions were delivered to six mixed groups of between 15 and 24 students between February 2010 and February 2011. All the sessions were facilitated by the same member of staff, who also administered the survey.

A pre-test/post-test design was used for data collation using paper-based values questionnaires as the survey vehicle. The surveys were administered immediately before and immediately after each session to identify shifts in participant perception or viewpoint arising as a result of the training. A written participant brief explained the overall purpose of the research, outlined the ethical considerations while emphasising that the surveys were voluntary, and participation in the surveys (or not) would not affect any assessment.

The survey comprised a value rating exercise based on nine value-types extrapolated from Schwartz’s (1987) values survey and Kahle’s LOV (Table 3). Brief explanations were included on the survey form to explain each value-type (e.g. *sense of universalism: to believe in social justice and equality*) and participants were asked to “Rate the significance of the following to you”, using a 10 point scale (see Homer and Kahle, 1988, p.641), where 1 equates to ‘no significance to you’ and 10 ‘vital to you’. Values orientations were chosen as the measure rather than specific ‘sustainability’ values because the core values elicitation activity undertaken in the training session involved contrasting participants’ personal values with ‘sustainability’ values, which could skew the responses to the post-training survey.

Value orientation	Definition	Embedded Values	Link to sustainability **** V strong *** Strong ** Moderate * Slight
Universalism	Understanding; appreciation; tolerance; protection; care for	Broadmindedness, wisdom, beauty, equality, unity with nature, peace, justice,	**** Intrinsic orientation; strong correlation with potential ‘sustainability’ values such as <i>equity</i> ,

	the welfare of all and for nature	environmental protection	<i>tolerance, justice</i> etc.
Benevolence	Preservation and enhancement of welfare of people within frequent personal contact	Honesty, loyalty, helpfulness, concern for others, forgiveness, true friendship, smooth group function	*** Intrinsic, other-focused/intrapersonal value, good link with potential 'sustainability' values
Warm relationships	-	Companionship, intimacy.	** Intrinsic orientation, also related to <i>benevolence</i> and <i>security</i>
Security	Safety, harmony, stability, relationships, self	Security (family, national), reciprocation of favours, social order	* Internally focused in LOV; link to <i>warm relationships</i> and <i>benevolence</i> .
Tradition /conformity	Respect, commitment, acceptance of own traditional culture or religion	Respect for tradition, group solidarity, loyal, humility, accepting role in life, moderate, self-restraint, responsible	* <i>Respect</i> is commonly cited as a 'sustainability' value, although conformity could oppose change.
Self-direction	Independent thought and action; choosing, creating, exploring	Creativity, autonomy, freedom, control, independent, curious, choosing own goals	* Self-facing, but possibly intrinsic. Some link with 'sustainability' values such as <i>freedom, self esteem</i>
Excitement/ Hedonism	Excitement, pleasure; enjoying life, gratification,	Stimulation, novelty, variety, challenge in life, daring.	Self-facing; potentially extrinsic and could conflict with sustainability
Achievement	Personal success according to socio-cultural standards	Successful, ambitious, capable, influential	Self-enhancing, extrinsic orientation; potential conflict with sustainability
Power	Status, prestige, control/dominance over people/things	Social power, wealth, authority, preserving own public image	Self-enhancing, extrinsic orientation; potential conflict with sustainability

Table 3 Value orientations included in the survey (See Miao 2009, p700, Murray and Murray 2007, Brown and Kasser 2005 and Schwartz 2009)

The survey data was analysed using SPSS to calculate paired sample 't' tests for the pre and post intervention differences and effect size (*d*), measured in accordance with Cohen's 1992 convention.

Results

Table 4 reports the summary statistics for the nine value-types surveyed, showing that all the means are above 6 with the highest scores being associated with *warm relationships*, *excitement* and *self-direction*, and the lowest with *power* and *tradition*.

Value Orientation	Mean score/10	Std Deviation
warm relationships before	8.469	1.4643
warm relationships after	8.743	1.4128
universalism before	7.442	1.6526
universalism after	7.854	1.5173
sense of benevolence before	7.186	1.5385
sense of benevolence after	7.810	1.5005
achievement before	7.991	1.5896
achievement after	7.956	1.7341
power before	6.336	1.9576
power after	6.350	2.2209
security before	7.336	1.5619
security after	7.611	1.6281
tradition before	6.097	1.9729
tradition after	6.345	2.0907
excitement before	8.637	1.5240
excitement after	8.699	1.5171
self-direction before	8.199	1.4631
self-direction after	8.221	1.5044

Table 4. Values responses in before and after workshop conditions (n=113)

Table 5 reports the results for each value-type response, revealing that no statistically significant rating shifts occurred between the pre and post training conditions for *achievement*, *power*, *excitement* and *self-direction*. However, significant shifts with small to moderate effect sizes arose for five values orientations; *warm relationships*, *universalism*, *benevolence*, *security* and *tradition*.

Value Orientation	Mean diff. before/after	95% confidence level	Significance (<i>Paired sample 't' test, two tailed</i>)	Effect size (<i>D</i>)
Benevolence	.6239	-.8210 (lower) - .4268 (upper).	Yes $t=-6.271, df=112, p<.001$	$D=.41$
Universalism	.4115	-.6200 (lower) - .2030 (upper).	Yes $t=-3.729, df=112, p<.001$	$D=.26$
Warm Relationships	.2743	-.4201 (lower), -.1286 (upper)	Yes $t=-3.729, df=112, p<.001$	$D=.19$
Security	.2743	-.4904 (lower) - .0583 (upper).	Yes $t=2.516, df=112, p=.013$	$D=.17$
Tradition	.2478	-.4699 (lower) - .0257 (upper).	Yes $t=-2.210, df=112, p=.029$	$D=.06$
Achievement	.0354 (negative)	-.1606 (lower) - .2314 (upper)	No $t=.358, df=112, p=.721$	-
Power	.0133	-.2471 (lower) - .2205 (upper).	No $t=-.112, df=112, p=.91$	-
Excitement	.0619	-.2239 (lower) - .1000 (upper)	No $t=-.758, df=112, p=.450$	-
Self-direction	.0221	-.2223 (lower) - .1781 (upper).	No $(t=-.219, df=112, p=.827)$	-

Table 5 Statistical significance of values survey responses

In Figures 2a-2c *warm relationships*, *universalism* and *benevolence* demonstrated the highest statistically significant changes, although a considerable proportion of the rating responses remained unchanged after the training. Nonetheless, 23.9% (27), 31% (35) and 40.7% (46) of participants presented higher post-training shifts for these respective value-types, with very small numbers showing lower ratings.

