Exploring what university teachers think about education *for* sustainability

Authors

Kerry Shephard and Mary Furnari
Higher Education Development Centre, University of Otago, Dunedin, New Zealand

Abstract

The higher education literature reveals the highly subjective nature of thinking about the roles of higher education and its teachers with respect to 'education for sustainability'. We used Q methodology to help to clarify and categorise commonly held viewpoints about this complex issue held by teachers in one university in New Zealand. We developed 50 statements about the issue and asked 43 participants to rank them and to record their responses to written questions. Our analysis confirms 4 significantly and qualitatively different viewpoints, one of which advocates for sustainability and for education for sustainability. The other three viewpoints do not and each has distinct characteristics that prevent those who own them from using their position within the university to encourage students to act sustainably. Our paper interprets these viewpoints and discusses their implications to higher education.

Introduction

A substantial debate exists about the roles of education in general, and of higher education in particular, with regard to education *for* sustainability (Corcoran and Wals, 2004; Shephard, 2010;Shephard, 2010; Sherren, 2008;Sherren, 2008; Teisl, Anderson, Noblet, Criner, Rubin and Dalton, 2011). There has also been for some years, certainly since the Brundtland Report (World Commission on Environment and Development, 1987)(World Commission on Environment and Development, 1987), an assumption by some that education has a special role to play in changing the nature of human existence to something more sustainable than it appears to be at present. This role has been repeatedly re-emphasised at an international level (perhaps most recently and emphatically by the Council of the European Union in November 2010, in stating that "*In a continuously changing world, all European citizens should be equipped with the knowledge, skills and attitudes needed to understand and deal with the challenges and complexities of modern day life, whilst taking due account of the environmental, social, cultural and economic implications, as well as to assume their global responsibilities*" and calling for this to be achieved with the help of all levels of education, with specified roles for higher education (Council of the European Union, 2010)(Council of the European Union, 2010). Commentary on the slow acceptance of this role also has a history (Dawe, Jucker, & Martin, 2005; (Shephard, 2010; Sterling & Scott, 2008;Sterling & Scott, 2008). Shephard, 2010)

The nature of this assumed role bears examination at this stage. Our emphasis must be on the preposition 'for'. This is not necessarily education about sustainability (with a focus on knowledge) but *for* sustainability (with a focus on students developing the knowledge, skills, values and dispositions necessary to achieve it). It seems likely that if simply acquiring knowledge was the aim, the debate would be less protracted than it has been. Shephard (2008)Shephard (2008) argues that affective learning, of values and attitudes, is highly problematic for higher education yet is at the heart of 'education for sustainability' and this provides an explanation for why education for sustainability is so challenging to higher education. (An equivalent claim, based on teachers' beliefs, has been made by Cotton (2006) for school teaching). Others emphasise the inter-disciplinary nature of sustainability and suggest that the university is badly designed and ill-equipped to cope with the complexity of

sustainability (Bosselmann, 2001)~~(Bosselmann, 2001)~~. Others stress a fundamental disjunction between 'education *for* sustainable development' [and by implication *for* sustainability] and the more traditional 'environmental education' and "take offence at prescriptive constructions such as 'education *for* sustainable development' that reduce the conceptual space for self-determination, autonomy, and alternative ways of thinking." (Jickling & Wals, 2008)~~(Jickling & Wals, 2008)~~.

At the centre of this debate are university teachers. In general this group of individuals decides what to teach and how to teach (albeit with varying degrees of guidance from professional bodies, public and student opinion and governments, commensurate with varying degrees, and interpretations, of academic freedom in different countries (Goodlad, 1988;~~(Goodlad, 1988;~~ A°kerlind & Kayrooz, 2003)~~A°kerlind & Kayrooz, 2003)~~ University teachers around the world hold diverse views about many aspects of higher education, perhaps in particular about what, if anything, we should be 'for'. Many are happy to be 'for' knowledge or 'for' critical thinking but may be unhappy to be 'for' other educational constructs particularly those involving affective elements (Krathwohl, Bloom, & Masia, 1988)~~(Krathwohl, Bloom, & Masia, 1988)~~.

University teachers' understanding of what might be expected of them appear to be critical to this debate. Reid and Petocz used a phenomenographic approach to describe the domain space for university teachers' understanding of sustainability and identified a range of overlapping concepts in two dimensions (relating to conceptions of sustainability in the context of teaching, and conceptions of teaching in the context of sustainability) (Reid & Petocz, 2006)~~(Reid & Petocz, 2006)~~. The research emphasised the diversity of intentions and strategies that university teachers display around the phenomenon of sustainability. At the extremes some apply an integrated (teaching and sustainability) approach to seek justice, while others regard teaching and sustainability as unrelated concepts and seek to keep sustainability at a distance from their teaching. Cotton and others used a mixed methods approach to explore lecturers' beliefs about, and understandings of, sustainable development, and their views on incorporating it into the curriculum (Cotton, Bailey, Warren, & Bissell, 2009)~~(Cotton, Bailey, Warren, & Bissell, 2009)~~. Their work revealed a diversity of understandings of education for sustainable development (ESD) and a range of views on the appropriateness of including sustainable development in the curriculum. They identified constraints on inclusion of sustainable development in teaching, including perceptions of limited relevance, lack of leadership, competing agendas and dominant pedagogies inappropriate for ESD outcomes. Cotton et al also identified a range of coping strategies allowing those with opportunities and dispositions towards ESD to link their teaching to ESD outcomes. Taken as a whole, the research literature ~~to date~~ confirms the highly subjective nature of thinking about 'education for sustainability',about~~,~~ related endeavours such as environmental-education and 'education for sustainable development and global citizenship'.~~;~~ and about ~~, for our purposes, at the heart of this project,~~ the roles of higher education and its teachers. Given the diversity of opinion and the lack of clarity about the roles of higher education players in the sphere of sustainability, it is unsurprising that the pace of change has been slow. As Bosselmann put it a decade ago "The entire sustainability debate seems to run in a circle of systemic non-competence." (Bosselmann, 2001, page 168)~~(Bosselmann, 2001)~~.

