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Disciplines in dialogue

Disciplinary perspectives
on interdisciplinary
teaching and learning

Edited by John Canning

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John Canning

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Introduction

John Canning

It seems that interdisciplinarity is usually regarded as 'a good thing'. We understand that so many issues in life cannot be understood entirely within the framework of a single discipline. As DeZure (n.d.) reminds us, life is interdisciplinary. We are faced with AIDS, poverty and environmental degradation, all of which have social, cultural and scientific dimensions. However, our universities are sectioned into schools and departments, each with their own (usually jealously guarded) budget. The UK's Research Assessment Exercise (RAE) is facilitated by disciplinary panels, which determine levels of funding for research. It is also suggested that the RAE penalises interdisciplinary research (Fazackerley 2004). The now dated but still well regarded Carnegie Foundation report *Scholarship Reconsidered: Priorities of the Professoriate* (Boyer 1990, Appendix A) reported that 98% of college teachers in the United States regarded their discipline as 'very important' or 'fairly important' to them. However, despite this importance attached to the discipline, only 8% agreed or strongly agreed that "multidisciplinary work is soft and should not be considered scholarship". I doubt that the picture would be much different had the survey asked about 'interdisciplinary' as opposed to 'multidisciplinary' work or had been recently undertaken in the UK.

In relation to interdisciplinary teaching and learning the picture sometimes appears bleak. Discussions of interdisciplinary learning and teaching are largely characterised by a concern for 'barriers' that impede the student and staff experience in terms of learning styles, assessment, and quality assurance (for example see Bradbeer 1999, Mansilla 2005, Canning 2005). Nevertheless, it has been evident for some time that there is no shortage of practitioners interested in discussing these issues.

This collection originates from a workshop that was funded by the Higher Education Academy via the Interdisciplinary Teaching and Learning Group. Moves to bring together Subject Centre colleagues with an interest in interdisciplinarity coincided with the Academy's response to the paper published by the Higher Education Funding Council for England (HEFCE) on Education for Sustainable Development (ESD). Whilst different parts of the Academy's Subject Centre Network had very different responses to how they may be able to engage with ESD, it was immediately clear that ESD is inherently interdisciplinary. Scientists may identify environmental 'problems', but responses are also social, political, economic, ethical and cultural. It was quickly apparent that there was synergy between the two projects.

The workshop 'Disciplines in Dialogue: A Sustainability Case Study' was held in York on 5 December 2005 and brought together interdisciplinarity and ESD using a Problem-Based Learning (PBL) approach. As Heather Witham discusses the workshop and what she perceives its outcomes to be in her essay, the rest of this short introduction will focus on some of the issues surrounding the publication of the essays in this volume. The only common experience of the authors that I can substantiate is that they were in the Higher Education Academy building in York on 5 December 2005, and that they all were asked to answer the same question, 'What does interdisciplinary mean to your discipline?' For the most part the essays have been published as submitted, though the essays were sent to appropriate Subject Centres for comment and a few were modified at this stage. Most contributors refer to the York event, though not all do, and they were not specifically asked to do so. It is the challenge of the reader to make his or her

own assessment of the extent (or even of the necessity) of the collection having any degree of coherence. Some readers may read the collection with a view to identifying links between the essays whereas others may see them as a collection of unrelated essays stapled together. I will not suggest how to read the essays, for that in itself may be construed as suggesting that there are right and wrong ways to engage with issues of interdisciplinary teaching and learning. In order not to suggest links, the essays are published in alphabetical order of the author's surname and not in sections of supposedly 'cognate' disciplines.

Underpinning interdisciplinarity is disciplinarity. As Becher (1989) reminds us, disciplines are inherently cultural formations, with their issues and debates. The naming of the authors' disciplines is, of course, not done with the intention of suggesting that the author is saying, "this is how Politics/ Music/ Engineering addresses interdisciplinary teaching and learning", but they are offering their particular perspective. I doubt that there is a single essay in this collection that would be uncontested by other colleagues in the same discipline. Moreover, the perspectives do not claim to be in any way representative of how political scientists/ musicians/ lawyers etc., respond to or practise interdisciplinary teaching and learning.

Disciplines are characterised by key players, key debates, key journals etc, which are all underpinned by power relationships. For this reason I have endeavoured to give as much leeway as possible to the authors in this regard and have sought to avoid using this introduction to present my own views of interdisciplinarity. I have also not undertaken the commonplace practice of summarising the papers in this introduction. However, it is interesting to note that a variety of approaches is taken. Some of the essays are well situated in existing literatures. Some are more like personal opinion pieces with little or no reference made to other writings. Most have some degree of autobiography in them. Some are quite theoretical: some are strongly rooted in the author's practice as a teacher. In some ESD and PBL are at the forefront of the argument; in other essays they are mentioned only in passing or not at all.

As editor, my greatest wish is that readers will respond to what they read. I do not mind whether they respond in agreement, disagreement, joy, anger, elation or despair.

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Disciplines in dialogue workshop: a sustainability case study

Heather Witham

Meeting the challenge of sustainability, given our current climate and energy crises, is of supreme importance to the education sector. Real-life problems are not one-discipline concerns: they require multidisciplinary and, more usually, interdisciplinary approaches.

As part of my work as Education for Sustainable Development Project Co-ordinator at the Higher Education Academy, I came across a report by Chris Church for the Community Development Foundation and the Joseph Rowntree Foundation entitled '*Seven Sides to Every Question? Towards effective inter-disciplinary action on sustainable development*'. While this paper is referring to disciplines in the non-academic sense (organisations representing different sectors of the community), the use of case studies to observe how different disciplines communicate and approach a problem stayed with me.

Our idea in the Interdisciplinary Teaching and Learning Group was to bring together representatives from the disciplines served by the 24 Subject Centres of the Academy. Invitations were sent out via the Subject Centres and we had 36 participants on the day (5 December 2005).

The invitation only stated that attendees would obtain the following outcomes:

- the chance to tackle a sustainable development case study with colleagues from other disciplines around the UK
- a demonstration of how Problem-Based Learning (PBL) can work in your own classroom.

Additionally, we planned to gain "insight into how disciplines speak to each other and what the barriers are to this happening effectively." We received permission from participants to record the day's proceedings.

Jenny Blumhof, co-facilitator, explained the Problem-Based Learning (PBL) 'trigger' for the first exercise:

In small groups you have one hour to start your thinking before we ask your groups for feedback and then look at PBL in detail.

You are a group of academic consultants invited by the Mayor of London to advise on 'greening' the 2012 Olympics so that they produce sustainable benefits for Londoners.

You have six weeks to submit a report and this morning your group will begin to address the problem. At the end of an hour, and with the aid of a flip chart, your group has two minutes to give a presentation on your preliminary ideas.

Attendees were then assigned rooms and tables. Each table had six disciplines

represented, and an effort was made *not* to group them according to cognate disciplines.

1. Music, English, Economics, Accounting, Sport, Environmental Sciences
2. Management, Materials, Linguistics, Bioscience, Dance/Movement, Anthropology
3. Drama, History, Social Work, Business, Physical Sciences, Psychology
4. Tourism, Art, Politics, Finance, English, Engineering, Geography
5. Information and Computer Sciences, Hospitality, Religious Studies, Area Studies, Design
6. Built Environment, Media, Archaeology, Leisure, Law, Education

On the table were a few articles about the Olympics in London, which included photographs. Members of the Interdisciplinary Group sat at the tables to take notes but were asked not to actually participate in the dialogue nor to facilitate the proceedings in any way.

At the end of the hour, we all re-assembled for a plenary discussion on PBL, sustainability and interdisciplinarity.

Participants were given the opportunity to write essays on what interdisciplinary teaching and learning means to their particular discipline(s), from their particular perspective. About one-third of those who attended did submit essays.

From our own readings of the group activity, Jenny and I made the following observations regarding the interdisciplinarity:

- dialogue seemed fragmentary. Was this because this would have just been the initial phase of the project, perhaps time was too limited to go beyond brainstorming?
- dialogue was repetitive
- some evidence of themes between the groups emerged, e.g. transport and housing, but this was not 'powerful'
- some evidence of disciplinary 'biases', especially for History, Environmental Sciences and Dance, was clear. But 'personal bias' may have been more prevalent.

Additionally we asked what would have happened if each group represented one discipline? Would the dialogue have been as fragmentary and repetitive?

Interestingly, the groups did not attempt to create tasks for each member based on their disciplinary background, as we had hoped they would. (Again, this may have been due to lack of time and this being the first phase of the project.) Given this, we may like to replicate the exercise to see how this task would be handled and if this would lead to any problems regarding boundaries.

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Music

Paul Barker

According to Basarab Nicolescu (1997) interdisciplinarity concerns the transfer of methods from one discipline to another. He distinguishes between three degrees:

1. Application: e.g. when the methods of nuclear physics were transferred to medicine it led to the appearance of new treatments for cancer.
2. Epistemology: e.g. transferring methods of formal logic to the area of general law generated analyses of the epistemology of law. (Epistemology attempts to differentiate between trustworthy and untrustworthy, or reliable and unreliable knowledge.)
3. New disciplines: e.g. the creation of chaos theory through the transference of mathematics to physics, resulting in mathematical physics, which in turn was applied to meteorological phenomena or stock market processes. Computer art is a simpler example.

This definition is by no means universally agreed, but it goes some way to differentiating between interdisciplinarity and related terminology: *disciplinarity*, which typifies the attitude of thinking within the box; *multidisciplinarity*, which pursues knowledge in parallel between disciplines; and *transdisciplinarity*, which seeks to find a greater unity beyond commonality.

I am aware of a lack of general acceptance of these definitions; in particular their application within the arts is commonly erratic. In all areas, disciplinarity – the box in which we practise our discipline – has become smaller and smaller since the Renaissance. Some argue that the depth of knowledge we practise has been at the expense of the bigger picture, at our own cost: for instance global warming may well represent an undesirable result of increased longevity and mobilisation in the communication age.

On the other hand within my own discipline of music, I am aware of the abundance of positive influences of interdisciplinarity: opera was invented at the turn of the 16th century by the Florentine Camerata, a privileged group of intellectuals who encompassed between them an impressive array of knowledge of poetry, science, technology, history, philosophy, astronomy and politics in addition to music, literature, theatre and visual design. Opera began as an attempt to synthesise this diverse knowledge, re-born in a newly rational and scientific age through transdisciplinarity. In its turn it led, in time, to the invention of the symphony orchestra, the musical and eventually film. Nicolescu places much importance on the third degree of interdisciplinarity, the advocacy of the creation of new disciplines. Opera, from Monteverdi to Mozart, Wagner, Glass and Stockhausen, represents a consummate example of this in an evolving continuum.

Whereas the Renaissance seemed to be an era that rejoiced in the discovery and application of the newly discovered relationships between all substance and thought, typified by polymaths such as Leonardo da Vinci and Michelangelo, the following centuries seemed to emphasise an increasing depth of knowledge at the expense of

breadth. Just as opera evolved almost unrecognisably in the five centuries since, so have our thought processes similarly transformed beyond recognition. Occasionally an objective eye offers us a fresh perspective and perhaps helps us to recognise a difficult truth. Professor Pitika Ntuli (1988) articulates a disturbing view of Western ring-fencing or partitioning after his first visit to Britain in the 1970s, that might be termed a-disciplinarity:

In my country, and in Swaziland, my country of adoption, the fusion of art forms, to be a poet, painter, sculptor, musician, actor, all in one, can be just a matter of course. Ceremonies, rituals, fuse all art forms, to allow for...cross-fertilization... Arriving in Britain I found myself living, or half-living, in different compartments simultaneously. Each compartment seemed hermetically sealed. Each so stiflingly private. (Ntuli 1988)

Ntuli's words expose the vacuum at the heart of what we might take for a sophisticated society. The cultural isolation it describes perhaps reflects intellectual and social isolation that seem to be the inevitable if unacceptable outcome of a society as complex and profligate as our own. Within this context, the advocacy of interdisciplinarity might seem more like a return to common sense: a chance to reflect on the need to rebalance between thought and effect, for contemplation and consideration to intervene between discovery, invention, implementation and sales. Today, such advocacy may be seen as a necessity and not merely a theoretical posture.

Noting that the true nature of music is to integrate itself into all cultural forms and beyond, to act as a unifying influence, some commentators have suggested the place of music at the hub of interdisciplinarity. Certainly music is increasingly used as a political and social tool to bring large numbers of people together with shared aims and objectives; and its usefulness as a tool of mass-marketing is blatant from politics and media to industry.