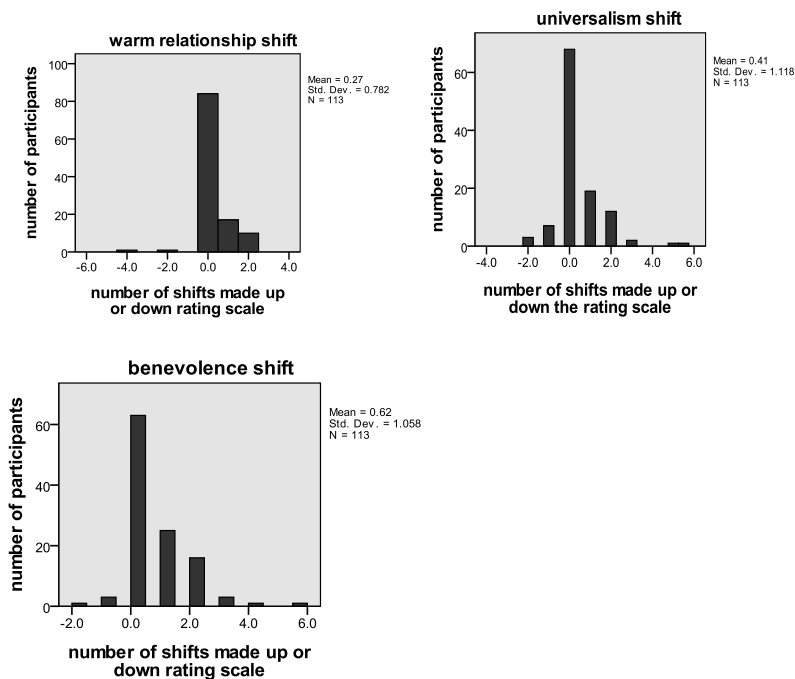


Figure 2a-2c. Size and direction of rating change for *warm relationships*, *universalism* and *benevolence*

Looking at the data for *warm relationships*, 29.2% (33) of participants rated the value as 10 before the workshop and 39.8% (45) rated it 10 afterwards. Similarly, while 8.8% (10) of participants rated *universalism* at 10 pre-workshop, this nearly doubled to 16.8% (19) after and despite 60.2% (68) not changing their ratings, 31% (35) individuals increased them. The percentage of participants rating *benevolence* as 9 or 10 increased from 19.5% (22) to 33.6% (38). In all, 44.2% of ratings (50) for *benevolence* shifted post-workshop and of these, most (46) increased in score in the after condition.

The two other value-types demonstrating significant shifts were *security* and *tradition*, both of which showed more 'negative' shifts than either *warm relationships*, *universalism*, or *benevolence*. Whilst 69.6% (79) of participants made no post-workshop changes for *security*, (Figure 3a), 21.2% (24) rated it more highly in the 'after' condition and the percentage of participants rating it as 9 or 10 increased from 20.3% to 29.2%.

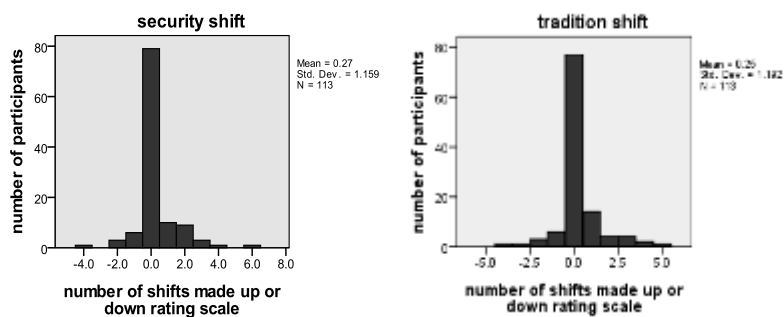


Figure 3a/3b Size and direction of rating change for *security* and *tradition*

For *tradition*, (Figure 3b), while 68.1% did not change their ratings, 22.1% (25) increased them and a higher percentage responded with a 10 (3.5% to 7.1%).

Looking at the rating shifts across the entire values survey (Figure 4), although (34.5% (39) of participants showed no change in any of the value orientations surveyed, (65.4% (74) did demonstrate one or more changes in their pre and post training value scores. Overall, the average number of shifts/score changes per participant was 4.74. The shift range was wide (between 1 and 27), with only 6 people (5.4%) making more than 17 changes.

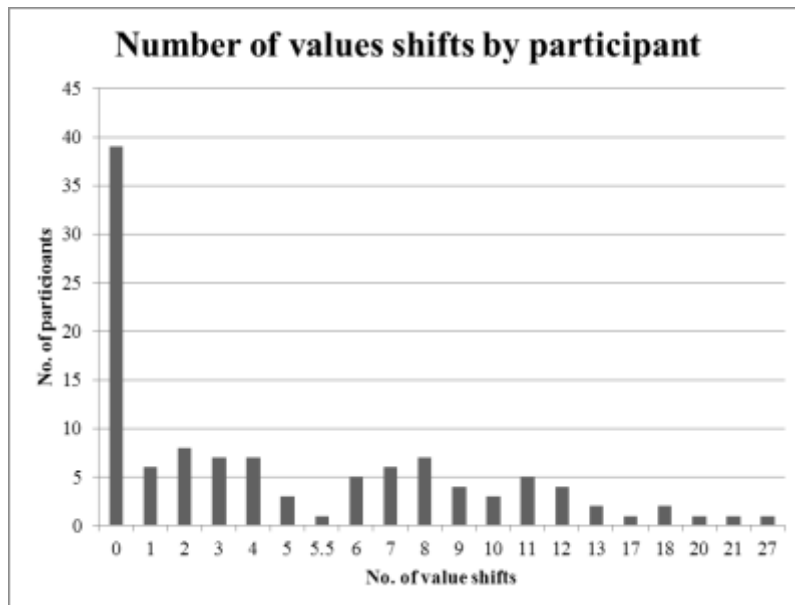


Figure 4 Frequency changes in values score for all values orientations surveyed (positive or negative)

Discussion

Tilbury, *et al.* (2002) asserts that learners need to clarify and understand their values as a key aspect of ESD. The findings from this study indicate that some clarification did occur as a result of the training activities as a clear majority of participants made one or more changes to their value ratings in the post-workshop survey. Furthermore, the three value-types that demonstrated the largest statistical effects, *warm relationships*, *benevolence* and *universalism*, are largely ‘intrinsic’ in nature, and therefore have the potential to positively influence pro-environment behaviour (Kasser and Ryan, 1996). In addition, according to Maiteny (2002), intrinsic motivational forces can help individuals address the external barriers that can easily inhibit pro-sustainability behaviour. *Warm relationships* is also a potentially intrinsic value that implies a focus on ‘others’, which has been identified as important to the promotion of sustainable development and pro-sustainability behaviour (for example, see Mulder, 2009, p.74 and Kasser, 2008). Interestingly, the other value-types that showed significant rating shifts, *security* and *tradition*, demonstrated both very small effects and a rather weaker correlation with sustainability.

Three of the four value-types demonstrating insignificant shifts, *power*, *achievement* and *excitement* are self-enhancing, extrinsic in nature and do not correlate particularly well with

sustainability. However, it is inappropriate to draw any firm conclusions from these shifts as it could be argued that the behaviour associated with them could conceivably be directed towards positive ends. Schwartz (2009) points out that positive activism could be reinforced by an extrinsic value orientation like *excitement* if it leads an individual to find the challenges associated with activism, exciting. Nonetheless, it is interesting that for 19 participants the shifts for *power* and *achievement* were in a negative direction, which could indicate pro-sustainability movement because the shift direction is away from extrinsic goals.

Figure 5 presents the mean rating scores for each value in rank order, reflecting Schwartz's (2009) assertion that the relationship between values is what influences behaviour. In Figure 5, in the before condition *excitement* was the highest ranking, but drops to position 2 in the post-workshop ranking. The prominence of *excitement* aligns with Schwartz's (2009) assertion that that age, life stage and education have a bearing on value orientations, bearing in mind the participants were early and mid-stage undergraduates. Meanwhile, the mean rank position of *warm relationships*, and *benevolence* changed from 2 to 1, and 7 to 6 implying the possibility of a hierarchical shift in values towards sustainability as a result of the training, even though the pro-sustainability value-type *universalism* retained its mid ranking position in the both conditions.