The research described in this paper used Q methodology to attempt to make sense of the complex phenomenon known as 'education for sustainability', in the context of higher education, and through the viewpoints provided by university teachers. Q methodology

2

explores the subjective dimension of an issue about which different points of view can be expressed (Brown, 1996). Brown emphasises (as examples) aesthetic judgement, poetic interpretation, and perceptions of organisational role, but includes any 'situation' that engages the attention of the qualitative researcher "interested in more than just life measured by the pound" (Brown, 1996, p561) as suitable for Q. Brown and others suggest that in these situations Q combines the strengths of qualitative and quantitative methodologies and creates a bridge between the two. A considerable literature (reviewed for example by Stennor, Watts, & Worrell, 2008)Stennor, Watts, & Worrell, 2008) suggests that one strength of Q methodology is its ability to clarify the foundations of misunderstanding and disagreement that may exist within populations about complex phenomena. It achieves this, analytically, by treating participants in the study as the variables of interest, rather than the items, or questions, which individuals address. This research does not identify the beliefs of individual university teacher's beliefs about sustainability and teaching, or the particular circumstances that they find themselves in. Instead it seeks common configurations of viewpoint that may help us better understand the complex phenomenon of education for sustainability in higher education, as seen through the views of university teachers in one institution.

Methods

We adopted a fairly conventional Q methodology approach in this study as described by Watts & Stenner (2005)Watts & Stenner (2005) and by Cross (2004)Cross (2004) and our research was underpinned by a University of Otago Ethics Approval that emphasised participant anonymity. We developed a research question (what do university teachers think about 'education for sustainability' and their possible roles in this domain?) and made use of a wide range of approaches (including an extensive literature review and informal interviews with many colleagues) to create more than 100 statements (the Q Set) that could realistically be regarded as possible responses by university teachers when asked to consider this question as it applied to them. The researchers initially reduced the number of statements to 80 by eliminating overlapping concepts and in the process ensured that they included approximately equal numbers of positive, neutral and negative responses.

The 80 item Q Set was piloted with six colleagues from the university, all of whom were involved in some form of higher-education teaching-activity and all of whom worked closely with one or both of the researchers. The pilot study took the same form as the main body of the research (described below in detail) but was designed to address the validity of the Q Set and the ability of typical university teachers to cope with the research situation. The six respondents provided detailed observations on the items that they found challenging or confusing. As a consequence the Q Set was reduced to 50 items (listed in the Appendix).

The main body of the research proceeded with 43 university teachers (Q Sorts) recruited to the project using an email request circulated within groups of university staff and a process designed to include as wide a range of viewpoint, discipline and experience as possible. The groups comprised awardees of university teaching awards, members of research groups, members of a 'new teachers support group' and heads of department. The groups were supplemented by some personal invitations to colleagues.

In this study the Q-sort process was done during face-to-face interviews during which participants sorted 50 cards containing one statement each and answered six open ended questions. The process is effectively a ranking procedure used to obtain data for factor analysis (Brown, 1980)(Brown, 1980). Each of the 50 statements which made up the Q-set

was printed onto 7cm x 9cm cards. Participants express their subjective views with regard to the research question by placing the 50 statements (Q-set), into a predetermined grid. Participants were instructed verbally and in writing to sort the cards based on the extent to which they agreed or disagreed with the statements relative to one another. Participants were asked to place the cards on a 13 point scale from -6 through 0 to +6. [The statements which the participants agreed with most were placed to the right and given a positive score. Those statements which the participants disagreed with most were placed to the left and were given a negative score.]. In common with much other Q research, the distribution of statements was constrained, in our case to allow just 1 statement on each of -6 and + 6, increasing to 6 statements on each of -1 and +1, and 8 on zero. The pseudo-normal distribution that results greatly facilitates analysis but has only a minor effect on the results of Q research (Watts & Stennor, 2005)(Watts & Stennor, 2005). Participants were also asked to answer six open ended questions in writing, which were used to assist in interpreting the emergent factors. These questions addressed the subject area of their teaching, aspects of sustainability incorporated into teaching, the nature of institutional encouragement or discouragement to include sustainability, what may have influenced their viewpoints, and what they think the University should be doing about incorporating sustainability into their teaching. It also asked for other comments around the theme of the research.

The quantitative data in this study was analysed using PQMethod (version 2.11), a software programme specifically designed for Q Methodology (Schmolck, 2002)(Schmolck, 2002). Our analysis started by applying centroid factor analysis. The factors that emerged with eigenvalues (sum of squared factor loadings for that factor) greater than one were rotated using a varimax approach, to maximise the variation explained by the factors. QSorts were allocated to factors on the basis of loadings greater than 0.4 (P<0.01). Factors were further interpreted by developing accounts of the factors based on the distribution of Q Set items within their respective 'factor arrays' as described by Watts & Stennor (2005Watts & Stennor (2005).

To interpret the data, an estimate or best description of each factor was produced by merging all the Q sorts that load significantly (at P<0.01) onto each factor and that exemplify that factor or point of view (Watts & Stennor, 2005)(Watts & Stennor, 2005). This process results in a factor score for each statement. Combining these factor scores into a single complete best-fit Q sort for each factor results in a factor array used for the interpretive analysis. The researchers initially and independently analysed the data based on the most extreme rankings of particular statements. They subsequently included less extreme rankings, distinguishing statements for each factor and the statements that most differentiated each factor from the other factors. Overall interpretation, however, was not based only on particular ranking positions of the statements. A *gestalt* or holistic interpretation was also achieved by considering the open-ended responses of the exemplar Q Sorts for each factor. Essentially the "*task is to reconstruct the subjective point of view expressed in the factor array and hence 'breath subjective life' back into the purely numerical representation.*" (Stennor, Watts, & Worrell, 2008, page 227)(Stennor, Watts, & Worrell, 2008, page 227). The researchers then brought their analyses together and agreed on the factor interpretations.