The case may remain yet to be proven, but one of the great virtues of music is that it exists entirely without language – or to be more precise, beyond words, since many consider music as a language itself, albeit a curious sort of language that is more listened to than conversed with. This notion, however, more properly reflects the over-sophisticated result of a society that values music more as a commodity or consumer item than a medium of communication. I might suggest that Professor Ntuli might have had a different expectation from music in his culture.

Music makes many disciplinary demands on its practitioners and teachers, both in depth and in breadth, and here I shall attempt to illustrate some of them.

The disciplines involved in the learning and execution of music are diverse, demanding a dialogue between physical, emotional and intellectual stimuli, through the co-ordination of auditory, tactile and visual senses, and involving control and differentiation between long- and short-term memory. The structure of music also inevitably reflects the sociological, philosophical and/or religious structures of the time and place of its conception, and an understanding of these aspects is required to perform and interpret different styles. Performance itself requires that all this information, mental and physical interdisciplinary technique, be subsumed beneath the conscious mind, allowing instinct to interact with the subconscious. A successful act of performance itself demands an

awareness of the inner reality of the material of the performance to coincide with the awareness of the external performance arena without conflict.

The learning of music may of necessity be a solitary and exacting discipline in itself, as may be the composition of music, yet both these activities may also be achieved through collaboration with other musicians, sometimes in large groups. Both individual discipline and social communication are required as music is essentially a social art form, often requiring the collaboration of instruments and voices, conductors, coaches, directors and actors in front of an audience.

Although music is ostensibly an auditory art form, deafness has proved an obstacle for neither performers nor composers (as is demonstrated by the examples of Beethoven and the percussionist Evelyn Glennie). There may be several explanations for this: one is that all sound is the result of physical vibration which may be experienced as a tactile rather than auditory sensation; another explanation touches on the nature of music to allow a discourse in and with time as its primary dimension, rather than sound.

The innately interdisciplinary aspect of music means it rarely exists in an absolute or pure form, without serving other objectives such as ritual and ceremony or integrating with other art forms in transdisciplinary relationships. The most common manifestation of the latter is the ancient alchemical alliance of music or tone with words to create song. Song is an example of Nicolescu's third degree of interdisciplinarity, which results in the creation of a new discipline. For many commentators, song represents alchemy in that it contains more than the sum of its parts; the successful alliance between music and words creates a powerful, independent entity, which may not again be reduced. The concept is most easily reflected in this mathematical equation:

$$1 + 1 = 3$$

Similar irrational formulae are often used as the basis for advanced mathematical research, and are often found to have important practical applications. Music is an amalgam of rational and irrational disciplines, and is a useful model for the cohabitation between modes of logical and irrational thought without conflict. Certainly the ability of music to apparently change the way listeners think and act was first perhaps noted by Plato in *The Republic*, and has been evidenced throughout history by censorship ruthlessly pursued by religious Puritans, by Communist and post-Communist China, by Communist Russia, by Fascist Germany and the capitalist USA. Music itself has been banned in its entirety by many fundamentalist Islamic leaders.

The scope and complexity of interdisciplinary demands on musicians have led many educationalists to note that in societies and institutions where music training is valued, the overall learning abilities of students are enhanced. The proven catalytic nature of music encourages some practitioners to make links consciously and subliminally, which enrich the energetic cycle of learning.

This catalytic nature of music has enjoyed much prominence lately through global international movements, and forms a fundamental fabric of music and its application through music education and music therapy, as well as through performance. Some random examples include:

- *Live Aid/Live 8*: Bob Geldof against World Poverty
- *Red Hot*: an international organisation dedicated to fighting AIDS through popular music culture
- *Africa Alive!* Campaign to educate African youth about HIV/AIDS through the medium of popular music, supported by the Johns Hopkins University Center for Communication Programs (JHU/CCP)
- *ACT*: aims to affirm the central importance of musical participation in human life and, thus, the value of music in the general education of all people
- *MIND* and many other similar organisations explore and publish research and promote projects in which music is used to catalyse human development, known popularly as the 'Mozart Effect'
- *Music therapy* is an established healthcare profession that uses music to address physical, emotional, cognitive, and social needs of individuals of all ages. Music therapy improves the quality of life for people who are well and for children and adults with disabilities or illnesses.

Perhaps the crucial example of transdisciplinary discovery concerns the Golden Section. It is a numerical sequence or ratio that dictates perfect or beautiful proportions that can be detected in nature and in human creativity as far back as the pyramids of Egypt. It was articulated first by the School of Pythagoras and is evident in many of the Classical Greek temple constructions. Leonardo Pisano, better known as Fibonacci, published his renowned book *Liber abaci* in 1202; it was based primarily on the arithmetic and algebra that Fibonacci had accumulated during his travels. The book, which went on to be widely copied and imitated, introduced the Hindu-Arabic place-valued decimal system and the use of Arabic numerals into Europe.

The Golden Section which he elucidated has since been discovered to appear everywhere in nature: spirals in seashells and the galaxies; the rings of Saturn; the design and markings of plants, fish, birds, mammals, and insects; in the design of the human body, DNA and the human heartbeat; and also the colour spectrum. Today it is used to make predictions and analyse changes in areas as diverse as the stock market and population growth. The shape of an everyday credit card is an example of a golden rectangle illustrating the proportions of the Golden Section. Musical scales are built upon the simple numerical series that is the foundation for the same mathematical relationship: starting with 0 and 1, each new number in the series is simply the sum of the two before it: 0, 1, 1, 2, 3, 5, 8, 13 etc. *Thirteen* notes separate each octave of *eight* notes in a musical scale, of which the *fifth* and *third* notes create the basic foundation of all chords, and are based on whole tone, which is *two* steps from the root tone, which itself is the *first* note of the scale.

The term 'the Golden Section' is often attributed to the scientist and astronomer Johannes Kepler, but the Renaissance created its own term to describe the phenomenon: 'the Divine Proportion'. The violin, whose design reached its zenith during the Renaissance, observes these criteria. Another epithet is the 'Golden Ratio' that also occurs, intentionally or coincidentally, in the works of many other artists and musicians. These include Virgil, and classical composers such as Mozart, Beethoven, Debussy, Bartók, Satie, Webern and Stockhausen. As a ratio, the number that represents and defines this proportion is irrational; it is better known as *Phi*:

1.6180339887498948482...

All this may be remarkable but the transdisciplinary or perhaps transcendental surprise is that Fibonacci discovered this most famous numerical sequence that underpins the theory as a result of studying problems of the breeding of rabbits. The following is a translation from the second section of *Liber abaci*:

A certain man put a pair of rabbits in a place surrounded on all sides by a wall. How many pairs of rabbits can be produced from that pair in a year if it is supposed that every month each pair begets a new pair, which from the second month on becomes productive?

The resulting sequence changed forever the way in which humanity saw the world. Its interdisciplinary repercussions, and its universal application in seeing and understanding profound laws that govern the natural world and our inner spiritual world, were opened for the ensuing centuries and continue to fuel our appetite for knowledge and understanding to this day.

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ACT:

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English

Sally Bentley

The study of English literature is already diverse and multidisciplinary. It has left the strictures of formalism and new criticism behind and now studies far more than 'the form, structure and rhetoric of texts' (QAA 2000). According to the English Benchmark statement, it now looks at 'their social provenance, the cultures of which they are a part and in which they intervene, and their treatment of ideas and material shared with other subject areas' (QAA 2000). In addition to an emphasis on material culture English has also taken upon itself the mantle of philosophy and tries to grapple with some of the ontological and epistemological questions of our time.

This short paper contains a few preliminary thoughts triggered by the Higher Education Academy's event on the topic of interdisciplinary dialogue (2005). It takes three examples of interdisciplinary teaching and learning from my own institution's English Literature honours degree programme and explores them to reflect on the nature of the encounter between English and other disciplines.

The main way in which English students encounter other disciplines is through the study of primary source material. The first example is from a Romanticism level two module which makes extensive use of art, amongst other disciplines, to enrich students' understanding in three ways. Through the exploration of art and music we examine the meaning of the term 'Romanticism', in particular the time frames with which it is often associated. Through watercolours and oil paintings we investigate visual presentations of themes germane to the Romantic period. For example, the idea of the sublime is investigated by looking at the paintings of Caspar Friedrich with their emphasis on rugged mountainscapes echoing the interests of the lake poets. Friedrich's interest in moonscapes neatly chimes with that of Wordsworth in the Lucy poems. Girton's watercolours offer insight into the presentation of ruins pertinent to the gothic novel and poems such as Wordsworth's *Lines Written A Few Miles Above Tintern Abbey*. Portraiture such as Haydon's depictions of Napoleon and Wellington is compared with works by Friedrich and related to themes of the individual and solitude seminal in the Romantic period.

Finally, we use art to explore historical background – Delacroix for the idea of Revolution and what it might mean, Joseph Wright of Derby's paintings for the impact of the industrial revolution, Reynolds for the cult of celebrity (linked of course with the idea of the value of the individual).

So what are we to make of this interdisciplinary exchange? It is certainly stimulating, broadening the horizons of the students, deepening their understanding and providing access to different epistemologies and alternate perspectives. Interdisciplinary approaches to teaching and learning such as these have also acted as a catalyst for more innovative teaching and learning methods. At Bishop Grosseteste College, for example, there is excellent use of the Visual Learning Environment to support learning of this kind, as tutors use the new technologies to provide audio, visual, and textual sources to supplement their own teaching. However, other articles may be full of enthusiasm for the benefits of interdisciplinary methods and are likely to give 'tips for teachers' on how

to develop practice further. So, instead, I would like to take this opportunity, as befits my discipline, to discuss and reflect on the subject a little more theoretically and with a slightly sceptical undertone, in order to appreciate better what interdisciplinarity has to offer.

Disciplines are, of course, just discourses and Bakhtin's theory of dialogism sheds light on what happens when discourses encounter each other. Dialogue may appear on the surface to be either friendly or hostile, convergent or divergent, but Bakhtin suggests that at a deeper level there is always a struggle for influence. When discourses meet, they are not willing to be drowned out by the other, unless they have no choice. Speakers will indeed listen carefully to each other, but they do so in order to inform and reinforce their own discursive position. Naturally, all participants in the dialogue are playing the same game and the result is rarely one discourse winning and the other being silenced. Instead, the outcome is what Bakhtin calls "dialogized heteroglossia" (2001, p.1199), which is the "co-existence of socio-ideological contradictions between the present and past [...] between tendencies, schools, circles and so forth" (2001, p.1213). This neatly describes the outcome of interdisciplinary dialogue.

The English scholars' encounter with other disciplines will not, therefore, be quite as open as might at first be thought, since any dialogue will inevitably involve a power struggle. Not all interdisciplinary encounters are the same, however, and the dialogic dynamic will vary accordingly. To simplify, for the purpose of this short paper, there appear to be two types of interdisciplinary exchange.

The first is when the partner discipline is rendered passive, such as when textual or visual resources are used to illuminate a literary text, something that is relatively common in the discipline of English. The Romanticism module described above appears, on the surface, to conform to this definition. We are aware of this issue, but see it as part of developing students' understanding of interdisciplinary work. The other two examples described below are at level three and offer the students alternative models of interdisciplinary study. In this case the other discipline can become truly the 'other' in the sense used by Edward Said (2001). In cases like this, the danger exists that the other discipline is silenced and exploited by English for its own purposes. The way the source is used lies very much in the hands of the tutor and the students. It is possible for the discipline to be presented as somewhat exotic or mysterious and there may even be an imperialistic undertone in which the enquiring discipline (here English) seeks to take what it wants from the other (in this case Art). Obviously the intellectual integrity of the academic staff, their understanding of the other discipline and their knowledge of the kind of exchange in which they are taking part will to some extent counter this tendency, but given the linguistic dynamic of dialogue, it needs to be recognised and explicitly acknowledged.

The second type of dialogic encounter is when a speaker from the second discipline enters the classroom to engage actively in literal dialogue with 'English' speakers. This happens in our own level three Modernism module, where tutors are brought in from the Art and Music Departments to speak to and with the students about their discipline's view of modernism. They bring with them source material (images and sounds), but more than this, they explain how their discipline interprets and makes sense of them, revealing and advocating their own epistemologies and using their specialist disciplinary languages.