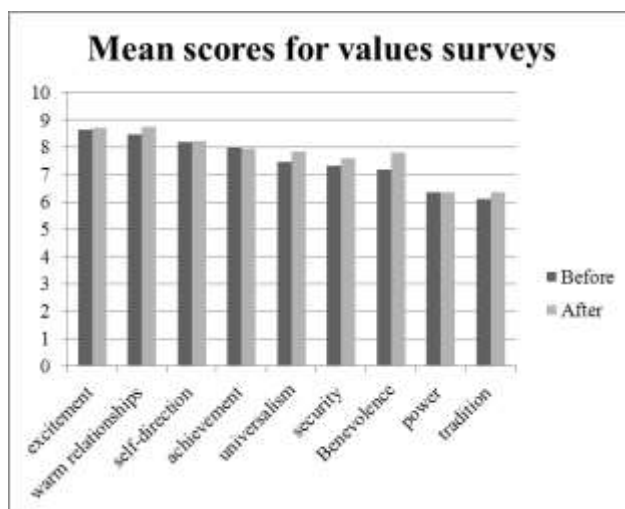


Figure 5 .Mean values responses in rank order for before condition showing after condition changes (n=113)

Despite these positive shifts, the effects were small to moderate, which in light of the educational context of the training could be considered appropriate because it reflects the open-

ended intentions of the training. As Osbaldiston and Sheldon (2002, p.48) assert, one person cannot *cause* another to move towards intrinsic motivations, but they can *facilitate* the intrapersonal processes that can lead to such a move, which is the over-arching intent of the values-based pedagogies. This is, perhaps, borne out by the results, for although a majority of participants did not register rating shifts for individual values, when looking across all nine value-types, two thirds recorded one or more changes.

Limitations

A number of limitations to this research have been identified that will feed into future work.

1. The values cited in the surveys were derived from Kahle and Schwartz's summary lists, however given that only outline explanations of each value were provided, participant perceptions of the meaning of each value may have been limited, variable or both.
2. The surveys were administered by the training facilitator who was also the students' tutor, which could bias the survey results if participants wished to 'please' their facilitator. Furthermore, given the post-survey instruction only to enter *changes* in rating, it is impossible to differentiate between those who genuinely experienced no change and those who could not be bothered to repeat the survey.
3. Values were rated rather than ranked by participants for speed and simplicity; this may be re-considered in future work to better reflect Schwartz's theory.
4. No control group was established for this research as the training was a compulsory component of the participants' studies.
5. Some potential for inconsistency in results arises due to the data being collated from six separate groups over a twelve month period. However, on examination, the profiles of group responses were found to be broadly consistent.

Conclusions and future work

While any conclusions drawn from this research should be considered as preliminary, the results are encouraging. The purpose of the intervention was not to overtly manipulate or change participant values or behaviour in any particular direction but to facilitate self-reflection and to observe any measurable impact of that reflection. The results suggest that reflection took place, indicated by a statistically significant shift in values ratings as a result of the training. Although the effects were small, the greatest values shifts occurred towards potentially pro-sustainability intrinsic motivations and all the average scores for the main pro-sustainability values increased.

The findings indicate that the pedagogies used had some effect for the participants, all of whom were engaged in the same environment-themed discipline. These results point towards the need for further research to evaluate the impact of the pedagogies on learners from different disciplines, particularly those that are not overtly environment themed. In addition, future research could include a review of whether training participants actually change their behaviour towards sustainability based on their sustainability training experiences

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The Heart of ESD: Personally engaging learners with sustainability

Paul Murray and Julie Goodhew

ABSTRACT

Education for Sustainable Development requires learners to integrate the knowledge, skills and values that can equip and empower them to engage positively with the concept of sustainability. This paper evaluates whether specific values-centred sustainability training activities can promote values clarification and engagement with sustainability when undertaken on an extra-curricular, voluntary basis. The research involves 87 undergraduates comprising 27 engineering students, 40 design students who undertook intensive sustainability training programmes based on a model called the Sustainable Self. Pre-test and post-test values and worldview surveys were delivered to the participating students and a control group to identify whether values clarification resulted from the training, while post-training interviews that took place four months after the training explored the deeper impacts of the training. The survey results indicate that values clarification did occur amongst the design students and less so amongst the Engineering students. The interviews indicated that in many cases the training provoked deep thought and reflection, and in some instances clear mind-set and behaviour.

INTRODUCTION

According to the UN, the purpose of Education for Sustainable Development (ESD) is to integrate the “*the values, behaviour and lifestyles required for a sustainable future*” into all aspects of education and learning (UNESCO, 2006, p.3). Implicit in this interpretation of ESD is that education for sustainability is, at heart, about empowering people for change (CES 2008; UNESCO 2010), which involves asking learners to consider issues of a profoundly personal nature in relation to their values and behaviour. However, as Higher Education traditionally concentrates on delivering the discipline-specific knowledge and skills that will enable graduates to operate competently within their chosen fields, personalised, values-led approaches to education can be controversial. Educators who endeavour to ‘teach’ people to adopt particular behaviours or values in the same way as they teach specific knowledge and skills lay themselves open to accusations of ideological indoctrination (Newman, 2010, Murray and Murray, 2007). Indeed, any attempt to enforce pre-determined, norm-based interpretations of sustainability can be viewed as undesirable as “*university education is not about implementing norms and values into the minds of students*” (Mulder 2010, p.82). Nonetheless, commentators tend to agree that ESD needs to move from ‘transmissive’ pedagogic techniques, which seek to pass on knowledge, to more open-ended, ‘transformative’ methods that encourage individuals to personalise their

understanding of sustainability and to examine how their values and other mental attributes affect their potential to act or behave sustainably, should they wish to (Sterling, 2004; Tilbury 2011).

Transformative approaches to ESD are inherently personal as they aim to help learners openly and neutrally explore their “*values, perspectives and aspirations*” (Tilbury, 2002, p19). Furthermore, personalised approaches to ESD may have powerful implications for positive change. Mulder (2010, p74) argues that the academic who develops a 1% more efficient technology will be making a useful contribution, but motivating students to develop and apply progressively more efficient technologies for the rest of their lives could have more profound positive impacts.

This paper evaluates the impacts of a model of personalised ESD called *The Sustainable Self*, as delivered to volunteer undergraduates in England studying two diverse disciplines, Three-dimensional Design and Civil Engineering.

Personalised ESD (PESD)

The idea of personalised education is not new. Four decades ago, Bloom’s Taxonomy of Learning described the ‘affective’ learning domain that focuses on the development of learners’ own attitudes, motivations, emotions and values (Bloom, *et al* 1973, Miller 2005). In affective learning, learners’ explore their emotional experiences, their values and their attitudes, which some educators may regard as ‘private’ and inappropriate to higher education (Shepherd 2008). However, it can be argued that emotions play an important role in promoting pro-sustainability change (Maiteny 2002; Kolmuss and Aygeman 2002; Schmuck and Shultz 2002). Affective/emotional learning has been identified as a key aspect of ESD (Eliam and Tamar 2010, Wals and Jickling 2002) because it helps learners develop the personal attributes that can motivate them to embrace change and to act sustainably (Shepherd 2008, p90). In expressing the qualities learners require to engage with sustainability, the German concept ‘Gestaltungskompetenz’ promotes the ability for learners to feel empathy and solidarity with others, which necessarily involves learners in connecting emotionally with others (Wals and Blewitt 2009). Indeed, Bloom raises the question whether we as humans ever really do “*thinking without feeling; acting without thinking*” (Bloom, *et al*, p.7). Nonetheless, personalised approaches to ESD cannot replace cognitive, discipline-based learning; the world will still need competent Architects, engineers and business professionals. Consequently, PESD is, perhaps, best viewed as a

both a complement and an underpinning to traditional modes of discipline-based education (Figure 1).