Results

Factor analysis identified four factors with eigenvalues greater than 1. Varimax rotation yielded 4 factors explaining 56% of the variation within the data. All four factors had two or more significantly (at P<0.01) loading Q Sorts that loaded on only one factor (a methodological requirement for an interpretable factor; (Watts & Stennor, 2005(Watts & Stennor, 2005). Of the 43 Sorts only two did not load significantly onto these four factors and 9 loaded significantly onto two factors (in which case the greatest loading was chosen). Of the 43 participants who completed the Q sort, 21, 3, 11 and 7 participants loaded significantly onto Factor 1, 2, 3 and 4 respectively.

Factor interpretations for the four factors are provided below, with each factor described as a corresponding group of individuals who on balance hold these viewpoints. These interpretations describe the groups' viewpoints (as if they were describing themselves) but necessarily focus on aspects that distinguish each group from all others. Some aspects are common to all groups and these are identified initially as an All-group description. Numbers following each clause are the Q set number of the related statement followed by its best-fit position in that groups factor array (or in the case of the all-group description, by best-fit positions in all four groups).

All-group description

We all regard university education as a transformative experience that develops professionals who are also contributing members of society (21: +4, +6, +6, +6) and we all think that academic staff in higher education have a unique role to fulfil in preparing educated citizens who can find solutions to the pressing problems of the day (41:+5, +5, +5, +4). To varying degrees we could all agree that our teaching should bring the big issues to the local or personal level (3: +3, +1, +4, +5) and that teaching about sustainability helps students see connections between the discipline and larger societal/global issues (19: +4, +1, +4, +3). We do not in general think that teaching about sustainability, if we chose to do so, would damage our careers (12: -3, -2, -3, -3). We are not particularly concerned to teach about personal sustainability, how to avoid burn out and how to strike a balance between professional and personal wellbeing (40: 0, 0, +2, +2).

Group 1
Advocates for sustainability and for integrating sustainability into higher education

Sustainability should not be an optional extra; it should underpin everything that we do in higher education (2: +5). We can personally make a difference (43: -4). Sustainability is clearly focused on our personal radar (13: -6) and we are confident that we know how to incorporate sustainability within our disciplinary teaching (17: -3) although new paradigms to challenge notions of unlimited growth would be helpful (48: +6). We do think that animals and plants have intrinsic rights of their own (31: -5) and we do need to teach cultural sustainability alongside environmental sustainability (10: +3). We are ambivalent about whether or not society or government should provide more direction on these issues to higher education (22: 0), about the potential of our academic colleagues to lead our students towards sustainable living (39: 0) and about the need for supportive leadership (38: 0).

Group 2
Traditional university teachers committed to the liberal ideals of higher education in disciplinary contexts

We do not ourselves integrate societal values and ethics in our teaching (6: -3) and our teaching does not necessarily result in students understanding how their actions contribute to social and global justice (9: -5) but both are possible as it is *our* responsibility to decide what we teach (35:5). Our teaching is not focused on students learning content material that they will need after graduation (7: -3) and we do not necessarily regard it as our role to contextualise the topics that we address (33: 0). Academics are not a simple cross-section of society and some academic colleagues certainly could lead our students towards sustainable living (39: -5). We have strong personal views on related issues [so, for example, think that animals and plants have their own intrinsic rights (31: -6)]. But sustainability does not underpin everything that we do (2: -4), it is not a personal priority (13: +3) and our own teaching has only a minor impact on planetary affairs (44: +4).

Group 3

Sustainably-minded university teachers inclined towards interdisciplinarity but not 'education for sustainability'

Universities should not leave teaching about sustainability to other education groups (23: -6) and university teachers who want to teach about sustainability should not have to do it in their own time (42: -5). Individual university teachers can make a difference (43: -3). We are personally interested in sustainability (13: -4), we do our best to explore societal values and ethics in our teaching (6: +3) and we emphasise the broader context of our disciplines (33, +5). Teaching about sustainability makes a positive contribution to higher education (49: -5) and to an extent we do introduce key concepts of sustainability, for example, as we address critical thinking (34: +2). But our teaching does not necessarily help students to understanding how their actions contribute to social and global justice (9: 0) nor do we particularly try to balance the needs of humans with those of other organisms (29: -1). We are not particularly convinced that sustainability should underpin everything that we do in higher education (2: +1).

Group 4

Anthropocentric university teachers mindful of their academic freedom and responsibility to be critic and conscience of society

Universities and university teachers have important roles to play in society but we need to be independent from external control and decide for ourselves what and how to teach (22: +4). We respect the rights of others to teach about sustainability (49: -5) and we may address aspects of sustainability in our teaching, but not necessarily any more than other issues with value-laden social implications (34:1) and nor do we feel pressure to do so (11: -5). We are comfortable asking students to examine their personal practices and actions and confident that we are being true to our own values (28: +3). We are not particularly inclined to balance the needs of humans with those of other organisms in our teaching (29: -1) nor are we averse to teaching concepts that ignore the rights or well-being of other organisms on this planet (30: 3). We do explore societal values and ethics in our teaching (6: +4) and we do personally make a difference (43: -6).

Discussion

We should be clear initially that these results suggest that all four significant groupings of university teachers in this research project have attributes that characterise good teaching. Commitment to transformative educational experiences, preparing educated citizens, forging links between big issues and personal or local levels, could all reside in a range of national teaching award criteria [see Shephard, Harland, Stein, & Tidswell (2010)Shephard,

Harland, Stein, & Tidswell (2010) for an international perspective on teaching awards]. Our institution involved could justifiably be proud of the commitment to teaching of its teachers and may also be pleased to hear (from an academic freedom position) that no group feels pressured to either teach about sustainability or not teach about it. Going further, all groups agree (albeit to varying degrees) that teaching about sustainability helps students see connections between the discipline and larger societal/global issues. From a general educational perspective the results are encouraging.