In this case the other discipline has a more powerful and persuasive voice. English is less likely to be able to make what it wants of Art and is more likely to be troubled and changed by what it encounters. It makes the interdisciplinary encounter more open-ended, untidy and exciting. Maggi Savin-Baden is in favour of such an approach, because she believes that our curricula are “over-signed” and excessively authored (2005). She suggests that we should present students with more dialogic, research-led learning. Letting students hear directly from tutors in other disciplines is one way of achieving this kind of dialogue.

Where does this leave interdisciplinary dialogue? It indicates that like all other forms of teaching and learning, interdisciplinary methods are neither essentially good nor bad. Certainly, they enrich the students' learning experience, because they open the student to new sources and perspectives, but they also have wider implications for the future of our own disciplines. Interdisciplinary dialogue can be used, whether consciously or unconsciously, to reinforce our own disciplinary discourse. It can allow English to define itself in relation to other disciplines, rather as Said (2001) argues that the British reinforced their own rational, civilised identity by interpreting the oriental other as their opposite. Applebee (1996) similarly argues in favour of a dialogic approach to university learning and views, in the title of his book, *Curriculum as Conversation*. Such an approach, he suggests, draws students further into the practices, mind-set and culture of the discipline in question. In this case, it can have the effect of helping the student become a fully acculturated English scholar.

Alternatively, interdisciplinary approaches can be used to change our very mind-set and to move us on from our existing understanding of what it is to be English scholars. This approach is as exciting as it is risky, because we are not certain where the encounter will take us and there is the possibility that our English identity will become diluted, a word with negative connotations, or, more positively, transformed.

Interdisciplinary dialogue can, therefore, have two quite different effects: to deconstruct or reinforce the discipline of English literature. In my final example, I describe how it is left to the students to negotiate the *verbal agon* and choose the kind of encounter they have with the other discipline. In my own level three Postmodernism module, studied at the very end of their degree, students take part in assessed interdisciplinary dialogue. Learning outcomes, teaching methodology, content and assessment practices are all aligned, in the manner advocated by Biggs (1999), to promote and support deep learning. Students take turns to lead a seminar on aspects of postmodern culture. They select a topic from any of the diverse manifestations of postmodern culture, such as music, painting, installations, photography, film, television, advertising, heritage, theatre and so on, and relate it to an aspect of literature. They are assessed on their ability to lead one seminar and engage in the discussions that are, in turn, led by their peers (Bentley 2003). It is not only their level of understanding that is marked, but the dialogic process that they adopt as they relate English literature to these other cultural discourses. They are engaged, in microcosm, in grappling with exactly the dilemma that has been raised here, which is the problem of using other disciplines to open their minds to new ways of thinking about English literature without allowing the other discipline to deconstruct their emerging discipline identity. The exchange is always as unpredictable as it is thought-provoking, perhaps like all interdisciplinary encounters.

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Information and Computer Sciences

Liz Burd

Interdisciplinarity is in the heart of the subject domain of Information and Computer Sciences (ICS). Computing is present in all walks of life. Most people use computing technologies in their daily working life and most will have computer technologies in their homes. Today most white goods have computing technologies within them and computing software is present in technologies from cars to washing machines and televisions to children's games. This embracing of technology by modern society therefore requires computing students to work with and within a variety of domains outside their field of study.

For instance, a typical computer system for development may be required by an accountancy company. The software engineers developing this system will need to communicate with experts in the accountancy field to develop the logic to be programmed into the system. The more that computer systems are expected to simplify the workplace, the more complex the logic that needs to be put into the system, and therefore the greater knowledge the software developer will be required to have about the system's domain.

It is essential that students studying within the ICS discipline are able to work with experts from other disciplines and have the skills of being able to learn new domains. It is therefore a necessary part of the ICS curriculum that we provide our students with exposure to and opportunities to practise interdisciplinary learning.

Such principles of student exposure and practice within their domains can be adopted in a wide variety of ways, but it is essential to ensure that students see the relevance of the work. This paper will address two main approaches to introduce students to interdisciplinary activity: through teaching activities and through problem-based learning activities. Greatest emphasis is placed on the latter activity as the active participation of the students may ensure higher levels of learning and understanding of the issues and achieved.

Teaching interdisciplinarity

The teaching of interdisciplinarity can be approached in a number of ways. For instance, some subject areas in computing lend themselves to the inclusion of other domains, such as data mining; others are inherently cross-disciplinary, such as theoretical computing linking with mathematics and bioinformatics linking with biology and health studies. For students in combined programmes these links are easy to see, but for students on more mainstream programmes such as Computer Science it is less clear how and why interdisciplinary links should be formed.

Experiences of the introduction of interdisciplinary topics within traditional Computer Science courses have often met with problems, the most frequent being resistance from staff and students. Staff feel that the opportunities to teach core skills in the programme are being eroded by the inclusion of more diverse topics within the curriculum, and students may feel similar resistance. Such resistance typically comes from assumptions based on the background knowledge of the students (for instance that they have

specific skills in maths) or from a fear that the diversity of materials presented to them will lead to poor performance in their examinations.

Clear communication and the appropriate focusing of learning outcomes can address both staff and students' problems. For instance, staff can be shown how core skills are being taught using a variety of topics for case study so they can be convinced of the benefits of interdisciplinarity activity as a way of providing variety and interest in the curriculum. Likewise, making clearer the key skills that they are learning and the way that these will later be assessed can alleviate students' concerns. Students fear that they are expected to be knowledgeable about the application domain but in fact they are usually required to demonstrate core computing skills within the new domain.

A further way in which interdisciplinarity can be introduced in the curriculum is through engaging students' skills. Computing subjects are frequently run as combined courses, often being linked with maths, business, languages, or geography. The skill base of a typical computing classroom will therefore be quite broad. Thus, utilising this breadth of knowledge in the classroom is a way of seamlessly introducing other domains while also promoting students' engagement in their lectures.

Problem-based learning

Active participation of the students in the learning process ensures higher levels of learning. Problem-based learning (PBL) is an excellent way of introducing the students to the skills which are required of them by the IT industry. There are a number of ways in which such skills can be included in the curriculum (and already are in some Computer Science Departments). Specifically, they include 'group working projects' and the students' final research dissertation or project.

A recent focus of the Centre of Excellence in Computing – Active Learning in Computer Science (ALiC) at Durham University is to investigate how such project and group working elements can be enhanced by interdisciplinary activity. The findings show that for the group work activity, most institutions require students to propose and develop some form of computer system. Owing to their very nature many of these systems require interdisciplinary collaboration and some of the more challenging are those who have 'customers' from outside the computing field.

For the student's final dissertation and project, however, such interdisciplinary collaboration, although not unheard of, is less common. Typically, student dissertation projects are individual work and traditionally have been based on a research topic from within the computing discipline. However, the importance of collaborative skills to industry means that institutions are introducing, or looking to introduce, more interdisciplinary work in their dissertation proposals.

One possible approach to support the skills requirements of industry is to forge links between departments and to form joint projects between students of two or more disciplines. However, the realities of getting such a proposal working in practice requires a high degree of preparation and management. For instance, the failure of one student must not lead to failure of the students from the other disciplines. In addition, resource requirements are likely to be higher for this kind of project: for instance these students will need a location and timetable to enable them to work together efficiently.

While the resource implications for setting up such projects are high, so are the potential benefits. Thus ALiC is working towards addressing and finding potential solutions to make collaborative cross-disciplinary activity a reality and will disseminate its findings throughout the higher education community.

Art Education

Leslie Cunliffe

Rapaciousness must be supplanted by care in use and responsiveness to things. It will involve seeing, and living with, other people as co-bearers of conscience and spontaneity housed in cultural routines, ways of life, rather than seeing them only as competitors for scarce resources. It will involve seeing lived time not as an arena only of consumptions, but rather as an arena for cultivation and for the expression of conscientiousness in practice. (Eldridge 1997, p.100)

Introduction

This article is concerned with attempting to specify an approach to the practice of interdisciplinary teaching and learning in higher education that is responsive to what Richard Eldridge above describes as “the expression of conscientiousness in practice”. As a by-product this could also contribute to the way art education is currently conceptualised and conducted, as wisdom and its corollary of “generative wisdom” (Solomon, Marshall and Gardner 2005) for developing a perspicuous and strategically beneficial approach to learning and creativity does not play a major role on such courses (Harbour 2006).

In contrast to the legacy of the Enlightenment’s stress on reliable knowing, conscientiousness in practice requires evaluating such reliability through the lens of responsible knowing, an approach that can be further illuminated by appropriating insights from virtue thought and its associated methods for developing relationally responsive right beliefs, actions and artefacts.

Aristotle’s idea of *phronêsis* (practical wisdom) can structure such ethical knowing by having an executive role over “the division of labour” (McPherson 2005, p.708) of different forms of knowledge in individual disciplines, or for maintaining interdisciplinarity across subjects. McPherson thinks that *phronêsis* is capable of filling this executive role because it can monitor and relate ethics to epistemic and creative endeavour in order to promote individual and general well being. Such flourishing (*eudaimonia*) in virtue thought always equates with wise and sustainable forms of creativity, learning and living based on what Steiner (2001, pp.1-53) describes as “future tense narratives”, an attitude to life that evaluates present actions by their potential to enrich and sustain future flourishing.

Acquiring virtue has a psychological and socio-cultural dimension, an emphasis that complements a dispositional and socio-cultural understanding of teaching and learning, while at the same time adding the extra ethical feature of responsible knowing to such perspectives (Cropley 1997; Dreyfus 2001; Jay et al 1993; McIntyre 1981; McPherson 2005; Sternberg and Jordan 2005), in order to know what to do with the “know that” and “know how” (Cunliffe 2005).

What are virtue practices?

The priority given to cultivating character traits

Aristotle thought that a deep structured virtuous character results from acquiring stable habits of mind. Such wise habits of mind emerge from practising ordinary but highly deliberate ethical and other forms of cognition, making the truly successful practice of virtue predicated on achieving unconscious competence by having to “go all the way down” (Hursthouse 1999), although a “strength of will” practice of virtue can also operate with those who, as yet, are only able to work at the level of conscious competence.

This strategic process for acquiring virtue requires the combination of intrinsic motivated belief to want to achieve excellence with mentors who supportively model excellence. Because virtue takes a long time to acquire, Hursthouse (2003a) thinks this is why, unlike mathematical whizz kids, there are no ethical, epistemic, or sophisticated creative whizz kids on the block, for the successful practice of virtue requires wisdom in order to apply responsibly judgments that are heuristic in nature, in contrast to being able to use, say, algorithmic rules as would be the case in mathematics.

Although virtue thought esteems cognitive reliability and other skills that have been central to evaluating educational attainment, this is not its main concern as virtue practices give primacy to the ethics of knowing. For example, the capacity to be epistemically reliable does not necessarily cash out as wise or ethically correct outcomes, as cleverness can be used to realise any end whereas wisdom as understood in virtue thought can only equate with good ends that sustain flourishing (Foot 2003). Code (1987) makes a similar point when she states:

A knower/believer has an important degree of choice with regard to modes of cognitive structuring, and is accountable for these choices; whereas a ‘reliable’ knower could simply be an accurate, and relatively passive, recorder of experience. (pp. 50-51)

For this reason virtue thinkers relocate normative properties away from individual beliefs and acts towards the stable dispositions of moral, cognitive and creative agents. Hursthouse (2003b) takes this form of analysis beyond its potentially dualistic structure of agent-based, act- or belief-based, self-regarding or other-regarding virtues, by drawing attention to Aristotle’s idea of virtue as an agent-focused process, which has the advantage of making the causal link between an agent’s motives and the same agent’s right acts and correct beliefs normative for practice.

A virtue approach to interdisciplinary teaching and learning can be distinguished by the priority it gives to cultivating character traits for carrying out wise or responsible ethical actions and judgments, character traits for sustaining wise or responsible beliefs and knowledge, and character traits for sustaining wise or responsible creative practices.

Communities of practice

MacIntyre (1981) thinks stable dispositions for performing right acts and to have correct, justified beliefs, are best obtained and sustained through belonging to specific, virtue communities of practice. For MacIntyre (1981, p.178) virtue is “an acquired quality the possession and exercise of which tends to enable us to achieve those goods which are internal to practices and the lack of which effectively prevents us from

achieving any such goods". Talent is therefore not considered a virtue because it is inherited rather than acquired.

MacIntyre thinks a community of practice is a coherent social structure that exists to realise the goods that flow from its standards and expectations. Such expectations have their roots in examples of virtue, which act as benchmarks for evaluating the achievement of its members or potential members. Becoming a member of a practice entails appropriating its standards through practising the virtues of justice, courage, and truthfulness.