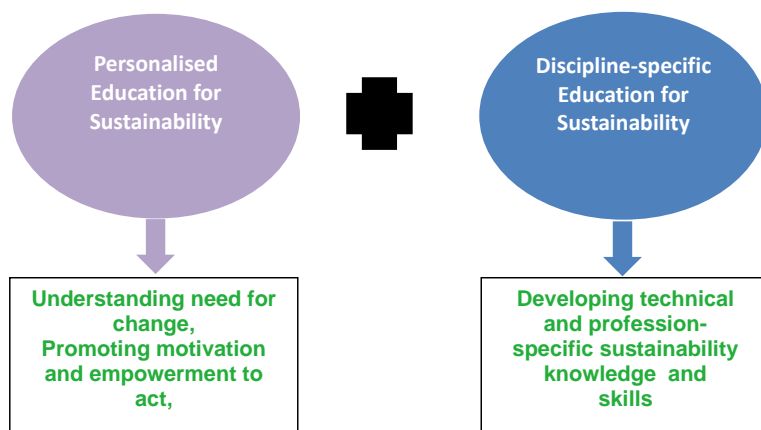


Figure 1 *The PESD approach to ESD*

In Figure 1, PESD underpins discipline-specific learning about sustainability by encouraging individuals to engage at a personal level with the sustainability agenda. This arrangement reflects the vision of ESD as an integration of “*reason and emotion*” (Podger, *et al* 2010, p.343), transcending approaches that seek to merely add sustainability as an extra subject in already crowded curricula (Wals and Blewitt 2009).

The Sustainable Self approach to PESD

The Sustainable Self is a PESD model devised to engage individuals with sustainability using structured but open-ended activities that can be offered alongside subject-based teaching. The model emerged from the outcomes of an ESD audit of a set of professionally-focused building degree programmes at Plymouth University, England, which revealed that although the curriculum delivered a high level of discipline-specific knowledge about sustainability, students did not feel personally engaged with the concept of sustainability (see Murray, *et al* 2007). In response, a programme of extra-curricular activities was devised to help students connect positively with the sustainability agenda, based on a six attribute model for positive change (Figure 2).

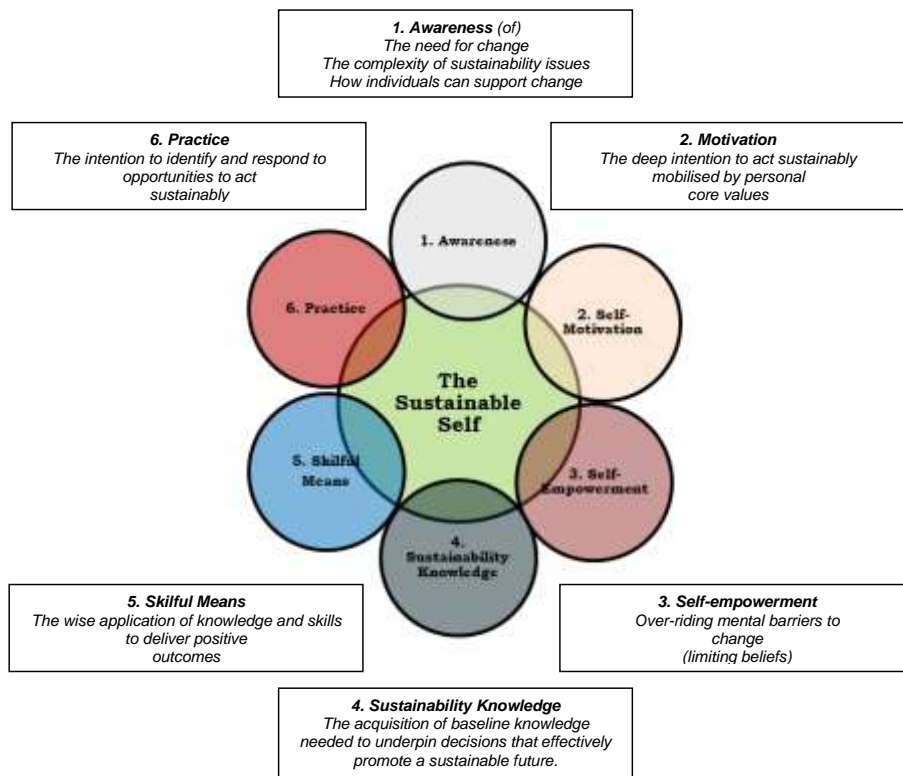


Figure 2: *The Sustainable Self model of PESD (adapted from Murray 2011)*

The *Sustainable Self* envisions six inter-related personal attributes that together can motivate, empower and equip individuals to move towards sustainability in their personal and professional lives (Figure 3). The model seeks to deepen understanding of sustainability issues, to provide learners with clarity about their values and how to start “*changing their mental models*” in ways that will promote positive action (Tilbury 2011, p25). Initially, the face-to-face training concentrated on the first three attributes, however in 2011, an interactive flexible learning text (Murray 2011) was published to supplement, deepen and extend the learning to encompass all of the model’s attributes.

The training is based on the premise that people are capable of changing their personal patterns through cognitive awareness (Oskamp 2002). With this in mind, the training activities to provoke learners to think about and reflect upon their values, perspectives

and aspirations (Tilbury 2002) in ways that deepen awareness of the need for personal change and the sense of motivation and empowerment to embrace change. The training does not attempt to influence participant values or behaviour, rather, it focuses on empowering learner enquiry with the training facilitator becoming a co-learner to create the necessary trusting and respectful environment for participants to express their ideas and opinions freely (Kugowa, *et al* 2006).

The training activities were designed to be

- suitable for use with a variety of audiences
- inherently engaging and motivational
- learner-centred and open-ended, allowing participants to make up their own minds and to “*find their own way*” (Mulder 2010, p 83)
- standalone; with no prior preparation required of participants

Since its inception in 2006, the training has been well-tested, having being delivered to over 800 individuals in the form of intensive activity-led workshops lasting between three and six hours. The pedagogies used reflect recommended good ESD practice, and include adaptive role play, discussion, perspective sharing, reflexive accounts, group analysis, and the use of stimuli such as imagery to prompt thought, feelings and reflection (See Cotton and Winter 2009 and Shephard, 2008)

The training consists of nine elements organised within themes allied to the first three *Sustainable Self* attributes (Table 1).