But from an 'education for sustainability' perspective the results emphasise a dichotomy; those who do 'on balance' educate for sustainability and those who don't. The qualifying 'on balance' is important. Participants were not working to any fixed definition of sustainability. Researchers prescribed no fixed combination of the qualities that may underpin education for sustainability. The research was designed to elicit university teachers' viewpoints on these issues. No single statement clearly distinguished our groups. But 'on balance', a dichotomy was clear.

Advocates for sustainability and for integrating sustainability into higher education (Group 1) were quantitatively the largest group in our research and were the most straightforward to interpret. Our Q analysis identifies their passion for sustainability and personal commitment to education for sustainability. "Sustainability should not be an optional extra; it should underpin everything that we do in higher education". Our open-ended questions elicited responses that do show some gradation in viewpoint on key issues but a general theme (with very few exceptions) was a need for the institution to take action that would impact on all students. This varied from requiring all students to take a first year paper, through requiring all teachers to attend professional development courses, to "whole scale institutional change". The 21 sorts in this group represented a very wide range of disciplines including science, humanities and commerce and both sexes. Other research has also found that university teachers' views on education for sustainability did not follow disciplinary lines (Cotton, Warren, Maiboroda, & Bailey, 2007)

'Those who don't' comprised three groups with relatively subtle but identifiable differences. Collectively they either do not agree that sustainability should underpin everything that we do in higher education or are relatively ambivalent about this statement; rather they do think that higher education has other equally important things to be getting on with, and that it is their role to be getting on with them. On balance these groups do not use their position in the university, or their knowledge and concerns about sustainability, to either encourage students to act sustainably, or to encourage other teachers to do so. The characteristics of each group are described below by reference to key educational paradigms that the authors think best exemplify their particular approach to higher education. In doing so the authors accept that, to a degree, their own subjective interpretations of the results, and of the higher education literature, are involved. Of Group 2, 3 and 4, Group 3 has most in common with Group 1. They are highly sustainably-minded themselves. They explore societal values and ethics in their teaching and they contextualise their disciplinary content, perhaps even in interdisciplinary contexts. This group's open-ended answers emphasise their academic freedom to decide what to teach, the limited relevance of sustainability to their own discipline and lack of resources. Some also emphasise that their own teaching integrates with that of others in their department and that the interdisciplinary complexity of sustainability issues are good for challenging students. There is much in common between this groups' description of their teaching and notions of interdisciplinary teaching, as described, for example, by Golding (2009)Golding (2009). Of all of the Groups, this group seem most

uncomfortable about its current contribution to sustainability, in higher education. Group 4 also explores values and ethics in their teaching, but focus even more strongly than does Group 3 on their academic freedom and on their role-dependent responsibility to decide what to teach. Perhaps underpinning their choices in this matter is a distinctive anthropocentric stance, reflecting what environmental sociologists have referred to as sociology's dominant paradigm or human exemptionalism paradigm (Dunlap & Marshall, 2007)(Dunlap & Marshall, 2007). This group's open-ended answers, for example, question why sustainability should be promoted ahead of other important values such as taxation policies, human rights and social justice. Aspects of sustainability taken for granted by Group 1 and 3 are probably not considered particularly pressing by Group 4. Group 2 is most like Group 4 but with a very strong disciplinary focus and a traditional, relatively teacher-centred, conception of university teaching that may override whatever personal values they hold dear. This group's open-ended answers emphasise the potential of discourse around sustainability to encourage students to question values assumptions wherever they meet them. Accordingly, Tthis group's descriptions of its teaching have some commonality with the transformational approaches described, for example, by Mezirow (2009)Mezirow (2009). Another feature in common between Groups 2, 3 and 4 is a willingness to allow, or even encourage, other university teachers to teach as they see fit. These groups collectively embrace an understanding of academic freedom that requires university teachers to address aspects of learning that they personally think important. Their common, but subjective, understanding of education for sustainability is that it encourages students to act sustainably and this encouragement is something that they either personally struggle with, or have chosen not to do. In general, these university teachers feel they could choose to 'educate for sustainability' if they wanted to. The numbers of sorts in these groups were not sufficient to comment on how representative of discipline and gender they may be.

At this point we should emphasise some of the limitations and deficiencies in our research.

- Q Methodology makes no claim to be able to categorise viewpoints that remain constant over time (Watts & Stennor, 2005)(Watts & Stennor, 2005). On the day our participants lined up our statements in a particular way, which had statistically significant comparability to the ways that others lined up the same cards. It may be that some participants would make other choices on other days, but the categories that have emerged do make sense to the researchers and there is broad agreement between the Q analysis itself and the participants''s qualitative statements. We have some confidence that the major viewpoints expressed by the participants are captured within these four factor interpretations.

- We have less confidence that we have captured all of the major viewpoints that university teachers in this institution have. Our sample of 43 is unlikely to be fully representative of the more than 2000 university teachers in this institution, but this is not a necessary condition for Q analysis. It is, however, important that the sample contains the range of major viewpoints to enable these to be included. Participants were volunteers, not conscripts, and it is possible that those holding highly negative viewpoints on 'education for sustainability' did not volunteer for this study about education for sustainability. We are encouraged, however, that: a significant proportion of participants needed to be invited several times; that they came claiming that they had 'nothing to do with education for sustainability'; and that their major motivation was respect for the importance of quality research in this field. It is also

8

clear that, from the perspective of Group 1, all other groups were relatively negative towards education for sustainability. ~~But I~~it remains possible that somewhere within the institution is another significant viewpoint. It is unlikely that this would be 'for' education for sustainability and quite possible that it would be very 'against'.