The importance of a community of practice makes up the second distinguishing feature of a virtue approach to art education and interdisciplinary teaching and learning. It is in such communities of practice that share established expectations where character traits for ethics, knowledge, and creativity can be deliberately cultivated, monitored and maintained.

Creativity

Recent research into creativity (Boden 2001; Ochse 1990; Sternberg (ed.) 1999) provides a detailed account of the necessary but not necessarily the sufficient conditions for engaging in generatively wise creative practices. Such conditions include having the right character traits, the positive role of good mentors, and maintaining deliberate and responsible approaches to the acquisition and practice of knowledge and skills, all of which replicate the way virtue is attained.

The new research paradigm undermines the older "tension view" (Weisberg 1999) of creativity that has dominated modernity and which still influences current pedagogies in higher art education (Jones 1997). The tension view dichotomises knowledge with traits (Weisberg 1999), that is, the role of secondary process thinking (the voluntary and deliberate acquisition and practice of knowledge and skill) with that of primary process thinking (involuntary, unconscious thought processes) (Ochse 1990), the socio-cultural with the psychological (Csikszentmihalyi 1999), and the ethical and the innovative (Gruber 1993). One effect of the dominance of the tension view in modernity has led to the inflationary process of promoting short-term novelty and the associated shock value of temporary mindsets over a desire for realising sustained achievement and flourishing as understood in the quality of creative products (Gombrich 2002).

In reviewing the recent research literature, Nickerson (1999) states that "character traits" rather than temporary mindsets are the most important variable for enhancing creativity. Ochse (1990) highlights the importance of motivation for enabling individuals to acquire the specified skills and knowledge of a field, so that obstacles that inhibit personal growth can be overcome. Dudek and Côté (1994) argue that genuine novelty in creativity results from the cultivation of traits and knowledge that are acquired over years of continuous investment of effort from working on problems in a value-laden context. Ward, Smith and Finke (1999) describe creative achievement as that which incrementally transcends previous developments in a field of enquiry, gradually modifying rather than rejecting past achievement. They see the generative capacity of creative cognition to move beyond existing boundaries as normative for all human beings, rather than as an exception to the rule exercised by the few.

Weisberg (1999) discusses the importance that mentors play in the process of achieving excellence in creativity. Howe (1999) highlights the crucial role expert instruction plays in sustaining high quality creative practices.

The descriptions of the variables that account for excellence in creativity as revealed in the new research paradigm reflects a shift away from the individual as the unit of analysis of achievement towards a socio-cultural understanding of individual achievement, so that “the phenomenon of creativity... is as much a cultural and social as it is a psychological event” (Csikszentmihalyi 1999, p.313). In this respect, the move towards a socio-cultural paradigm in creativity is catching up with virtue thought.

The recent research literature on creativity highlights the indispensable contribution that character traits play in promoting creativity, along with responsible and deliberate approaches to acquiring and practising knowledge and skills for enabling creativity, and the role of good mentors for developing expertise for realising higher levels of creative achievement (see Table 1).

Virtues that need to be modelled and acquired for regulating knowledge (the desire for truthfulness in the construction and evaluation of knowledge).	Virtues that need to be modelled and acquired for regulating creativity (the desire for new, more complex reconstructions of knowledge and meaning, as opposed to simply novel or trite creative reconstructions).	Virtues that need to be modelled and acquired for regulating an ethical character (the desire for truthfulness in character and in actions).	Virtues that need to be modelled and fostered to support the development of self-regulated creativity (the desire to model the virtues that students are expected to acquire and practise for improving their own creativity).
based on Zagzebski 1996	based on Cropley 1997; Sternberg 1999	based on MacIntyre 1981	based on Cropley 1997; Nickerson 1999
Virtues of impartiality: openness to ideas, willingness to exchange ideas, to learn from others, lack of jealousy of others' work, lack of personal bias, lively sense of own fallibility.	Virtues of curiosity, adventurousness, and tolerance of ambiguity; ability to think up many ways to solve problems.	Virtue of justice: fairness; maintenance and promotion of the good and right.	Virtue of encouraging independent learning.
Virtues of the sober-minded enquirer as opposed to the enthusiast: making sure that the love of certain ideas, preferences, solutions, etc. does not result in unwarranted conclusions; adaptability; intellectual care; coherent explanations,	Virtues of task commitment, persistence, and determination that allow for the deliberate practice and acquisition of the necessary skills and knowledge related to the field of enquiry.	Virtue of temperance: moderation; self-restraint.	Virtue of co-operative, socially integrated style of teaching and learning.

intellectual humility; self-monitoring.			
Virtues of intellectual courage: willingness to examine and conceive of alternatives to popularly held beliefs/ideas; perseverance; diligence; determination to see a project through.	Virtues of self-confidence and the willingness to risk being wrong, the drive to experiment and the willingness to try difficult tasks.	Virtue of courage (or fortitude): readiness to face/endure danger or difficulty; courage of one's convictions.	Virtue of taking students' suggestions and questions seriously.
Virtues of trust and insight: being able to recognise reliable authority; insight into persons, problems, theories.	Virtue of an active imagination: the ability to recognise, discover or invent problems.	Virtue of faith: trust; loyalty; strong belief in things hoped for.	Virtue of encouraging flexible thinking in students.
	Virtue of skill at making remote associations, bisociating, accepting primary process material, forming new gestalts, etc. (divergent thinking); skill at seeing connections, overlaps, similarities, and logical implications (convergent thinking).	Virtue of prudence: care and foresight.	Virtue of learning to cope with frustration and failure, so that students have the courage to try the new and unusual.
		Virtue of hope: expectation; desire for better things.	Virtue of promoting meta-cognition in students.
			Virtue of providing students with opportunities to work with a wide variety of materials and under different conditions.

Table 1: A collation of wisdom for underpinning subject and interdisciplinary teaching and learning in higher education. The content, skills or cognitive resources necessary for higher education are taken for granted in this table.

Curriculum content

So far this article has discussed the importance of ethical, epistemic and creative virtue if individuals and communities of practice are to flourish in the context of higher education. A wise approach to interdisciplinary teaching and learning will also need to

grapple with what constitutes a wise curriculum. Foot (2003, p.109) describes such wisdom as concerned with knowing “how much particular ends are worth”, making a wise choice of curriculum converge with wise content as some things are more important to know than others because they help to sustain flourishing.

Ochse (1990) thinks the dominance of the “tension view” of creativity has led to the neglect of complexity and richness of content for creative accomplishment. In this respect, past attempts to explain creativity aimed at identifying an aboriginal unconscious source for the extraordinary processes have missed the point, because the processes, by definition, are “ordinary” or shared by everyone. However, what is not common to all is the quality of knowledge and skills that provide the necessary conditions for enabling creativity, which when combined with an intense workload and the appropriate character traits promote creativity (Perkins 1988).

Aristotle believed that virtue is attractive to people because it makes significant demands on them. Following Aristotle, Rawls (1971) thinks that given a choice between engaging with less or more complexity, most human beings will usually opt for complexity because ultimately this is more rewarding. By extension, a wise choice of curriculum would want to deal in complexity in order that students’ learning be more rewarding.

Therefore curriculum content matters for a virtue approach to interdisciplinary education, as some things are more worth knowing than others. It is the content of the curriculum that enables strategic learning and creativity to take place.

Conclusion

This article has been concerned with the contribution that virtue thought and practices can make to any debate about how to structure interdisciplinary education. As virtue thought is predicated on forms of practical wisdom that emerge from deep structured character traits aimed at discerning ethical, epistemic and creative actions and beliefs, it has the capacity to be the hub to the interdisciplinary spokes of the educational wheel. Such a view is in line with Dreyfus’s (2001) addition of *phronésis* to Dreyfus and Dreyfus’s (1986) earlier specification for expertise, a change that reconfigures and strengthens the overall commitment of learning and teaching to an ethical, epistemological and creative project governed by self-awareness aimed at promoting individual and common good.

The growing social, economic, religious, ecological and cultural crises that prevail with such demoralising intensity throughout the world in the 21st century is not only beyond the range of single disciplines but also out of reach of any interdisciplinary approach to education as this, in itself, will not generate the necessary ethics for responsibly knowing what to do with all our “know how” and “know that”. This is why wisdom and its corollary of generative wisdom needs to be considered normative for an interdisciplinary approach to educational practice.

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Community Development

James Derounian

Introduction

Interdisciplinary teaching and learning is central to my discipline of Community Development (CD). Community development is:

a process of helping groups in the community to develop, in order to tackle their needs, disadvantage or inequality [...] helps people to identify their needs, to come together in a group, to be supported in the action which they decide to take in order to achieve their goals. It is a learning process, encouraging people collectively to improve their skills, confidence, awareness and understanding, in order to acquire resources and influence (Francis and Henderson 1992, p.2).

CD and higher education therefore share much in common, particularly in terms of “a learning process” and “encouraging people collectively to improve their skills, confidence, awareness and understanding”. Equally, community development is intrinsically interdisciplinary in nature and application: how communities identify their own needs determines the remedial disciplines and actions that are relevant. It may be heritage- or tourism-based; require an understanding of local customs or artistic traditions; and require planning and management to translate community aspirations into practice. There will be ethical and policy considerations related to winners and losers resulting from various courses of action. And community development and local participation in decision-making is central to the UK Government’s pursuit of sustainability. Furthermore:

participation in practical projects and policy discussions, as an experiential form of community education, is increasingly recognised as a learning experience which can reinforce positive messages about sustainable lifestyles and sustainable development (Warburton 1998, p.28).

Moving from the general to the particular

Learning and knowing, we believe, should not be a passive experience. Daily life is not a backdrop to education, but education itself. Therein lie the sensibilities and the autonomy necessary for citizenship in a global world. Before losing themselves in the virtual or plunging headlong into the international, students need to carefully and critically examine what exists under their feet and outside their front (and back) doors. (DeLind and Link 2004, p.127).

What I will explore, with teaching colleagues in my University Professional Development Group, is a critical analysis of these sentiments and I will make them operational in the teaching and learning of a single module. As the starting point the work will examine two insights generated by the December 2005 *Disciplines in Dialogue* workshop around the issue of sustainability. The first is the importance of students’ ‘daily life’ as a basis for active learning.

The second stimulus, provided by Professor David Selby (Plymouth University) in his session on “Interdisciplinary approaches to education for sustainable development”, is where teaching and learning is advocated via a “place-based avenue”. “Place” (or the immediate/everyday locality) was seen as a vehicle for:

1. appropriate and effective teaching and learning
2. making sense of sustainability in terms of the staff and students’ immediate university surrounds and locale
3. staff and students to ‘triangulate’ and assemble different, and probably diverging, views and understandings of place
4. connecting with local residents and organisations – from the public, private and voluntary sectors – to provide contrasting and challenging inputs and perceptions
5. many and various disciplinary contributions related to understandings of place – ranging across the social and natural sciences
6. a mutual learning process – “not learning at the feet of a master, but a process of joint learning in which the knowledge of all parties is respected and which acknowledges that the ‘educator himself needs educating’ (Marx cited in Freire 1996, p. 25).

Developing a specific module to reflect interdisciplinary teaching and learning

The intention is to prepare a generic, level 1 (undergraduate) skills development module at the University of Gloucestershire, as a mechanism for delivering this place-based focus. The module is ‘Developing Writing Skills’. This short course encourages students to hone their communication skills by writing for a particular audience (academic, lay, professional and so on). It also imparts key messages such as the importance of telling a good story and presenting materials in an attractive way (picking up on Marshall McLuhan’s adage that “the medium is the message”).

This module will be delivered over six weeks, via individual 2-hour contact sessions. Over such a limited space of time, the module is strongly assignment-driven.

The assignment

Students write a 1,000-word article that reflects on the town of Cheltenham’s St Paul’s area. They research and publish a mock article either from the perspective of their main area of study in higher education, e.g. heritage management, environmental policy, community development etc or related to a topic that has fired their interest as a result of undertaking the course and associated research. The article is targeted at a clearly identified newspaper or magazine and conforms faithfully to that style (e.g. *The Guardian* newspaper, *The Economist*, *Nature* magazine and so on). To reinforce this point students include a page from their chosen outlet, and submit this alongside their own ‘lookalike’ article. Inclusion of photos, diagrams etc. is encouraged, where this is in keeping with the intended publication.