1 AWARENESS	
Personalising the terminology (<i>Reflection/discussion</i>)	Participants reflect on different definitions of sustainability, identifying and discussing key words that resonate with them.
Metaphors (<i>Stimulus activity/discussion</i>)	Groups discuss two images representing humanity's current direction and resistance to change.
Making connections (<i>Stimulus activity/group analysis/discussion/ sharing perspectives</i>)	Groups rank ten different photographs to explore the relevance and complexity of sustainability issues
2 MOTIVATION	
Understanding values systems	Briefing on the role of values, attitudes and beliefs in personal behaviour

Core values <i>(Reflection/discussion/ reflexive accounts)</i> Attitudes: Perceptual Positions <i>(Role play, perspective changing /stimulus activity/discussion)</i> Sustainability attitudes <i>(Discussion)</i>	Participants elicit and explore their personal core values and contrast these with published 'sustainability' values Photographic images are used to explore emotional responses to specific sustainability issues. Open discussion on pro-sustainability attitudes such as compassion, respect, and how these can be cultivated.
3 EMPOWERMENT	
Beliefs Cultivating Self- empowerment <i>Reflexive accounts/discussion/ peer learning</i>	Briefing on how personal beliefs can inhibit and/or promote change Individuals experiment with reframing techniques to move from a self-limiting to a self-empowered mind-set supportive of positive change.
4. ONGOING PRACTICE	
Reinforcement	Open discussion on promoting conscious intent and reinforcing positive personal change through self-study and the use of the supplementary book

Table 1 *Sustainability Training activities*

Personal engagement: the role of values

If the cultivation of positive intent and self-motivation lies at the heart of *The Sustainable Self* model, an exploration of personal values is key to the training. The design of the training activities draws upon the American psychology tradition, which defines a human value as “*an enduring belief that a specific mode of conduct or end-state of existence is personally and socially preferable*” (Rokeach, 1976 p159). In terms of their influence on behaviour, values are particularly associated with motivation (Brown and Kasser 2005; Kollmus and Agyman 2002) and in the context of PESD; the motivations they embody have the potential to lead to positive changes in thinking and ultimately, in motivated behaviour (Darnton and Kirk 2011).

Social psychologists advise that people hold dozens of values in their conscious and unconscious minds (Rokeach 1976). According to Shalom Schwartz (1992) we each hold our values in a shifting and dynamic hierarchical continuum within which some become more important than others. Schwartz identifies ten value-types derived from 57 individual values, which are organised within four motivationally distinct domains (Figure 2).

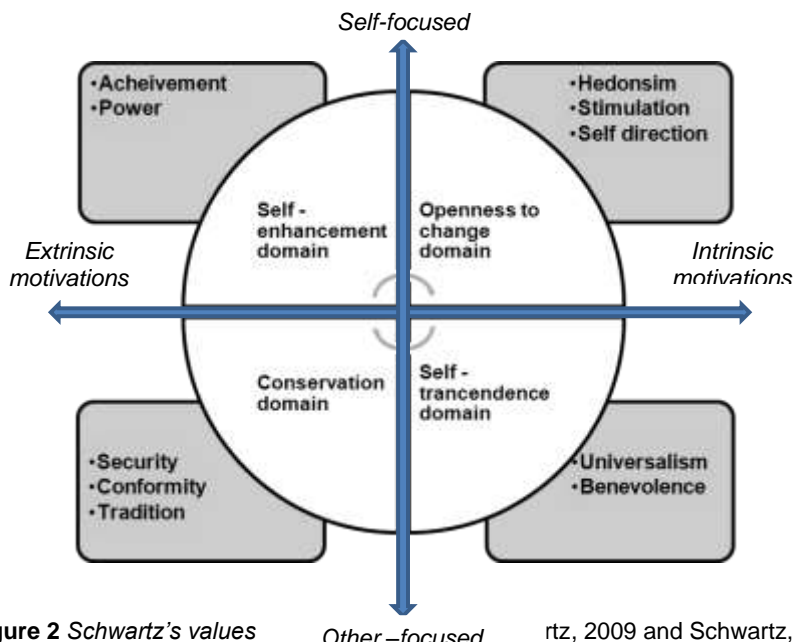


Figure 2 Schwartz's values (Schwartz, 2009 and Schwartz, 2010)

Schwartz (1992) holds that while the values held in the four domains are recognised by virtually all people and cultures, what differs is the priority or importance that individuals place on specific values at specific times. Thus, the relative importance of values in relation to each other guides motivation and, potentially, behaviour (Schwartz, 2009). If true, should the priority given to specific values change then intention and behaviour shifts may follow (Schwartz, 2009, Darnton and Kirk 2011, p40). It follows then that promoting sustainability may be more about encouraging people to identify and *mobilise* certain pre-existing values than persuading them to adopt *new* values. Work by Miao, *et al* (2009, p712) suggests that consciously priming or activating a specific set of values "*increases the behaviour that affirms those values and decreases behaviour affirming the opposite values*". Therefore, individuals could support themselves in living and working sustainability by consciously prioritising the values they already possess that are conducive to sustainability.

Values theory does not confirm what types of value will serve to promote sustainability, although Stern's work on *Values Beliefs Norms* theory identifies three classifications of values that impact on a person's decisions to act (or not) in an environmentally responsible manner. Sterns defines these values as *egoistic*, (which weigh the costs and benefits to

the self primarily), *altruistic* values (which weigh the costs and benefits to others primarily) and *biospheric* (weighing the costs and benefits to the biosphere/Earth as a whole) (de Groot and Steg 2008, p333; Stern 2000).

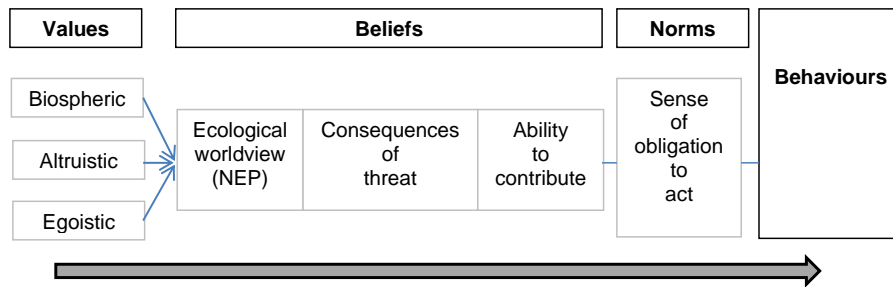


Figure 3 Sterns Values Beliefs Norms Theory structure (adapted from Stern 2000,

Stern cites several studies that indicate that egoistic (self-enhancing) values correlate negatively with pro-environment decisions, while altruistic and biospheric values are “*strongly implicated in activating pro-environmental personal norms*” (Stern 2000, p414, de Groot and Steg 2008). Schwartz’s theory reinforces the relevance of self and other focused values, reporting that the upper two values domains (openness to change and self-enhancement) are concerned with the expression of personal self-interests and the lower two are socially focused, being about relationships with others (Schwartz 2010). Research suggests that people who rank highly other/socially-focused values such as *universalism* tend to be more likely to express pro-human rights attitudes, to support the purchase of Fair trade products, and to express environmental responsibilities (See Darnton and Kirk, 2011 and Pinto, *et al* 2011). Further analysis has been undertaken by psychologists Deci and Ryan (2000) who theorise that people act in response to life goals that are either intrinsic or extrinsic in nature. Intrinsic goals motivate people to do something because they internally value the activity but when external coercion or persuasion is involved, they are responding to extrinsic goals. Intrinsic motivations meet basic human psychological needs, reflecting values such as personal growth, relationships and community involvement while extrinsic goals focus on external rewards, supported by values such as status, image, reputation and success (Deci and Ryan 1985, Weinstein 2009). What is significant in Deci and Ryan’s work is that holding intrinsic goals has been associated with higher commitment to ecological stewardship (Brown and Kasser, 2005). Taken together, these studies indicate that intrinsic, altruistic/other-focused, biospheric

values located within Schwartz's benevolence and universalism value-types are those most likely to support pro-sustainability thinking and behaviour. Examples of these value are *peace, wisdom, unity with nature, care for the welfare of others, environmental protection, social justice, being helpful to others,, forgiveness, being responsible and life-meaning* (Schwartz 2006, de Groot and Steg 2008).