- The Q Set (statements) themselves may also not be optimum. Part of the subjectivity associated with education for sustainability relates to differences in the ways that people understand the words and phrases associated with this concept. Researchers using Q methodology attempt to create statements that will have consistent interpretations based on single sentiments. Our statements were constructed with this in mind and tested and refined in a pilot, but even so will have been interpreted in different ways by different participants. Open ended answers from some participants do suggest that their interpretation of sustainability, education for sustainability and related concepts was almost entirely within an anthropocentric paradigm. Other participants no doubt used other frameworks within which to interpret the Q Set and rank them. This is inevitable, anticipated and part of the subjectivity that we are researching. No matter how 'perfect' the statements are in the eyes of the researchers, different interpretations are natural and do need to be incorporated in the data analysis. Watts and Stennor describe how participants may make "*vigorous attempts to impose their viewpoints on any set of statements they are given*" (Watts & Stennor, 2005, page 76)~~(Watts & Stennor, 2005, page 76)~~ and that in effect a Q set is never entirely complete.

Q methodology is essentially exploratory and best suited to provide coherence to questions that have potentially complex and contestable answers (Stainton Rogers, 1995)~~(Stainton Rogers, 1995)~~. Having identified four groups of university teachers with qualitatively different viewpoints on education for sustainability, where next? What questions could now be asked with coherence? Two paths are envisaged.

First, and from an institutional and higher education perspective, knowledge of the nature of the identified differences may be more valuable than knowledge of how many groups are involved. Between groups 2, 3 and 4, differences are subtle and, particularly with respect to conceptions about university roles, a matter of degree. Perhaps each group has quantitatively different perceptions of the importance of academic freedom but as a basic quality, this is not contested between them. Between these groups there probably are fundamental differences in worldview about the position of humans with respect to nature but as yet these are not problematic. Between Group 1 and all other groups, however, the differences are substantial and relevant to our institution now. 'Those who do' and 'those who don't' seem to be committed to mutually-exclusive models of HE and views of their role within it. Such strong value-based differences are unlikely to be reconciled either by inspired institutional leadership or by government intervention. The literature on organisational change, particularly as applied to the academy, suggests that change is most challenging where values-based differences are involved (see for example Kezar & Eckel, 2002)~~Kezar & Eckel, 2002)~~. Consensus seems unlikely, at least in the short term.

A better prospect may be increased accommodation to others' viewpoints; and indeed accommodation to alternative viewpoints appears to be inbuilt in the viewpoints of Groups 2, 3 and 4. These groups collectively appreciate what Group 1 is doing and perhaps even want them to do more. Of the three, only Group 2 did not strongly disagree with Fish's assertion that university teachers should save the world in their own time (Fish, 2008)~~(Fish, 2008)~~;

9

showing difference to statement #2 and managing with #2 University teachers who want to teach but sustainability shall be in their own time 4,0,5,4 When such accommodation is a feature of this particular institution, lack of hard-line Fish-followers in our study, or a sign of changing times is unclear. But even from an 'education for sustainability' perspective it is a positive sign.

Lack of accommodation is more of a characteristic of Group 1. Their particular aspirations for higher education depend on outcomes that could only be achieved if others adopt a particular, and to them alien, understanding of the roles of higher education and of university teachers. A possible, but relatively trivial, institutional response could be to encourage greater accommodation to the views of others. In that case two routes would be, logically, worth considering: better resourcing of the 'education for sustainability' undertaken by Group 1 (for theirs is an expensive mission) to reduce the need for accommodation; and perhaps but more controversially, professional-development for all groups; for Group 1 (to help them understand better the rational and legitimate views of other groups) and for other groups (to help them to explore compromise situations; Group 3 teachers appear to be particularly open to discussion around changing roles of higher education). A more substantial response, no doubt operating beyond the institution, would be to question the current nature of higher education and, within it, the construction of knowledge and its relationship to the structure of the academy. Gumport & Snydman (2002)Gumport & Snydman (2002) argue that higher education itself establishes categories of expertise and knowledge, that its own organisational context and structure influences what counts as knowledge and that it has a well-established charter to embody both stability and change on behalf of society. This substantial response *may* make more demands for change of Groups 2, 3 and 4, than of Group1; and build substantially on the classic work of Hefferlin (1969)Hefferlin (1969) and others in focussing on the curriculum as the primary academic structure around which knowledge is organised, and changed. Along similar lines, Le Grange calls for new models of knowledge production and fragmentation of disciplinary knowledge to create space within which alternative knowledge forms can develop (Le Grange, 2011)(Le Grange, 2011). Shephard argues that change may alternatively focus on challenging the relationship between learners and teachers and suggests that "Fears that teachers can teach values, however appropriate or inappropriate, to their students have less foundation as the power swings from teacher to learner" (Shephard, 2010, page 21)(Shephard, 2010, page 21).

Second, and from a higher-education studies perspective, this research creates the possibility of quantitative follow up. In particular we might expect some relationship between the conceptions held by university teachers about their roles and its manifestation as teaching, and the learning of their students. A potentially comparable relationship between teachers' conceptions of teaching and student approaches to learning has proved to be a powerful catalyst for change in higher education teaching and learning (Trigwell, Prosser, & Ginns, 2005)(Trigwell, Prosser, & Ginns, 2005). There is great interest in the nature of teaching and the impact of teaching approaches on students and student learning. Yet we have remarkably little evidence to support notions that higher-education for sustainability influences student development as sustainably-minded citizens, in the ways that it is hoped to (perhaps particularly by Group 1 teachers). Q methodological determination of the differences between groups lends itself to the creation of quantitative instruments to determine to which group individual teachers best fit and we are currently refining our own Approaches to Sustainability Teaching Inventory (ASTI). Research is underway to determine change in students as they experience higher education (Shephard, Smith, Deaker, Harraway, Broughton-Ansin and Mann, 2011;(Shephard, Smith, Deaker, Harraway, Broughton-Ansin and Mann, 2011; Shephard, Mann, Smith, & Deaker, 2009)Shephard,

~~Mann, Smith, & Deaker, 2009).~~ The next step is to research the relationship between university teacher~~'~~s' conceptions about education for sustainability and student learning. To what extent do university teachers' own views on sustainability, and on education for sustainability, influence their students?