A draft schedule for contact sessions

Session 1

Tutor introduces the module approach, tasks and assignments. Working on the basis of around 20 'environmental' students undertaking the course; from a range of social and natural sciences – local policy, geography, environmental management, heritage etc. Active learning exercises on writing.

Guided tour of the Lower High Street with a local historian: "The St Paul's area's past life".

'Homework': identify a past issue of relevance to your main programme of study and come prepared to make a short presentation, for next week. To do this, visit either the University of Gloucestershire local history archive, or the main Cheltenham library (historical collection). Staff and students undertake 'homework'.

Session 2

Students and staff feedback on past issue. Then small groups of 4-5 accompany local residents to learn about 'The St Paul's area in the present', including a stop at the St Paul's Community Resource Centre. Share findings and perspectives back in the classroom. Active learning exercises on writing.

'Homework': identify a current issue of relevance to your main programme of study and come prepared to make a short presentation, for next week. To do this, visit the offices of the *Echo* newspaper and look at recent back copies. Staff and students undertake 'homework'.

Session 3

Students and staff feedback on present issue. Speaker from Cheltenham Borough Council planning/community development team: 'The St Paul's area in the future'. Then students brainstorm in buzz groups about likely future issues of relevance to their study programmes. Creative writing lecturer to feed in tips on effective writing. Active learning exercises on writing.

'Homework': identify a future issue of relevance to your main programme of study and come prepared with a draft idea for your article: what issue you aim to tackle and who for, for next week. Staff and students undertake 'homework'.

Session 4

Staff from different backgrounds and students peer review draft ideas. Followed by an IT 'publishing' workshop, showing how to get the right look and 'feel' for your article. Also presentation from professional writer – Phil Wilkinson, author of *Restoration*, the book accompanying the Channel 4 series about renovation of historic buildings.

'Homework': work up the issue of relevance to your main programme of study and come prepared with a full draft article for next week.

Session 5

Staff and student 'surgery': critique of draft articles.

Session 6

Post articles to WebCT for marking online. Make available to local residents – seek their feedback, input to marking and response to student articles.

Student module evaluation – independently undertaken by CETL staff. Each student, in class, prepares a short, 100-word article highlighting key (positive and/or negative) points related to the module's teaching and learning and suggestions for improvement.

This approach and schedule are intended to be semi-structured, to allow for opportunities that may arise over the six weeks e.g. a relevant exhibition at Cheltenham museum. The emphasis is on 'developing writing skills' and on the 'triangulation' of views about the St Paul's area. In so doing students should, at an early stage in their studies, gain some understanding of their new 'home', which they will inhabit for the three years of their degree studies. It will provide a rich response to the stimulus of the immediate locality and make connections between students; between students and staff; and between staff, students and residents of St Paul's. It may well be the first encounter that residents have had with the University and might even lead some to consider higher education or further dealings with the campus. It will also offer a holistic perspective on a locality – in the spirit of sustainability – and should engender respect and interest in students' varying interests and study programmes.

The intended teaching and learning draws on Kolb's Cycle, in terms of concrete experience (visiting and hearing about the immediate locality); self-reflection leading to the development of an article idea; and active experimentation in terms of assembling and presenting the written submission. It also fits with Cowan's (2002) socio-constructivist model that stresses students sharing experiences and discussing ways forward.

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Politics

Sarah Hale

No discipline is completely an island. Within the academy, each discipline interacts with cognate subject areas and specialists and (where relevant) practitioners work, and talk, with people from a wide range of academic backgrounds and none. Some disciplines are more self-contained and inward-looking, while others by their very nature have links and relevance across a broad range. Politics has, I think, a claim to be the most broadly relevant of disciplines. In some form or another politics impinges on everything. Often, in the world of academia, this is in the form of policy: decisions made by politicians in forums like Parliament. There can be no academic in any field who is unaware of the Research Assessment Exercise (RAE), tuition and top-up fees, widening participation and so on, all of which are the result of political decisions. At another level, politics can be viewed as an attempt to understand power relations – again, something that is familiar in most institutions and departments regardless of discipline. Nor is it necessarily correct to assume that disciplines have traditionally been kept separate from each other and essentially pursued along parallel tracks.

Many universities – particularly the ‘old new’ institutions – pioneered cross- and interdisciplinary learning in the 1960s (and possibly even earlier). Keele was one of these institutions, and another was Sussex, on which I will focus because it is familiar to me. At Sussex, from its inception until recently, a degree or subject was not located within a specific school, but could be taken in one of a number of schools selected by the student. Politics degrees were available in the Schools of Social Sciences, English and American Studies, African and Asian Studies, or European Studies. As a single honours Politics student in the School of Social Sciences, half my courses (modules) were ‘major’ courses – the core Politics curriculum – and half ‘School’ courses. Classes for major courses were made up of Politics students from all the Schools above, while School course classes comprised students from many different subjects taught in the School, including Economics, Psychology, Sociology and Philosophy. This mixing of such a diversity of students was one of the greatest benefits of the system. Another advantage was the wide range of courses it made available, enabling students to pursue individual interests but constantly keeping these within the broader context of both the discipline and the School. So, for example, I was able to choose School courses in Political Philosophy, Legal Philosophy, Communication, and in aspects of Economics, and these greatly enriched my Politics learning. Students taking Politics in AFRAS could complement their Politics major courses with work in Development Studies, while those in EURO could study Italian literature, to take just one example. The irony of this is that just as interdisciplinary teaching and learning becomes an issue at national level, institutions are cutting back on this kind of interdisciplinarity, partly in response to the requirements of the RAE, and partly because of the costs involved in the inevitable degree of duplication of support services entailed. While it is often possible for students to take ‘electives’ from outside their discipline there is no substitute for such enriching immersion in an interdisciplinary environment.

Instead, the idea of interdisciplinarity is currently being pushed in different directions, and in some cases further, than in the experiments of the 1960s. Then, interdisciplinarity was between disciplines or subject areas within a broader but still recognisable category – say social sciences. The interdisciplinary context in many post-

1992 universities is far broader and less coherent than this. For example, my post at the University of Huddersfield is in the Division of Sociology, Criminology and Politics, within the Department of Behavioural Sciences (which comprises the above disciplines plus Psychology), in the School of Human and Health Sciences, which includes Nursing, Midwifery and Podiatry, as well as Social Work.

Furthermore, the senior management team within the School have recently recommended that the 'and' in Human and Health Sciences be stressed, and capitalised upon as a unique selling point. The School has recently allocated funds for the development of not just interdisciplinary, but interprofessional learning within the school. For Politics, this means not just working with other social science disciplines, but with Social Work (in particular to develop teaching resources) and in the future possibly with Clinical and Health Sciences. This arguably stretches the concept of interdisciplinarity beyond the point of academic coherence. This is not merely dialogue between academic disciplines, but between academic disciplines and professional and vocational training programmes.

This may be part of a wider trend which has already been noted by academics in other fields. For example, writing from the perspective of cultural studies, Baetens (2005) notes that:

[F]ar from being thought of as an intellectual challenge [...] as a democratic and liberal bottom-up sharing of competences, expertise and imagination [...] interdisciplinarity has now become a managerial strategy of local ad hoc problem solving, decidedly top-down and justified by the necessity to maximise the academic workforce. (p.7)

In practice, this means assigning faculty to teach on courses outside their disciplinary specialism, even where courses themselves retain the appearance of traditional disciplinary boundaries. The move towards *antidisciplinarity* which Baetens observes has been explicit in fields like cultural studies (where the challenge is to disciplines such as Art History and literary criticism); it has been less marked in the social sciences. However, this does not mean that there has not been a *de facto* breaking down of disciplinary boundaries at a practical level. Baetens notes that "[a]s 'anti-disciplinarity', cultural studies helped to dismantle the ancient (disciplinary) structures which are felt to be an obstacle to competitive excellence by the new academic managers" (p.7). Such a view on the part of managers is in no way confined to the field of cultural studies; it is just that there the subject itself has done their work for them.

So, as academics, we need to bear in mind the potential dangers of embracing the new interdisciplinarity with open arms. On the other hand, if writers like Baetens are correct in identifying the new impetus for interdisciplinarity as being driven by managerial and financial rather than academic and intellectual concerns, there is little that we at the sharp end can do about it, and we will have to adapt to working within the new paradigm and doing our best to mitigate its worse effects. It is open to us to make a virtue of necessity, and try to bring out the best aspects and benefits of interdisciplinary working, both for our disciplines and our students. Interdisciplinary approaches do have great potential benefits. These include gaining a deeper understanding of one's own subject, as well as a broader knowledge of others. Interacting with students and staff from other disciplines can bring new perspectives to bear on the student's own. The

rising popularity of combined and joint honours degrees points to a trend away from subject specialisation, which may reflect (or be reflected by) the introduction in 2000 of AS-levels to broaden the post-16 curriculum and discourage the narrowing of options at that stage.

The government's widening participation agenda has also had a considerable impact on teaching, and this will extend into interdisciplinary teaching. The drive to get 50% of all 18-30-year-olds into some form of higher education has obvious effects on staff-student ratios and funding. But it may also, because of the qualitative differences in student intake, and their previous experiences of education, affect the way we use, and they respond to, interdisciplinary approaches.

So much for the context and general points. Back in the real world, I shall now reflect briefly upon what interdisciplinarity means in terms of my own – perhaps unusual – experience of teaching and learning in Politics.

My own teaching experience has been in two contrasting contexts: at the University of Sussex before it abandoned the interdisciplinary schools system, and in the post-1992 sector, first at Portsmouth, where there was very little interdisciplinarity, and currently at Huddersfield, where I am explicitly charged with developing both interdisciplinary and interprofessional learning. In this context, this means designing a module which can be taken by students of Sociology, Criminology and Politics together. This module is to utilise problem-based learning (PBL), and the challenge is seen to lie in providing scenarios to which all students can relate, bringing different perspectives from their specific disciplinary backgrounds. (One idea is to focus on responses to anti-social behaviour.) However, reflection on my own experience at Sussex suggests that it may be a mistake to try too hard to tailor all the learning materials to be suitable for all students' own disciplines. One of the greatest bonuses, for students, of interdisciplinarity is confronting the unfamiliar and then coming to see how it relates to, and in doing so enhances your understanding of, your own discipline.

Although my background is in teaching Politics, in particular, political theory and history of political thought, my current post is as project manager for an FDTL5-funded project, Case-Based Learning in Politics. This is intrinsically interdisciplinary in some respects since the first stage of the project was to look to other disciplines, where this teaching method has a longer track record, to identify, adapt and adopt best practice. However, in adopting a method we are not necessarily learning anything from the discipline itself, or applying it to our own. I have worked closely with colleagues developing case-based resources in nursing in order to learn from their experience, but this is not interdisciplinary in that we have not learnt or applied anything from nursing itself, only from its pedagogy.

Because of my particular role and interests, I will briefly mention the potential for problem-based learning to be used in an interdisciplinary fashion in the social sciences, and possibly beyond (most likely into Social Work). Often, interdisciplinary learning will not permeate an entire degree, but will be imposed on individual modules. Most students in this case will spend most of their teaching and learning time in the same group, made up of other students of the same discipline. In this situation, interdisciplinary learning means not only adapting to new disciplinary paradigms and discourses, but also meeting and working with new people. Problem-based learning has

the potential to be invaluable in smoothing over both these obstacles. Because it is based on small group work, engagement with a PBL scenario will help to forge immediate bonds between students from different disciplinary backgrounds; they will have a common focus, while benefiting from each other's different disciplinary perspectives. Because they are addressing an immediate problem in a practical way, the distinctive traditions and languages of individual disciplines, which can be a barrier to interdisciplinary work, will be in the background. Naturally, if the ultimate aim is to promote interdisciplinarity as an end in itself, these will have to be explored at some stage, but PBL still provides an excellent 'way in'.

Language does not seem to be a problem at the level of communication between representatives of different disciplines, but at a deeper level, which we must access if we are to derive real benefits from interdisciplinarity; there may well be difficulties in understanding each other's models, paradigms, approaches and ways of looking at the world. Interdisciplinarity is more than 'disciplines in dialogue' with each other; it is, to extend the metaphor, disciplines living and working together. One danger that has been identified is "eclecticism, whereby students work with materials without a full understanding of their histories and contexts" (Ahmed 2001). In the current context, a relatively superficial interdisciplinarity is perhaps as much as can be hoped for; the question then arises of whether this is better than none at all. Ultimately, putting together interdisciplinary modules or courses, driven by managerial concerns, is a very poor substitute for creating a genuinely interdisciplinary environment of the sort that has been undermined by the very same pressures. It is not only a case of what interdisciplinarity means to Politics, but what politics (small p) has done to interdisciplinarity. Interdisciplinarity, to have any intellectual or academic value, must mean more than just talking to each other across disciplines.