Research methodology

The research aim is to explore whether the sustainability training produces changes in participant thinking in ways which can influence their engagement with sustainability.

The objectives of the study are to:

1. Deliver the training programme to groups of volunteer students studying diverse disciplines: Three Dimensional Design and Engineering
2. Utilise *quantitative* and *qualitative* research methods to explore whether :
 - a. values clarification occurs during the training,
 - b. the training induces deeper understanding of the meaning of sustainability,
 - c. the activities can promote the sense of self-motivation and empowerment needed to move individuals further towards more sustainable ways of thinking and acting

Multiple techniques, as described in Bussink-Smith, *et al* (2011) and Shephard (2008), were used to harvest a rich variety of data. A pre-test/post-test survey process was employed to secure quantitative data on values and mind-set shifts, while deeper, qualitative data was collected through one-to-one follow-up interviews conducted several months after the training (Figure 5).

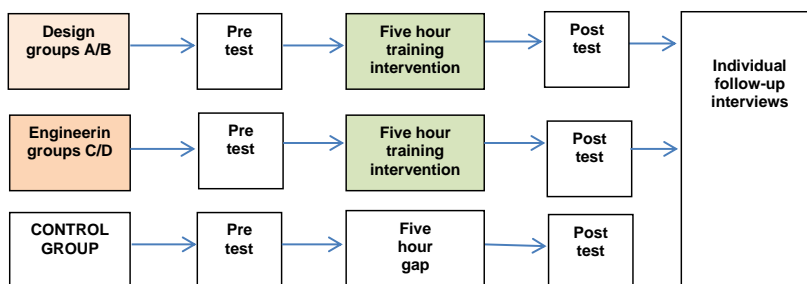


Figure 5 Research strategy

The quantitative research included a values survey and a worldview survey delivered on paper based questionnaires administered immediately before and immediately after the training by a research assistant, who also provided a pre-test briefing and post-test debrief.

The values survey comprised Schwartz's ten value-types (Figure 2). The full Schwartz 57 unit values inventory was not used because of the time involved in its completion and the issue of participant fatigue following what amounts to intensive training, which could adversely affect the post-training survey results. Key words explained each value-type (e.g. **sense of universalism**: *peace, wisdom, beauty, equality, unity with nature, peace, inner harmony, being broadminded, social justice, environmental protection*,). Participants were asked to "rank the significance of the following to you", using a nine point scale where 1 equates to *I feel opposed to this* and 9 'of supreme significance' (Schwartz 1992).

The values surveys data was analysed using several statistical techniques:

- 1.
- 2.
3. (Julie to include what and why?)

The worldview element comprised the New Ecological Paradigm Scale (NEPS), a widely adopted tool for measuring of pro-environmental worldview orientations (Dunlap, *et al* 2000, Siposy, *et al* 2008, Bussink-Smith, *et al* 2011). The NEPS is a development of Dunlap and Van Liere's original New Environmental Paradigm, first published in 1978 and includes 15 statement-items that are rated and scored on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Pro-ecological views are indicated through agreement with eight odd-numbered items and disagreement with seven even-numbered items (which are therefore reverse scored). Thus, total scores lie between 15 and 75 with higher scores indicating stronger ecological worldviews. The NEPS does not refer to the socio-economic dimensions of sustainability, however it is well tested for validity and reliability and it constitutes a core influence in Stern's VBN theory of pro-environmental behaviour (Figure 4). **The NEP survey data was scored using Dunlap and Van Liere's (2000) system and the scores statistically by calculating The survey data was analysed using SPSS to calculate paired sample 't' tests for the pre and post intervention differences and effect size (*d*), measured in accordance with Cohen's 1992 convention.**

Follow-up one-to-one, semi-structured interviews were undertaken between 14 and 17 weeks after the training to obtain deeper information about the impacts of the training. The interviewees, who were recruited from the pool of training participants by email, were filmed and recorded for approximately 25 minutes by an independent trained interviewer who asked questions relating to:

1. Recall and feelings about the values expressed during the training to explore whether values reflection/clarification occurred and its impact.
2. Shifts in participant perceptions of sustainability and their sense of motivation to act more sustainably

The interviews were analysed thematically to identify key themes arising out of the training experience. .

Results

89 students participated in three conditions (See Table 2). 80 students were aged 19–24, two were over 25 and two did not give their age. 61 were male, 21 female. With regard to the interviews, 11 students participated, of which nine were from the Design group, two from Engineering, xx were female and xx were male

	Design (n = 40)	Engineering (n = 27)	Control (n = 22)
Gender			
Male	22	25	14
Female	17	2	2
Age:			
19 – 24	37	25	18
Over 25	3	2	2

Table 2 Survey participants

Values survey: Table 3 illustrates the baseline results for the pre and post training values survey scores. (*Shading indicates a statistically significant result*)

Values Mean Score (SD)	Design (n = 40)		Engineering (n = 27)		Control (n = 22)	
	Pre- Training	Post Training	Pre- Training	Post Training	Pre- Training	Post Training
<i>Conformity</i>	7.18(1.52)	7.88 (1.22)	7.70 (1.14)	7.85 (0.82)	7.38 (1.37)	7.41 (1.22)
<i>Achievement</i>	7.53 (1.40)	7.85 (1.25)	7.52 (1.31)	7.66(1.14)	7.91 (1.31)	7.50 (1.14)

Commented [PM1]: (Needs a get together to sort this I think??)

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<i>Power</i>	5.58(1.95)	5.95 (1.95)	5.52 (2.04)	5.59 (2.06)	5.73 (1.70)	5.86 (1.75)
<i>Security</i>	7.15(1.46)	7.85 (1.12)	7.56 (1.31)	7.37 (1.60)	7.39(1.37)	7.32 (1.89)
<i>Sense of Universalism</i>	6.70(1.96)	7.28 (2.03)	6.48 (1.65)	7.26 (1.63)	5.36 (1.79)	6.27 (1.72)
<i>Hedonism</i>	7.75 (1.68)	8.55 (1.06)	7.77 (1.45)	7.93 (1.30)	7.68 (1.46)	7.82 (1.18)
<i>Self Direction</i>	7.93 (1.16)	8.35 (0.92)	7.81 (1.03)	7.93 (1.33)	7.14 (1.42)	7.36 (1.36)
<i>Stimulation</i>	7.65 (1.19)	8.00(1.28)	7.41 (1.50)	7.63 (1.60)	6.91 (1.87)	7.09 (1.54)
<i>Sense of Benevolence</i>	7.93 (1.19)	8.15 (1.29)	7.59 (1.37)	7.74 (1.79)	7.68 (1.17)	7.50 (1.68)
<i>Tradition</i>	5.65 (1.72)	6.85 (1.83)	6.22 (1.89)	6.78 (2.03)	5.41 (1.74)	5.86 (2.12)

Table 3 Means values scores and changes pre to post training by training participant vs. control

In Table 3, the Design group increased its scores from the pre to post condition for all the value-types surveyed. Analysing the mean score results **using one-way Anova tests and where appropriate non-parametric tests (???)** revealed that of the ten value types, six increased significantly (conformity, security, universalism, hedonism, self-direction and tradition). In contrast, the Engineering group recorded significantly increased mean scores for universalism and tradition, numeric but insignificant increases for a further seven values and an insignificant decrease in score for security. For the Control group, scores for eight of the ten values increased slightly, but the change was only significant for one value, universalism. Thus, all the groups increased their mean score for universalism significantly, although the Control group started at a notably lower level (Figure 5)