Acknowledgements

References

Åkerlind, G. S., & Kayrooz, C. (2003). Understanding Academic Freedom: The views of social scientists. *Higher Education Research & Development, 22*, 327-344. doi:10.1080/0729436032000145176

Bosselmann, K. (2001). University and Sustainability: compatible agendas? *Educational Philosophy and Theory, 33*(2), 167-186. doi:10.1111/j.1469-5812.2001.tb00261.x

Brown, S. (1980). *Political subjectivity: Applications of Q methodology in political science.* New Haven, CT.: Yale University Press.

Brown, S. R. (1996). Q Methodology and Qualitative Research. *Qualitative Health Research, 6*, 561-567. doi:10.1177/104973239600600408

Corcoran, P. B., & Wals, A. E. J. (2004). *Higher education and the challenge of sustainability : problems, promise, and practice.* Dordrecht: Kluwer Academic Publishers.

Cotton, D. R. E. (2006). Implementing curriculum guidance on environmental education: the importance of teachers' beliefs. *Journal of Curriculum Studies, 38*, 67-83. doi:10.1080/00220270500038644

Cotton, D. R. E., Warren, M. F., Maiboroda, O., & Bailey, I. (2007). Sustainable development, higher education and pedagogy: a study of lecturers' beliefs and

attitudes. *Environmental Education Research, 13,* 579-597.

doi:10.1080/13504620701659061

Cotton, D., Bailey, I., Warren, M., & Bissell, S. (2009). Revolutions and second-best

solutions: education for sustainable development in higher education. *Studies in*

Higher Education, 34(7), 719-733. doi:10.1080/03075070802641552

Council of the European Union. (2010). Council conclusions on education for sustainable

development 3046th EDUCATION, YOUTH, CULTURE and SPORT Council

meeting Brussels, 18 and 19 November 2010. European Union. Retrieved from

http://www.consilium.europa.eu/uedocs/cms_Data/docs/pressdata/en/educ/1

17855.pdf

Cross, R. M. (2004). Exploring attitudes: the case for Q methodology. *Health Education*

Research, 20, 206-213. doi:10.1093/her/cyg121

Dawe, G., Jucker, R., & Martin, S. (2005). *Sustainable Development in Higher Education.*

Higher Education Academy. Retrieved from

http://www.heacademy.ac.uk/resources/detail/sustainability/dawe_report_200

5

Dunlap, R. E., & Marshall, B. K. (2007). Environmental Sociology. *in Environmental*

Sociology C. D. Bryant and D. L. Peck (eds.), 21st Century Sociology: A Reference

Handbook, Vol. 2. (pp. 329-340). Thousand Oaks, CA: Sage.

Fish, S. (2008). *Save the world on your own time.* Oxford [England] ;;New York N.Y.:

Oxford University Press.

Golding, C. (2009). *Integrating the disciplines : successful interdisciplinary subjects.*

Parkville Vic: Centre for the Study of Higher Education University of Melbourne.

Goodlad, S. (1988). Four forms of herecy in higher education. *in M Tight (ed) Academic Freedom and Responsibility*. Milton Keynes: Society for Research into Higher Education & Open University Press.

Gumport, P. J., & Snydman, S. K. (2002). The Formal Organization of Knowledge: An Analysis of Academic Structure. *The Journal of Higher Education, 73*, 375-408. doi:10.1353/jhe.2002.0025

Hefferlin, J. B. L. (1969). *Dynamics of academic reform.* San Francisco, CA.: Jossey- Bass.

Jickling, B., & Wals, A. E. J. (2008). Globalization and environmental education: looking beyond sustainable development. *Journal of Curriculum Studies, 40*, 1-21. doi:10.1080/00220270701684667

Kezar, A. J., & Eckel, P. D. (2002). The Effect of Institutional Culture on Change Strategies in Higher Education: Universal Principles or Culturally Responsive Concepts? *The Journal of Higher Education, 73*, 435-460. doi:10.1353/jhe.2002.0038

Krathwohl, D., Bloom, B., & Masia, B. (1988). *Taxonomy of educational objectives, Handbook II: The affective domain.* New York: David McKay Co.

Le Grange, L. L. L. (2011). Sustainability and Higher Education: From arborescent to rhizomatic thinking. *Educational Philosophy and Theory, 43*, 742-754. doi:10.1111/j.1469-5812.2008.00503.x

Mezirow, J. (2009). *Transformative learning in practice : insights from community, workplace, and higher education* (1st ed.). San Francisco CA: Jossey-Bass.

Reid, A., & Petocz, P. (2006). University Lecturers' Understanding of Sustainability. *Higher Education, 51*(1), 105-123. doi:10.1007/s10734-004-6379-4

Schmolck, P. (2002). The Q Method Page. Retrieved September 26, 2011, from http://www.lrz.de/~schmolck/qmethod/

Shephard, K. (2008). Higher education for sustainability: seeking affective learning outcomes. *International Journal of Sustainability in Higher Education, 9*(1), 87-98. doi:10.1108/14676370810842201

Shephard, K. (2010). Higher Education's Role in "Education for Sustainability." *Australian Universities Review, 52*(1), 13-22.