So, what, in the end, does interdisciplinary teaching and learning mean for Politics? The answer must be that it depends on the context in which that teaching and learning takes place. In a context where there is real immersion in interdisciplinarity it means an ability to put Politics in its wider context as a social science, and to integrate cognate subjects like Political Philosophy and Economics seamlessly, leading to a far greater depth of understanding of Politics itself. In a context where interdisciplinarity is 'imposed' upon existing separate disciplines, for example via specific, isolated, interdisciplinary modules, it has the potential to enable students to see different perspectives on aspects of the subject, and to engage with students from other disciplines. While this is useful and valuable it is necessarily more limited in its benefits, and there is a greater need to be aware of the risk of shallow eclecticism. It can be argued that because of its importance across all areas, not only in academia but also in everyday life, Politics has a greater need than other disciplines to be studied in an interdisciplinary context. The challenge is to do this in a way that really brings out the benefits of interdisciplinarity and enhances and deepens the learning of Politics itself.

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Law

Karen Morrow

Introduction

As a discipline, Law, far from being monolithic (as it tends to be perceived by non-lawyers), is in fact multifaceted in character. Given that the internal divisions within the subject area encompass considerable diversity in fields of expertise, even academic dialogue and teaching within the broad boundaries of Law can, and often does, require the kind of interaction between academics that is more usually seen in cross-disciplinary contexts. In the true interdisciplinary context, Law courses are very much in demand by students both for specific vocational reasons and to satisfy more general academic curiosity. Law is perhaps unique in that it touches, more or less directly, on all branches of professional endeavour and is pervasive in the influence that it exercises over all aspects of everyday life. One of the ramifications of this is that there is a fairly broad general need and desire for awareness and understanding of relevant aspects of the law in most academic contexts. It is difficult to imagine a career requiring a degree qualification that does not bring with it a need to know about areas of the law that applies to it.

The interdisciplinary aspects of law teaching take a number of forms, the main categories of which will be discussed as an aid to reflecting what cross-disciplinary teaching and learning means in this particular academic context.

Law electives

Many students will take advantage of modular degree programmes to pursue the study of one or more areas of law. To this end, specialised simple courses, often running for a single semester, have been developed in many universities to enable students from other disciplines to obtain a 'taster' of legal study. Such courses tend to be extremely popular, as, for many undergraduates, the law has a certain glamorous attraction fermented by their exposure to it in the entertainment media. Whether this reputation is deserved is very much a moot point.

In addition to taking specially tailored broad introductory courses, in some areas students from other disciplines are permitted to undertake normal Law modules. They may do so by a number of routes. Students may be required to take courses of the type alluded to above, in order to equip them for more advanced study – for example, they may have had to study an introductory module on the law of obligations before being allowed to take a more advanced course in Business Law. Alternatively, students from other disciplines may be entered on to mainstream Law modules because of the nature and content of their degree course – as, for example, in environmental law. This means that, while non-Law students may have special requirements with respect to basic legal concepts that apply in the environmental law context, this is offset to a degree by the knowledge and understanding of environmental issues that they have already gained from their own discipline specific studies. Law students, while notionally already equipped with the former type of knowledge, tend to lack the latter.

In many ways, as environmental lawyers necessarily find themselves in dialogue with a huge range of disciplines from the social sciences to the hard sciences and beyond, this area is particularly fortuitously placed for interdisciplinary teaching and learning. Environmental law is of interest to students from a wide variety of disciplines, as its crosscutting nature makes it relevant in a wide range of professions. As a result, environmental law tends to be open to a wide variety of disciplines including Geography, Earth Sciences, Environmental Studies, Environmental Management, Environmental Engineering, Biosciences, Biology, etc.. Teaching environmental law can be undertaken either by segregating law students and non-law students or by teaching mixed groups. The latter tends to be most rewarding from a teaching and learning point of view as it leads to a more rounded treatment of the issues. Mixed group teaching and learning poses special challenges for class tutors, as the differential levels of knowledge in the student body tend to be both more apparent and more profound in this situation than in single discipline teaching contexts. However, this also brings with it great opportunities from a teaching and learning perspective. Creative engagement with the variety of knowledge and the differing perspectives that mixed groups of students bring to the examination of environmental problems tends to allow the tutor to foster a more sophisticated and thought-provoking class dialogue for all concerned. In addition, this type of teaching and learning can be used to equip students from all disciplines not only with a more developed understanding of the legal issues but also with skills in communicating with other specialists which will stand them in good stead in their professional lives.

Service teaching

In a university context

One result of the demand for knowledge and understanding of the law outside the context of the Law degree is that non-Law departments are often keen to develop collaborative teaching arrangements with lawyers. This occurs not only in those areas where this might be expected (such as management, accountancy and business studies) but also in contexts where linkages are less immediately obvious (such as languages, gender studies etc.).

Standard courses (i.e. courses as delivered to students taking the LLB degree) or specially adapted law courses may be delivered to cohorts of non-law students on vocational degree courses, often as requirements imposed or encouraged by the relevant professional associations. Such courses form part of what is known as 'service teaching', in which parent departments effectively hand over the teaching of the legal aspects of their degree programmes to legal academics. In some cases non-Law schools may employ legally qualified staff 'in house' to teach the relevant modules. This type of service teaching is generally used to deliver a very instrumental type of coverage of the law to students. It is inevitably subject to definite limitations both in terms of the subject coverage itself, which is geared to fulfil very specific vocational goals, and also in terms of its ability to do more than provide students with a rather superficial insight into the broader discipline of Law.

In a CPD/ professional context

Given the dynamic and constantly developing nature of law and its relevance to everyday working life, there is considerable demand for tuition in this area in the context of continuing professional development and professional training in a wide

variety of professions. This is the case in areas as diverse as health care, the hospitality industry, local government and the civil service and environmental management, to name but a few. Teaching in this type of context usually concentrates on the practical implications of recent developments in the law, both in terms of statute and case law, and normally takes the form of a single lecture or workshop session or a short course. Coverage for legal issues in a CPD/professional education setting may be stand alone in nature or integrated into broader training schemes.

True interdisciplinary teaching and learning

Co-operative course development

One of the areas where interdisciplinary teaching and learning is potentially best employed is in the development of courses that cut across disciplinary boundaries. The idea of constructing courses that can fill the gaps between disciplines and also exploit connections between them is a highly appealing one to those who recognise the value of a more holistic worldview. However, in practice internal university management structures tend to make this type of endeavour rather difficult to achieve in all but exceptional cases.

Arguably the advent of modularity has made this type of development less imperative in that students can (notionally at least) access courses in other disciplines. It is also true to say that, particularly in vocational areas of study, such as Law, such are the demands of the professions that 'course cramming' is an ever present issue and one that discourages optimum development of innovative and imaginative cross-disciplinary teaching and learning.

Implications of interdisciplinary teaching and learning

In principle, and indeed in practice where it has been carefully developed, cross-disciplinary teaching and learning involving law has a great deal to offer in terms of creating a practically situated but also creative and constructive dialogue between and among academics and students. In some areas, not least in the progression of environmental and sustainable development agendas, such dialogue is not merely desirable but arguably imperative. However, institutional and vocational constraints serve to make it difficult to realise successfully such co-operation in anything more than a fairly rudimentary form. This arguably serves to impoverish both academia and the professions that we provide with their key personnel, though it is difficult to see how it can be effectively addressed until the value of inter-disciplinary teaching and learning is more widely considered. Certainly, as things stand, for the most part the full potential of cross-disciplinary teaching and learning is not recognised in UK higher education. It tends to be viewed more often as a source of logistic and administrative problems than as a potentially valuable societal resource.

Engineering

Roger Penlington

How is Engineering defined as an academic discipline?

“Engineering is concerned with developing, providing and maintaining infrastructure, products and services for society.” (QAA 2005)

Within this there are generic component activities of the Engineering course which may be broadly described as:

- the acquisition of subject-based knowledge and understanding
- the development of intellectual and analytical abilities scientifically applied to engineering applications
- subject-based practical skills
- general transferable skills and social awareness.

Traditionally, the use of interdisciplinary teaching and learning has been encouraged where activities could be seen as directly relating to the employability of graduates: for example, introductions to business or languages, where some 25% of engineering graduates' first destination is finance and business (The Engineering and Technology Board 2005). Curriculum design has been strongly influenced by professional bodies and the accreditation requirements for the professional registration of graduates. This has resulted in an emphasis on awareness of, and the ability to communicate effectively with, other disciplines rather than any specific knowledge or ability outside the engineering core.

An additional factor which has had a negative influence on the scope for interdisciplinary teaching and learning is the acknowledged congestion of the engineering curriculum. Typically a first-year undergraduate would have 15 to 18 contact hours per week, with additional group study and assessment work. This is further reinforced by the volume of knowledge and experience deemed as the minimum education and experience requirement for the registration as a Chartered Engineer – academic study beyond an undergraduate degree (for example an MSc) – in addition to a period of professional experience.

One aspect of many engineering courses where interdisciplinary teaching has had a significant and beneficial influence is the teaching of design. Engineering design holds a unique position within the curriculum; it is the only activity that can bring together all the required attributes of an engineer within one activity for all levels of study. It not only allows students to combine the demonstration of their knowledge and understanding (for example of engineering science), but also combines the application of their analytical and practical skills within a creative problem-solving environment. It is this environment that extends the traditional discipline boundaries to include a consideration of the wider social responsibility of the engineering profession.

Design will generally be a key theme flowing through all years of an engineering course – from shorter directed exercises that aim to impart knowledge and skill in the first year, to larger year-long projects in the final year, where the student or group of

students will be presented with complex tasks, often based upon ambiguous data derived from 'real world' situations.

The methods employed in the teaching of design are generally more varied and innovative than in any other part of an engineering course; considerable use is often made of individual and group project and/or problem-based learning techniques. The use of these techniques allows the lecturer to explore creativity (Jackson 2005) within engineering, which can only encourage interdisciplinary teaching and learning. Students often respond well to the teaching, learning and assessment methods employed for the teaching of design, which may contrast markedly with other subjects that rely heavily upon traditional unseen examinations.

As a design exercise will generally result in some form of artefact or service, the notion of a customer is frequently used to extend the thinking of the student into a broad social context. Interdisciplinary teaching and learning can make an important contribution to the technical content of a design exercise; for example ergonomics, information management, marketing, economics and law may all be needed to establish how the outcome becomes 'fit for purpose'. Recently there has been interest in developing the authority of students' group working through collaboration with psychologists. This may be through the use of workbooks which enable a group of students to become aware of how effectively they are working together or through an investigation of 'personality types' and temperament (Lester *et al.* 2003).

Sustainability and sustainable development are being introduced into engineering courses, and require engineering undergraduates to understand complex wider social issues which do not necessarily have traditional or obvious technological solutions. To be able to develop solutions students must not only consider the economic, environmental and social ramifications of their actions but perhaps face their largest challenge in having to communicate technological and behavioural changes to the wider community. Traditionally, the engineer is seen as providing and maintaining infrastructure, products and services *for* society rather than as is now required *from within* society. For this reason it is important that engineers find a way of re-evaluating how courses address wider learning, and that professional bodies define the sequence in which knowledge, understanding and skills are acquired.

More recently there have been moves to broaden the appeal of engineering courses to school leavers as a response to a decline in numbers of applications to university engineering departments. Significantly, this has led to an increase in the use of interdisciplinary teaching and learning on courses with an engineering core. Examples of disciplines which are becoming partners with engineering to establish new courses include design (industrial and product), business, biological sciences, sport and the environmental sciences.

The challenge facing this type of course with its wider curriculum base is as outlined above, the sequencing of learning – having to establish a balance between developing an understanding of knowledge and experience of practical application. The traditional reliance of engineering teaching and learning on the three core elements of scientific principles, mathematics and realisation may be developed through the focus of the application. For example, partnerships of engineering and sport may be based upon the application of basic knowledge of materials science, mechanics and fluid dynamics to the

development of equipment to be used within the sports discipline. This requires a more detailed knowledge of the user, for example knowledge of anatomy, which would traditionally be acquired either through postgraduate study or within employment through team working. This encourages, and perhaps necessitates, new approaches to teaching and learning to ensure a coherent programme of study and the credibility of graduates.