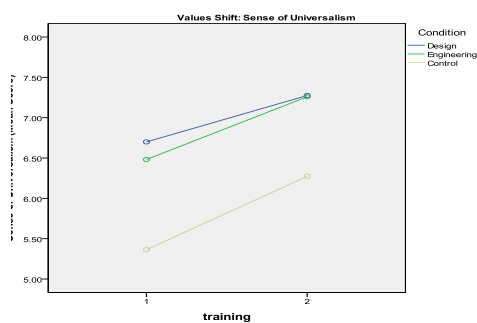


Figure 5: Pre to Post Training means Scores for Sense of Universalism

Given that large individual score changes might skew the mean score results, the values survey data was also analysed in terms of by shift size and direction across the pre and post training conditions. **This was attempted two ways, using 3 by 3 Chi Square tests and one-way Anova. (Table 4)**

Shifts in value-types	Design (n= 40) % of participants	Engineering (n = 27) % of participants	Control (n = 22) % of participants	3v3 χ^2	Prob
<i>Universalism</i>					
No change	30	37	45.45		
Increase	52.5	52	45.45		
Decrease	17.5	11	9.1		
<i>Tradition</i>					
No change	30	37	55		
Increase	57.5	44	36		
Decrease	12.5	19	9		
<i>Conformity</i>					
No change	45	74	68		
Increase	48.5	19	18		
Decrease	7.5	7	14		
<i>Achievement</i>					
No change	47.5	55.6	55		
Increase	37.5	25.9	9		
Decrease	15	18.5	36		
<i>Security</i>					
No change	37.5	48	50		
Increase	50	26	23		
Decrease	12.5	26	27		
<i>Power</i>					
No change	27.5	52	86		
Increase	52.5	33	14		
Decrease	20	15	0		
<i>Hedonsim</i>					
No change	45	59	64		
Increase	50	22	18		
Decrease	5	19	18		
<i>Self-direction</i>					
No change	40	48	50		
Increase	42.5	33	27		
Decrease	17.5	19	23		
<i>Stimulation</i>					
No change	42.5	37	54		
Increase	40	37	23		
Decrease	17.5	26	23		
<i>Benevolence</i>					
No change	40	41	64		
Increase	40	37	18		
Decrease	20	22	18		

Table 4 Shifts in value-type scores expressed as percentages . (Shading indicates a statistically significant result)

Commented [PM3]: I'm rather unclear on the relevant tests here (as you can see probably!)

Commented [PM4]: Adds up to 101%

Commented [PM5]: Does the Engineering group score increase significantly too?

In Table 4, no statistically significant shifts in scores were identified for **Power**, (?) Stimulation, Hedonism or Benevolence. However, significant shifts were evident for Universalism (all groups), Tradition (Design and Engineering), Conformity (Design), Security (Design), Conformity (Design) and Achievement (Design). Looking more deeply at the 'self-transcendent' value-types, with regard to Universalism, all the groups showed significant increases in scores from pre to post training, but significant differences were also exhibited between the Design and Engineering groups and the control (See figure 6a-c) because although **the control group did exhibit a significant score shift, a smaller percentage of the group changed their scores and of those that did change a smaller percentage increased their scores than occurred with the other two groups.**

Commented [PM6]: This the right interpretation?

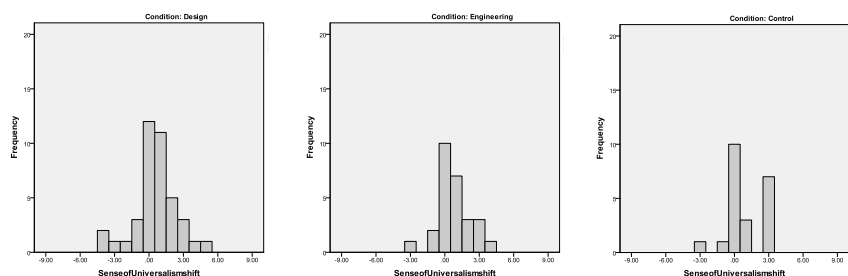


Figure 6a-6c. Size and direction of changes made by participants to value ratings for 'Sense of Universalism' and Sense of Benevolence

No statistically significant changes were found between the groups for Benevolence, although 60 % of participants in both the Design and Engineering showed shifts in values scores in comparison with the Control, with the Design group showing higher levels of score increases in terms of numbers and magnitude (Figure 7a-7c)

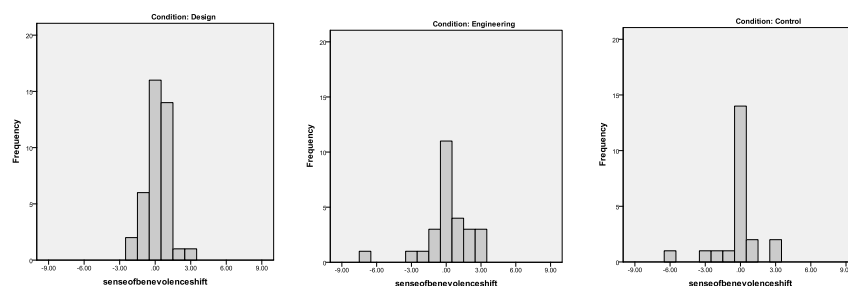


Figure 7a-7c. Size and direction of changes made by participants to value ratings for 'Sense of Benevolence'

The patterns for the other value-types showing significant changes follows a similar pattern, with the Control group showing less changes overall (see Figure 8a as an example).

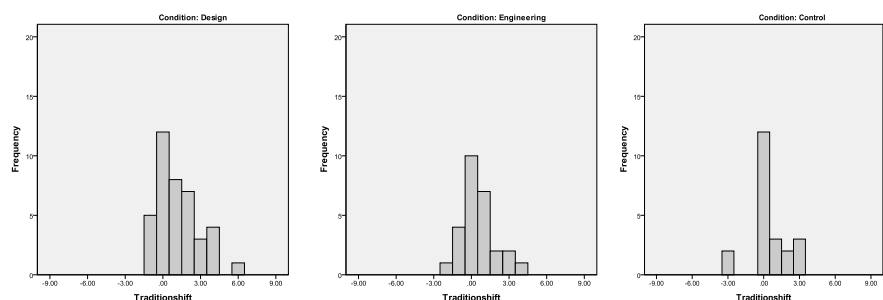


Figure 8a-8c. Size and direction of changes made by participants to value ratings for 'Tradition'.

The NEP survey

		NEP score (15-75)	Mean	SD	N	Significant shift?
Pre-training	Design		3.537	.493	40	
	Engineering		3.198	.613	27	
	Control		3.400	.415	22	
	Total		3.400	.530	89	
Post-training	Design		3.669	.530	40	Yes: (t = -2.70, DF = 39, p = 0.01)
	Engineering		3.340	.628	27	Yes: t = -2.27, DF = 26, p = 0.03
	Control		3.467	.550	22	No

Commented [PM7]: Sorry, I don't understand the Means here. Are NEP scores not from 15-75???

Commented [PM8]: Is this correctly shown?