Shephard, K., Harland, A., Stein, S., & Tidswell, T. (2010). Preparing an application for a higher-education teaching-excellence award: whose foot fits Cinderella's shoe? *Journal of Higher Education Policy and Management, 33*, 47-56. doi:10.1080/1360080X.2011.537011

Shephard, K., Mann, S., Smith, N., & Deaker, L. (2009). Benchmarking the environmental values and attitudes of students in New Zealand's post-compulsory education. *Environmental Education Research, 15*, 571-587. doi:10.1080/13504620903050523

Shephard, K., Smith, N., Deaker, L., Harraway, J., Broughton-Ansin, F., & Mann, S. (2011). Comparing different measures of affective attributes relating to sustainability. *Environmental Education Research, 17*, 329-340. doi:10.1080/13504622.2010.542450

Sherren, K. (2008). A history of the future of higher education for sustainable development. *Environmental Education Research, 14*, 238-256. doi:10.1080/13504620802148873

Stainton Rogers, R. (1995). Q methodology. *Q methodology. In J. A. Smith, R. Harre, & L. Van Langenhove (Eds.), Rethinking methods in psychology* (pp. 178-192). Thousand Oaks, CA: Sage.

Stennor, P., Watts, S., & Worrell, M. (2008). Q methodology. *in C. Willig and W. Stainton Rogers (eds) The Sage handbook of qualitative research in psychology* (pp. pp215-239.). London: Sage.

Sterling, S., & Scott, W. (2008). Higher education and ESD in England: a critical commentary on recent initiatives. *Environmental Education Research, 14*(4), 386-398. doi:10.1080/13504620802344001

Teisl, M., Anderson, M., Noblet, C., Criner, G., Rubin, J., & Dalton, T. (2011). Are Environmental Professors Unbalanced? Evidence From the Field. *The Journal of Environmental Education, 42*(2), 67-83. doi:10.1080/00958961003705899

Trigwell, K., Prosser, M., & Ginns, P. (2005). Phenomenographic pedagogy and a revised Approaches to teaching inventory. *Higher Education Research and Development, 24*(4), 349-360. doi:10.1080/07294360500284730

Watts, S., & Stennor, P. (2005). Doing Q methodology: Theory, method and interpretation. *Qualitative Research in Psychology, 2*, 67–91.

World Commission on Environment and Development. (1987). Brundtland Report: Our Common Future. Retrieved from <http://worldinbalance. net/intagreements/1987-brundtland.php>

A°kerlind, G. S., & Kayrooz, C. (2003). Understanding Academic Freedom: The views of social scientists. *Higher Education Research & Development, 22*, 327-344. doi:10.1080/0729436032000145176

Appendix

The 50-item Q set used in this research project, together with factor scores for each group

Q Statement	Group Factor Scores			
	1	2	3	4

15

Statement				
1. I am unclear about my responsibility for teaching about sustainability	-2	3	2	1
2. Sustainability in higher education should not be an optional extra, it should underpin everything we do	5	-4	1	-1
3. I think my teaching should bring the big issues to the local or personal level	3	1	4	5
4. Integrating sustainability into my teaching distracts from content acquisition	-3	-1	-3	0
5. Integrating sustainability into my teaching practices is just part of my holistic approach to teaching	2	-4	0	0
6. Exploration of societal values and ethics is integrated into my teaching	4	-3	3	4
7. My teaching is focused on students learning content material that they will need after graduation	1	-3	3	2
8. My teaching involves getting students to see the 'long view' and to see the long term impact of their discipline	3	0	4	5
9. My teaching results in students understanding how their actions contribute to social and global justice	1	-5	0	3
10. We need to teach cultural sustainability alongside environmental sustainability	3	-1	2	2
11. I feel pressure to incorporate sustainability into my teaching	-1	-2	-1	-5
12. Teaching about sustainability in my discipline is a career-breaker. It does not go down well with students or colleagues	-3	-2	-3	-3
13. Sustainability is so far off my radar I am not sure why I agreed to contribute to this research	-6	3	-4	-2
14. Teaching about sustainability is an opportunity to make a political statement	0	1	-2	1
15. Connections between sustainability and my discipline do exist but they have not yet been clearly articulated	-2	3	3	-1
16. Sustainability is too diffuse a concept at present to teach	-3	0	0	-3
17. I am unsure how to incorporate sustainability into my discipline	-3	2	2	1
18. Teaching about sustainability distracts students from fully engaging with my discipline	-2	0	-3	0
19. Teaching about sustainability helps students see connections between the discipline and larger societal/global issues	4	3	4	2
20. There is a clear line between my role as a disciplinary teacher and imagined roles of university teachers as educators of citizens	-1	1	-1	-2
21. I view university education as a transformative experience that develops professionals who are also contributing members of society	4	6	6	6
22. Universities cannot be critic and conscience of society if society, or government, tells us what and how to teach	0	4	1	4
23. Leave this for the schools and polytechnics; it's not our role	-5	-1	-6	-2