These newer partnership disciplines are able to reconsider teaching methods afresh. This has included the employment of techniques such as problem-based learning, which may stimulate the acquisition of knowledge through the requirements of the application. There is a fundamental need for greater consideration of teaching methods where students from differing disciplines are brought together. It is often the case that in each discipline area these students will form a small part of a larger cohort of single discipline students. Where this happens, the interdisciplinary students may be at a disadvantage, as their needs and prior learning (or gaps in prior learning) may not carry weight within a modularised system.

Although there have been well represented innovations in teaching, innovation in assessment has been receiving less attention. For students on interdisciplinary courses, mixed messages about assessment, threshold, benchmark and output standards may weaken their confidence in their learning. For example, where engineering students study within departments with an arts background, it is generally found that the essay is more common than the technical report. A lack of familiarity with assessment methods requires more consideration of how formative assessment is incorporated within the teaching and learning. The part that assessment plays in the motivation of students is widely recognised: "Assessment defines what students regard as important" (Brown and Knight 1994). One difficulty with interdisciplinary teaching is that there must be equity within assessment and that the assessment employed must be equally suited to all students, whatever their backgrounds or patterns of study. From an engineering perspective, innovation in assessment methods should be a key part of any consideration of teaching and learning across disciplines.

An illustration of long-term interdisciplinary study is given by the activities which have been undertaken since 1920 by the Newcomen Society (<http://www.necomem.com>), whose motto *Actorum memores simul affectamus agenda* has been freely translated as "That the future may learn from the past". The study of the history of engineering and technology is an excellent illustration of the bringing together of two discipline areas with complementary interests which work well as they provide stimulation, exploration and the intellectual reward of understanding.

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Dance

Ana Sánchez-Colberg

I will be addressing the question from the perspective of the 'teaching and learning' of contemporary dance-theatre and performance within the context of the conservatoire. The very nature of the two subjects – arguably disciplines – predicates that the discussion cannot avoid touching upon key issues in current debates on the 'subject' of interdisciplinarity in general, and its impact on interdisciplinary teaching and learning in dance-theatre and performance specifically.

Moran's (2002) suggestion that "we cannot understand interdisciplinarity without first examining the existing disciplines, since interdisciplinary approaches are always an engagement with them, and the modes of knowledge that they exclude by virtue of their separation from each other" (p.2) seems an appropriate starting point. Dance, whether the more traditional 'disciplined' ballet or the more 'undisciplined' contemporary dance, nonetheless incorporates both 'modern usages' of the word: "a particular branch of learning or body of knowledge" as well as "the maintenance of order and control amongst subordinate groups [...]" (Moran 2002, p.2). Anyone who has ever attempted training as a dancer within the 'conservatoire' knows exactly what I mean. Even the most 'radical forms' of contemporary dance – the release, body-mind-centering techniques – require an attitude of exclusive training focusing on notions of 'the proper' (whether the 'proper' beauty in ballet, or body-mind-health 'proper' in contemporary dance). Although focusing on different aspects of motility, all techniques rely on the mastery of skills that clearly identify 'this and not other' as correct – if not virtuosic. Training in dance involves mastery of the skills of the discipline, through discipline. However, in contrast to the 'theoretical subjects', the particular branch of learning is about literally a 'body' of knowledge, located within the 'practico-sensorial' modalities suggested by Lefebvre (1991 pp.199-200). In simple terms it is first about the deployment of body and action through time and space before it even considers 'language'. Therefore, to be able to engage in a discussion of interdisciplinarity and dance, we would have to question the general observation that "disciplines are founded on language" (www.ucl.ac.uk/calt/alpd/wiki/index.php?title=Definitions_of_Interdisciplinarity [accessed 2 October 2007]). Without relegating dance to a Lacanian-silent-non-existent abject, we must confront the flesh and bone fact that the discipline of dance is identified by a set of 'ways of doing' (not just limited to skills of doing) which may or may not – depending on issues of 'style' – be comparable to a linguistic phenomenon. Although informally we speak of 'the language of dance', it is not actually a language – the systems of codification, consensus, qualitative and quantitative stability, required of 'language'-based knowledge are not relevant. However, as dancers we 'know what we mean', we show, we do, we do not necessarily speak. Within the 'discipline' of dance, the particularities of dance-theatre practice, my area of expertise, throws a few other variables into the discussion. The practice develops from what can be proposed as an interdisciplinary attitude within the discipline of dance – a different body of knowledge within dance, and a different way of 'looking' at this knowledge (www.ucl.ac.uk/calt/alpd/wiki/index.php?title=Definitions_of_Interdisciplinarity [accessed 2 October 2007]). Dance-theatre sees dance as a process of performance, and into performance, that explores:

the relationship between ineffable aspects of our humanity – our interior psycho-physical landscape [the dance discipline/movement discipline] – and the external world of action, the realm of the theatrical [the theatre/drama discipline], within a performance frame that places, what is normally viewed as a private domain within the context of the public realm, the realm of plurality, of human exchange [Interdisciplinarity] (Sánchez-Colberg 2004, p.198).

This is more than an issue of aesthetic differences. I am proposing that in the classroom/studio environment these conditions are central to any interdisciplinary endeavour that involves dance.

In the autumn terms of the academic years 2003 and 2004, Michael Weinstock, course leader of MA Emergent and New Technologies at the Architectural Association, and I, then course leader of the MA European Dance Theatre at Laban organised a series of 'interdisciplinary encounters' between our students. The spirit of the endeavour aimed to open up a dialogue between two disciplines that over the past decade had found great affinity in the world of arts production. Collaborations between architects and the dance world, from dance production to dance buildings, had trumpeted a 'new way forward', almost a new discipline. The project also sustained our shared interest in the idea of 'emergence'. Michael had been working on a publication discussing 'emergence' from a multi-disciplinary perspective (Hensel *et al.* 2004). I was interested in the particular application of emergent theory to performance, as a way to debunk notions of theatrical representation. Arguably we were coming from two extremely different disciplines, yet we had a commonality, comparability and compatibility.

In our planning discussions we had identified that in fact, the two groups – microscopically representative of two disciplines – shared a common 'language'. Keywords such as structure, dynamics, space, effort, weight, time, flow, density, volume, projection and design are commonplace in architecture. For students of dance-theatre these terms are the building blocks of Rudolf Laban's theories of movement and space on which a significant part of their course focuses. Moreover, prior to the collaboration, each group – within the context of their course – had spent the earlier part of the term investigating the relationship between body-movement-space in the actualisation of forms – concrete and virtual. The dancers focused on 'human' body-form, the architects explored 'body' in a wider sense – a body/object in time and space. The groups had to work together to a brief requiring the production of a draft emergent performance event interfacing technology, movement, objects and humans.

What became evident throughout the process of collaboration was that the challenge of working 'interdisciplinarily' was not based on issues of 'language', on the 'conceptual' body of knowledge. The challenge was located in the nature of the body-as-tool, the tactical deployment of the body-knowledge-subject and the skills relevant to the subject-tool within the particular frame of the activity. The frames of reference, I suggest, were in fact shared and common. The early part of the project was structured around two sessions in which the groups 'shared their perspectives'. We decided to start with the 'dance'. The first meeting was held at Laban, a three-hour workshop in which we explored in the studio the basic concepts of Laban's Choreutics and Effort. This meant that the architects had to join the dancers, take their shoes off and move. An advantage of Laban's methodology, particularly Choreutics, is that it deals with basic principles of human motion in space. The method does not require learning a

specialised vocabulary of steps, a language. One does not need years of training to 'get it'. It has been compared to a kind of descriptive phenomenology and in this respect its conceptual underpinning is complex (see Sánchez-Colberg 1998).

At this point the challenge was not about the 'content' or subject of each of the disciplines, but how each exercises its concepts in practice. In the case of dance-theatre this involves the highly individual issues that emerge when anyone moves – the psycho-socio-cultural inscriptions of individual bodies that define who can and cannot dance, who lives in a language-based world or in a body-based world. The challenge was brought on by questioning the basic tool of the discipline – the body – that is also in the case of the 'dance discipline' its subject and material. If one follows conventional distinctions that define method-based-subjects as paradigms and subject-based-subjects as disciplines ^[1] then in dance-theatre, discipline and paradigm are inextricably intertwined, if not one and the same.

For the architects the 'abstract body' that many mastered electronically was suddenly a specific body, their bodies, themselves, which seemed awkward, imperfect, unknown. The dancers' issues with the 'tool' did not surface until the next encounter, when the group visited the Architectural Association to be introduced to the architects' main tool, computers, and their subjects and material generated electronically. Dancers heard words familiar to them – body, groups, formations, rules. But the computerised non-human forms emerging in front of them were foreign. There was no perceptual link – the system dancers rely most on – to actual bodies, no consideration of limits – something that is 'second nature' to dancers – imposed by flesh and blood. An interesting cognitive shift took place. If the architects were confounded by the limits of their flesh and blood bodies, the dancers were confounded by the seemingly limitless possibilities of the non-human (yet organic) forms within the computer-generated environment. This 'confusion' had a positive effect. All participants felt that they were starting from equal footing, from point zero, where a complete set of new ways of doing had to be established in order to manage the brief. This was established practically, in the doing; it was not absorbed into language, and then only as a proposition, until the debriefs following the sharing of the works.

In the seminar discussion after the two sessions there was a general consensus that there was a shared sense of ineffability, of not being able to contain in language the experience of the 'new bodies' and the 'new doing'. In language terms (including the electronic language world of the computer) the concept of 'body' and its implications in time/space offered themselves as a stable, given, 'known'. In the 'bodily' knowledge such stability was compromised. The sense of displacement and disorientation was not caused by having to absorb a new quantity of information – in the conventional sense – nor caused by having to redefine previous semantic boundaries. Rather the sense of dislocation came from a change of the *locality* (which I am defining beyond 'context' as locality is relational, context is circumscribed) of their applied knowledge. Therefore, we arrived at a very interesting proposal, a rethinking of interdisciplinarity as an issue of space, not just of 'subject-matter' in an exclusive field. Therefore, in terms of dance teaching and learning, I would concord with the idea that "interdisciplinarity is more usefully characterised as a *critical space* in which to reflect, a chance to deconstruct our previously unproblematised disciplinary modes of thought" (UCL Wiki 2007). However, for me what jumps out of the sentence is the notion of *critical* and *space*, singularly and collectively. Critical, not just in the sense of offering a critique – but of creating crisis,

albeit in the controlled environment of art making. Space, taken to be a place where explorative actions allow learning to take place from being able to understand, manage and reform a world (space/place) and a world view (knowledge of that space/place) following the learning that comes from crisis. As this experience suggests, in the case of dance the change of modes of thought is directly linked to (if not dependent upon) a change of ways of doing.

The premise of 'disciplines in dialogue' is central to the learning and teaching in the MA Performance Practices and Research at the Central School of Speech and Drama. The course is concerned with advanced enquiry into broad disciplines of performance. Its format is that of a laboratory of performance practices driven by research questions and queries. The course acknowledges that the term 'performance' does not define a discipline but actually 'disciplines in dialogue' that continually define and redefine the landscape of contemporary performance practice. In addressing these questions students undertake both practical and conceptual work. In the unit Performance Practices students engage in problem-based learning through a series of projects related to current issues in interdisciplinary performance practice. This academic year students are devising and critiquing 'performance' in dialogue with phenomenology and movement studies, music, architecture and new technology. As a starting point students consider the specificity of the concept of 'dialogue' (a significant aspect of the discussion in the workshop in December 2005). In our contemporary world of reality TV, talk shows and information overload, where talk is 'trivia', the fullness of the concept 'dialogue' may be easily forgotten. In the course we consider the original meaning of the word, from the Greek *dia* (into) and *logos* (knowledge): a conversation, a debate, an argument at the end of which there is the potential for new knowledge, the philosopher's preferred method towards an understanding that would then affect a way of life, promoting change in the ways of doing and being as much as new ways of thinking/speaking. In trying to unpack the idea of 'dialogue' in relation to interdisciplinary teaching and learning, we have revisited the Platonic model and begun to trace a compatibility with theatre-making strategies. Students of performance find affinity with the manner in which Plato's Dialogues have been described as:

intellectual, noetic experiences; as dramatisations of communicative interactions, they bring into exhibition claims and arguments in active confrontation with each other. The dramatised encounters hold in suspension the question of the validity or invalidity of the counter-claims and arguments [...] (Fortunoff 2002).