Table 5 NEPS scores pre and post training

Table 5 shows that the both the Design and Engineering groups significantly increased their NEP scores from pre to post training, while the Control group did not. as did the Engineering group. There was also a difference between the training groups NEP scores at the outset (pre training), where the Design group had significantly higher scores

compared to the Engineering group ($t = 2.51$, $DF = 65$, $p = .015$). This difference between groups remained at post training ($t = 2.31$, $DF = 65$, $p = .024$).

Interviews

Thirteen students volunteered for the interviews, of which eleven participated. Nine were Design students, two were from the Engineering. The themes identified from the interviews focused on:

- values recall and impact
- the meaning of sustainability
- mind-set and perspective change
- behavioural changes
- the impact of image and 'role play' based activities

Values recall: Ten of eleven participants recalled elements of the values they elicited through the training, specifically (seven participants), generally or both. In all eighteen specific values were recalled:

P1: Inner Self
P3: Happiness
P7: Ethics
P8: Friends and family, Happiness, Fulfilment
P9: Wisdom, Happiness, Wealth, Friends and family
P10: Respect, Being happy
P11: Bravery, Friendship, Work, Confidence,

Participants indicated that immersion in the training induced a deeper understanding of values and their role:

P5: “*I thought it was going to be about global warming. I thought that was really interesting the whole perspective, the human thing, how we treat people... I did not think it was going to be about that.*”

P8: “*You think sustainability; that's recycling... Sustainability is more than that.... All of your core values do have an impact on how sustainable you are as a person*”

P11: “*Bravery and friendship, they were the ones for me, but loads of people had work, family or confidence or something like that... Bravery because I am quite a shy person. Friendship because everyone needs friends. You don't really look in to what you value, you just kind of do your every-day life.*”

Commented [PM9]: This a good example?

In some cases, the experience of eliciting, exploring and openly discussing values altered participant thinking and, potentially, their future behaviour:

P1: *"Makes you think about what you are buying and what you do when you get rid of it. This was a new feeling."*

P2: *"I was thinking differently after the session. ...I understood the values more, instead of not really knowing... Before, I thought it was a bit of a gimmick, but the training made me realise that there is more to it."*

P9: *"Since then I have been a lot more appreciative of family... I appreciate what they have done for me.... I probably would not have got to that stage if I had not done the training."*

The meaning of sustainability: Around half of the participants mentioned insights into the meaning of sustainability that arose from the training:

P4: *"Sustainability is like a mind-set rather than a thing you have to do.... It was changing the way you think".*

P4: *"I feel more confident about what sustainability means. It's such a funny word. You don't really know what people mean by it.... I feel more informed. It is good for the university to offer....go away and think about everything in a different way."*

P5: *"Sustainability has got a very bad reputation. I would not think of it about life style and things like that. People's values do directly correlate to that. But before the session, I would not have put them in the same box as sustainability."*

P6: *"For me sustainability has a negative content, it is about middle class people finding a way of maintaining their lifestyle, but putting a green facade on it. I was pleasantly surprised and refreshed that (the facilitator) talked about sustainability as a non-consumerist lifestyle."*

P6: *"Sustainability was not about doing something about recycling, but about the quality of our interactions."*

P8: *"People can go 'sustainability I have heard it all before', but on the day it was, 'actually, I have not heard this before... You have to be sustainable in the way you think, and behave."*

Mind-set change: The training appeared to prompt reflection that induced changes in perspective for most interviewees:

P4: *"It got me thinking. It was not thinking from a design point of view, it was almost like, self-discovery, the world, from a different perspective. Thinking outside of the box."*

P8: *"It was peculiar on the day to do sustainability and then do the stepping in to someone else's shoes, it was not that I could see the link with sustainability. It was only later that we all said, it twigged, that is why we did that bit. It was good to have that angle on sustainability."*

P9: *"Having it pointed out in the training. Just by being told really, just having it pointed out. A light bulb came on. I probably would not have got to that stage if I had not done the training... It opened your eyes to what is more important in life I guess."*

Behaviour change: XXX interviewees reported behavioural changes that they attributed to the training

P3: *"I am a bit more understanding and a bit more laid back. I don't get angry. I have compassion."*

P8: *"I was thinking about what job I might get but I chose the direction which would make me happier, I went with my core value of happiness, instead of the direction that would get me the most money."*

P9: *I remember seeing the Big Issue (Homeless) seller and I don't usually help but I thought a couple of quid, it will make a big difference. It would be quite nice just to help him out. I had never done that before. Before I just sort of ignore them."*

P11: *"Before the training I would have not thought about it, now, I always do one good thing a day"*

However, several participants also reported a lack of change:

P2: *"I remember a couple of weeks afterwards, trying to apply to work but it fizzled out."*

P5: *"I don't really think I changed at all. I did not change my behaviour."*

P11: *"We recycle but I was doing that before. I need more ideas on how to do it. I don't know about sustainable materials or processes. That would be really helpful."*

Image-based activities: For eight of the interviewees, the image-based activities (Making Connections and Perceptual Positions) appeared to be particularly powerful in producing shifts in mind-set and perspective.

P2: *"One of the bits that was memorable was the images.. Remembered the pictures and put yourself in the perspective... Most memorable task.... We all ended up being serious about it. Afterwards it made me think about not judging people."*

P5: *"One thing that did stand out was one of the photos of one of the estates in Glasgow... We were asked to become the people in the pictures, children in Glasgow. ..it was unfair, no jobs, not looked after, surrounded by drug culture. I looked at it with a different attitude."*

P9: *"I remember doing an activity when we were in the shoes of another. I had to be a farmer. I remember being hunched over and straining on your body. It was almost sort of realising what others are going through so you can eat and stuff... You might see it on TV but not think anything of it. But in there showed, how hard it can be. Thinking of someone from their point of view."*

P10: *"We did a role play in 3 different perspectives, that made you think a lot more and you had to be the person, analyse and judge them and think about why I think that. People are quick to judge. When you are in that situation it puts it in a different perspective. It makes you not want to judge people."*

Discussion

The study aim is to determine whether the training resulted in changes in participant thinking in ways which might influence their engagement with sustainability. To evaluate whether this aim is achieved the study was designed to explore whether values clarification occurred as a result of the training, whether participants gained deeper insights into the meaning of sustainability through the training and whether the activities could promote the self-motivation and sense of empowerment needed to move towards more sustainable ways of thinking and acting.

Evidence of Values exploration and clarification:

The values survey results initially indicate that the values exploration suggested by Tilbury (2001, 2002) as a key element of ESD does appear to have occurred during the training, although the extent to which this occurred varies significantly by discipline. Whether analysed by mean score changes or by the direction and size of score shift,, the design group recorded three times as many significant shifts as the Engineering group, although

there was some variance in the value-types showing increases for the Design Group using the different methods. To some extent, these results echo the outcome of a preliminary study involving where 113 students from a single discipline who undertook the same training as a compulsory element of their curriculum (Murray, *et al* 2014 pending). In that research, significant shifts in values scores were recorded for a clear majority of the participants and the value-types showing the most significant changes were those that correlate most with sustainability, benevolence and universalism. However in this study, none of the groups recorded significant changes for *hedonism*, although *all* of the groups, including the control, showed positive changes in their scores or *universalism*. Thus, based on the values survey alone, the results are best judges as inconclusive. However, the NEP survey, which was not included in the preliminary study, does provide a solid indication that statistically significant changes in worldview thinking, closely related to values, did indeed arise out of the training. Furthermore, the interview discussions demonstrate that not only did values clarification occur

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Effects on Understanding sustainability:

Changes in thinking

Changes in behaviour

Limitations

Conclusions

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