24. Education for sustainability cannot be a priority when neither university staff nor students think that it is	-1	2	0	0
25. People who preach about sustainability are very annoying	-1	1	-3	-4
26. Teachers who ignore sustainability issues are very arrogant	-1	-3	-2	-4
27. I need to be true to my own values when I teach so I cannot teach principles that I do not manage to adopt myself	1	2	0	1
28. I do my best to 'walk the talk' so I am comfortable asking students to examine their personal practices and actions	1	-1	0	3
29. In my teaching I try to balance the needs of humans with those of other organisms	1	2	-1	-1
30. I cannot in all conscience teach concepts that ignore the rights or well-being of other organisms on this planet	2	0	0	-3
31. I don't think that animals and plants have any rights other than those that humans give them	-5	-6	-1	-1
32. My form of teaching emphasises important content and there is little room in it for spurious content	-2	2	-1	0
33. My form of teaching emphasises context and it is my role to contextualise the topics that we address	2	0	5	3
34. I address critical thinking in my teaching and inevitably introduce the key concepts of sustainability	3	-3	2	1
35. Teachers decide what is taught, not students	0	5	-2	-1
36. My teaching addresses what I think is important and what my students think is important	1	1	3	3
37. I am waiting for institutional or professional leadership on sustainability issues	-2	-1	0	-1
38. Even if university leadership is not supportive, I still think it is my responsibility to teach sustainability	0	-1	1	0
39. Academic staff in universities have essentially the same values as those of wider society and are in no position to lead our students towards sustainable living	0	-5	-2	-3
40. It's important to teach about personal sustainability, how to avoid burn out and strike a balance between professional and personal wellbeing	0	0	2	2
41. Academic staff in higher education have a unique role to fulfil in preparing educated citizens who can find solutions to the pressing problems of the day	5	5	5	4
42. University teachers who want to teach about sustainability should do it in their own time	-4	0	-5	-4
43. Nothing I can do will possibly make a difference	-4	0	-2	-6
44. My teaching has a minor impact on planetary affairs	0	4	1	0
45. My teaching can contribute to a sustainable future for all	2	-2	1	1
46. Young teachers need to take action because older teachers won't be around to live with the consequences of their actions	-1	-2	-4	-2
47. Older teachers need to take responsibility for this now because	0	1	-	-2

sustainability issues are their generation's fault and because they have the power		4	
48. We need new paradigms that challenge notions of unlimited growth	6	4	1	2
49. Teaching about sustainability emphasises negativity. I hate it.	-4	-2	-5	-5
50. Teaching about sustainability is a positive and reaffirming aspect of my role	2	-4	-1	0

1.51. ~~I am unclear about my responsibility for teaching about sustainability~~

2.52. ~~Sustainability in higher education should not be an optional extra, it should underpin everything we do~~

3.53. ~~I think my teaching should bring the big issues to the local or personal level~~

4.54. ~~Integrating sustainability into my teaching distracts from content acquisition~~

5.55. ~~Integrating sustainability into my teaching practices is just part of my holistic approach to teaching~~

6.56. ~~Exploration of societal values and ethics is integrated into my teaching~~

7.57. ~~My teaching is focused on students learning content material that they will need after graduation~~

8.58. ~~My teaching involves getting students to see the 'long view' and to see the long term impact of their discipline~~

9.59. ~~My teaching results in students understanding how their actions contribute to social and global justice~~

10.60. ~~We need to teach cultural sustainability alongside environmental sustainability~~

11.61. ~~I feel pressure to incorporate sustainability into my teaching~~

12.62. ~~Teaching about sustainability in my discipline is a career-breaker. It does not go down well with students or colleagues~~

13.63. ~~Sustainability is so far off my radar I am not sure why I agreed to contribute to this research~~

14.64. ~~Teaching about sustainability is an opportunity to make a political statement~~

15.65. ~~Connections between sustainability and my discipline do exist but they have not yet been clearly articulated~~

16.66. ~~Sustainability is too diffuse a concept at present to teach~~

17.67. ~~I am unsure how to incorporate sustainability into my discipline~~

18.68. ~~Teaching about sustainability distracts students from fully engaging with my discipline~~

19.69. ~~Teaching about sustainability helps students see connections between the discipline and larger societal/global issues~~

20.70. ~~There is a clear line between my role as a disciplinary teacher and imagined roles of university teachers as educators of citizens~~

21.71. ~~I view university education as a transformative experience that develops professionals who are also contributing members of society~~

22.72. ~~Universities cannot be critic and conscience of society if society, or government, tells us what and how to teach~~

23.73. ~~Leave this for the schools and polytechnics; it's not our role~~

24.74. ~~Education for sustainability cannot be a priority when neither university staff nor students think that it is~~

25.75.	People who preach about sustainability are very annoying
26.76.	Teachers who ignore sustainability issues are very arrogant
27.77.	I need to be true to my own values when I teach so I cannot teach principles that I do not manage to adopt myself
28.78.	I do my best to 'walk the talk' so I am comfortable asking students to examine their personal practices and actions
29.79.	In my teaching I try to balance the needs of humans with those of other organisms
30.80.	I cannot in all conscience teach concepts that ignore the rights or well-being of other organisms on this planet
31.81.	I don't think that animals and plants have any rights other than those that humans give them
32.82.	My form of teaching emphasises important content and there is little room in it for spurious content
33.83.	My form of teaching emphasises context and it is my role to contextualise the topics that we address
34.84.	I address critical thinking in my teaching and inevitably introduce the key concepts of sustainability
35.85.	Teachers decide what is taught, not students
36.86.	My teaching addresses what I think is important and what my students think is important
37.87.	I am waiting for institutional or professional leadership on sustainability issues
38.88.	Even if university leadership is not supportive, I still think it is my responsibility to teach sustainability
39.89.	Academic staff in universities have essentially the same values as those of wider society and are in no position to lead our students towards sustainable living
40.90.	It's important to teach about personal sustainability, how to avoid burn out and strike a balance between professional and personal wellbeing
41.91.	Academic staff in higher education have a unique role to fulfil in preparing educated citizens who can find solutions to the pressing problems of the day
42.92.	University teachers who want to teach about sustainability should do it in their own time
43.93.	Nothing I can do will possibly make a difference
44.94.	My teaching has a minor impact on planetary affairs
45.95.	My teaching can contribute to a sustainable future for all
46.96.	Young teachers need to take action because older teachers won't be around to live with the consequences of their actions
47.97.	Older teachers need to take responsibility for this now because sustainability issues are their generation's fault and because they have the power
48.98.	We need new paradigms that challenge notions of unlimited growth
49.99.	Teaching about sustainability emphasises negativity. I hate it
50.100.	Teaching about sustainability is a positive and reaffirming aspect of my role

Total word count including abstract, references and appendix 7171