A dialogue is suggested, between performance and philosophy, in which a dialogue is no longer considered exclusively within literary/philosophical disciplines but within theatre, as events that are framed and enacted to arrive at new knowledge. I remind students that dialogues served a *maieutic* function. The word *maieutic* comes from the Greek root of 'mother' and means to elicit and clarify the idea of others as it exhorts "interlocutors into stating and reflecting upon the implications of their uncritically held opinions" (Fortunoff 2002). Therefore the aim is not to create a new discipline of interdisciplinarity, but to bring back 'new knowledge' to the place from which each departed, disciplined or undisciplined as that 'place' may be. In opening up a careful consideration of 'dialogue' students have found a way forward in their interdisciplinary endeavours by being encouraged to put aside received notions of disciplinary hierarchical power structures in order to find new ways of working collaboratively.

Note

[1] Students have found the discussion on interdisciplinarity as part of the Leverhulme Evidence Project useful to their considerations. The discussion of interdisciplinarity can be found in www.ucl.ac.uk/calt/alpd/wiki/index.php?title=Definitions_of_Interdisciplinarity [accessed 2 October 2007].

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Area Studies

Nicholas Watts

In this account, I will reflect on some issues of interdisciplinarity in addressing the environmental issue in research, teaching and learning, and consider briefly the link to (Caribbean) area studies.

The environment, and its more recent incarnation in international discourse in the context of sustainable development, is a problem that requires an interdisciplinary and integrated approach to analysis and policy development. A recent (and failed) attempt to develop postgraduate provision in sustainable development helped to highlight a number of the key dimensions of the problem of taking an interdisciplinary approach to the issues of global environmental change.

I am a graduate of Keele University during the period that I and my contemporaries value greatly, of the Foundation Year, where students had to complete a year's liberal education and pass in subjects in the humanities, social and natural sciences. At this time, Keele might have been described as institutionally interdisciplinary, and was turning out individuals with some internalised experience of working across disciplinary boundaries. (I graduated, incidentally, in German and Psychology with subsidiaries in Mathematics and French.)

Keele has since, of course, bowed to the exigencies of the market and culled the original, interdisciplinary Foundation Year, although now the title 'Foundation Year', is applied quite differently, in the context of foundation studies, i.e. to prepare students who lack the qualifications to proceed directly to an Honours Degree course (see www.keele.ac.uk/depts/aa/foundationyear/intro_fy.htm [accessed 2 October 2007]). However, the Keele experience shows up two issues: institutional commitment to interdisciplinary (or perhaps multidisciplinary) teaching and learning, and the question of the extent to which interdisciplinarity, or thinking and working across disciplines, may be within the compass of the individual, rather than reliant on a team-based approach, as described by Gibbons as 'Mode 2', with a flatter and more flexible structure and greater 'connectivity' across institutions and research settings (see Gibbons *et al.* 1994 and Nowotny *et al.* 2001).

Second is the problem itself. One may describe the environmental problem and its social and political impact as having moved through a trajectory implying a different (humanities and social science) disciplinary focus at each stage. Of course, the humanities and social sciences stand on the shoulders (or occasionally heads) of the natural sciences in terms of the substantive knowledge brought to bear in the debate, though there are usually 'scientific' findings to support both sides of a policy argument, at least until the funding of and interests behind the research are exposed. For example, policy actors with positions that challenge the dominant mainstream will have, in opposition, prepared policy backed by research that supports their position (see Kingdon 1995).

This in turn raises two issues. First, how can the disciplinary skills be aggregated in an individual or group over time, or at a point in time, given the transaction costs in either repeatedly retraining an individual or in bringing a team together and prising them away

from their institutionalised furrows in their own discipline, and the easier route to professional recognition in sticking with the treadmill. Second comes the question of the assumptive worlds associated with different disciplines. Working in the environment field, I am repeatedly struck by the differences in 'mentality' that appear to accompany disciplinary or professional training. Physical geographers and structural engineers, for example, are likely to have a more categorical than probabilistic approach (a place is where it is, a bridge must satisfy clear rules if it is to stay up). 'Deconstruction' would not be a favourite intellectual tool of the structural engineer.

So far, then, we have the issues of individual or team approach, development of skills and communication between disciplines (as well as questions of defining the ground rules for shared understanding and agreeing what is important), and the question of the nature of individual higher education institutions that may or may not favour interdisciplinary working.

Let us return to the environment example. I choose to characterise the trajectory of the environment as a problem in the public sphere as follows. First, comes problem awareness ('Silent Spring' (Carson 1962) and 'Spaceship Earth' (Fuller 1969) are the metaphors associated with this stage). Environmental awareness and related individual behaviours (dimensions and characterisation of the protagonists of environmental protection, or the 'New Environmental Paradigm' and the defenders of the 'Dominant Social Paradigm') are properly the domain of environmental psychologists and environmental sociologists, as well as some human geographers, using tools of attitude surveys or qualitative research such as focus group techniques to understand the subjectivity of environmentalism. At this stage, a certain naïvety attached to public policy – an expectation that enhanced environmental awareness would lead to widespread changes in favour of environmentally benign behaviours. The failure of enhanced environmental awareness to shift the basis for economic development, as well as a reflexive challenge to established values in the face of awareness of the human impact on environment, led to a second phase, of collective action and questions of value change, with new disciplines, and methodologies, entering the frame. (It should be noted that I am, here, positing an ideal typical heuristic sequence. Of course, as environmental problems were highlighted, people across all disciplines considered how their skills might be applied. However, the policy face of the issue makes a sequential approach useful.)

Second comes mobilisation. As environmental awareness grows among élite-challenging groups, the environmental issue becomes the focus for a generation of pressure groups and new social movements, and methodologies shift to the field of political sociology, subfield social movement theory, with initial face-offs between theorists espousing relative deprivation theory, resource mobilisation theory (including conceptualisation of political opportunity structures and, later, market opportunity structures) and identity theory. Environmentalism has taken different forms in different states, and this is reflected in different idioms of analysis of the environmental movement with, for example, Melucci (Italy) focusing on identity (see Keane and Mier 1989), Touraine (1977) (France) on historicity, Beck (1992) on the risk society (Germany), Schnaiberg (2003) on the treadmill of production and environmental justice (USA), and Lowe and Goyder (1983) on environmental groups (UK).

Third comes either institutionalisation of environmentalist claims in environmental policy and/or promotion of environmental goals in the shape of green political parties, with the German Greens leading the way in politics of emancipatory procedural innovations (no figureheads, participation, the 'anti-party-party') as well as substantive claims rooted in concepts of identity and risk minimisation. Here, the effective institutionalisation of environmental policy is likely to diminish the support for oppositional environmentalism, so that some countries will experience a greening of policy and others a greening of politics. By this time, the environment has become a legitimate focus for area studies. In some states, Germany in particular, the greening of both policy and politics took place in parallel.

With the greening of politics and emergence of green parties, the methodology shifted to the study of party politics and electoral studies, including quantitative and qualitative studies of green party development and electoral performance. The development of green party platforms required a more comprehensive ideological underpinning, so, as well as the study of political behaviour, green political ideology came under the scrutiny of political theorists and philosophers, spawning environmental political theory and environmental ethics.

The inclusion of the environment in public policy posed simultaneous demands on analysts of public policy, with a burgeoning literature in environmental policy analysis. The environment and, latterly, 'sustainable development' place explicitly interdisciplinary demands on policy-makers, who are required to integrate policy to minimise internal conflicts over environmental standards and targets (if often with conspicuous lack of success, for example in conflicts between environment and trade ministries). Sustainable development, defined initially in terms of three 'pillars' of sustainability – economic, social and ecological – and increasingly also a fourth pillar – cultural – requires inputs from the appropriate disciplines (now including the science of ecology in determining threats to ecosystem function as well as the arts and humanities in protecting indigenous cultures, including languages).

In the classroom, environmental policy provides an excellent opportunity to explore this canvas of problems and disciplines. Using another heuristic, that of sequential 'stages' of policy analysis, it is possible to address a particular environmental problem in the context of group-work projects. Such a module, or course, requires students to deploy three sets of skills: theory and methods in analysis of public policy; understanding the ecological aspects of policy; and team-work. As with most attempts at interdisciplinary work, this is challenging, but, if successful, gives students a real sense of achievement in relating theory to real world practice and helps develop their confidence in dealing with public institutions in the course of practical work. Here, students have to develop an understanding of multi-level governance from the global to the local; policy styles (especially between countries, but also between local jurisdictions within a country); interview and survey techniques; interest-based analysis of actors in the policy process; forecasting, implementation, monitoring and evaluation. At the undergraduate level, some of this may appear rather superficial, but it does aid students in developing a sense of the relative roles of different disciplinary contributions to an integrated analysis of public policy.

An incidental benefit of such an approach, which can focus on current implementation of a chosen environmental policy (such as air pollution, waste management, green

spaces), and include a component for oral presentation of groupwork, is that it can serve to minimise opportunities for plagiarism (as local authority sources can be traced if the tutor is in touch with the relevant officers); it allows discussion to identify the relative contribution of different individuals to the group project, and thus evaluation of teamworking skills. It also brings us back to the question of whether interdisciplinarity requires the individual to be a jack-of-all-trades, or skilled in the co-ordination of a team with appropriate skills.

The escalation of the environmental problem, in particular in relation to climate change and threats to biodiversity, has been accompanied by developments in international regimes. It is less easy to posit this as part of a heuristic sequence of stages in environmental issues, as of course the Stockholm conference in 1972 was a major catalyst for the promotion of environmental consciousness. The study of environment in international relations has developed in parallel with the internationalisation of the environmental issue, growing after the 1992 Rio conference and sustained by the 2002 World Summit for Sustainable Development (WSSD) at Johannesburg, and the annual meetings of the Commission for Sustainable Development in New York and other relevant conventions. As awareness of the issue has grown, so has the international relations literature on environment, and an understanding of this has become necessary in the study of the environmental problem with a view to generate workable policy solutions.

As a result, a social science approach to environmental issues would include the following modules:

- Environmental Psychology (environmental attitudes and behaviours)
- Environmental Sociology (environmental values, 'carriers' of environmentalism, constructions of 'nature')
- Political Sociology (the 'environmental movement')
- Policy Analysis (multi-level governance in sustainable development)
- Political Behaviour (green politics/ the green vote)
- Political Theory (green ideologies)
- Environmental Ethics
- International Relations of Global Environmental Change.

The importance of (changes in) the substantive knowledge base of environmental policy (environmental hazards, climate change, pollution and genetic defects, etc.) also requires a keen sense of the public understanding of science. Increasingly, the arts (e.g. www.capefarewell.com) and humanities ('nature' in literature, for example in Caribbean literatures) are engaging in the discourse on sustainable development. However, given the potential for interdisciplinary co-operation in the education of the present cohort of students to provide the necessary knowledge, skills and emotional basis for dealing with medium- and long-term issues of sustainable development, the institutional basis for such cooperation has yet to emerge. The efforts of the Higher Education Funding Council for England (HEFCE) stop short of more than exhortation of universities to engage with sustainable development. The Research Assessment Exercise is, in some areas, making efforts to increase recognition of interdisciplinary collaboration and interdisciplinary work, but the balance is still heavily in favour of specialist disciplines.

If we take this conclusion to the field of Area Studies, especially in the Caribbean, we find strong environmental sciences, but a relative dearth of environmental social sciences necessary for training for successful development and, especially, implementation and evaluation of Multilateral Environmental Agreements (in particular, the UN Framework Convention on Climate Change and the UN Convention on Biodiversity). Small island states should offer excellent opportunities for exploration of the role of problem-based learning both in the academy and as part of continuing professional development for environmental professionals in these countries. Indeed, small island states in the Caribbean have their own regimes for sustainable development, reflected in the Cartagena Convention (1987), the Barbados Programme of Action (1994), and the Mauritius Strategy (2005). The question remains, how to pull together the necessary component parts of the above list of social science disciplines to create a manageable curriculum for local use.

Part of the answer lies, no doubt, in the development of interdisciplinarity in a context of problem-based learning. Another key challenge, though, has been presented by Michael M'Gonigle and Justine Starke (2006) in a seminal work that addresses the need for the academy to identify its 'place' and role in the sustainable development of its community. Somewhat redolent of the debates around the curriculum of Keele in the 1960s and 1970s, this puts such debate into the new context of the sustainability challenge.

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