

The wicked and complex in education: developing a transdisciplinary perspective for policy formulation, implementation and professional practice

Anne Bore & Nigel Wright

Abstract

The concept of ‘wicked issues’, originally developed in the field of urban planning, has been taken up by design educators, architects and public health academics where the means for handling ‘wicked issues’ has been developed through ‘reflective practice’. In the education of teachers, whilst reflective practice has been a significant feature of professional education, the problems to which this has been applied are principally ‘tame’ ones. In this paper, the authors argue that there has been a lack of crossover between two parallel literatures. The literature on ‘wicked issues’ does not fully recognise the difficulties with reflective practice and that in education which extols reflective practice, is not aware of the ‘wicked’ nature of the problems which confront teachers and schools. The paper argues for a fresh understanding of the underlying nature of problems in education so that more appropriate approaches can be devised for their resolution. This is particularly important at a time when the government in England is planning to make teaching a masters level profession, briefly defined by the Quality Assurance Agency for Higher Education (QAA) benchmark statement as ‘Decision-making in complex and unpredictable situations’. The paper begins by locating the argument and analysis of ‘wicked problems’ within the nature of social complexity and chaos. The second part of the paper explores implications for those involved in policy formation, implementation and service provision. Given the range of stakeholders in education, the paper argues for a trans-disciplinary approach recognising the multiple perspectives and methodologies leading to the acquisition of reticulist skills and knowledge necessary to boundary cross.

Keywords: social complexity, ‘wicked problems’, ‘tame problems’, trans-disciplinary, masters level profession, reticulist,

Introduction

Early in 2008, the Secretary of State at the UK Department for Children, Schools and Families (DCSF) announced a ‘new masters qualification to boost teaching’ (DCSF 2008a DCSF. 2008a. *New masters qualification to boost teaching* Press notice 2008/0044). In the paper accompanying the Minister’s announcement, ‘Being the best for our children: Releasing talent for teaching and learning’ the government affirmed its view that:

No profession will be able to meet the demands of the new century without the strongest commitment for its own continued development. This is especially true of teachers and those who support them in the task of equipping our young people for life in a fast changing world. (DCSF 2008b DCSF. 2008b. *Being the best for our children: Releasing talent for teaching and learning*, London: DCSF. , 3)

The press release refers to many familiar problems in schooling such as the link between poverty and attainment and the avoidance of wasting talent (DCSF 2008a DCSF. 2008a. *New masters qualification to boost teaching* Press notice 2008/0044). The paper points to the need for a higher level of skill in the teaching profession than ever before in order for schools to meet the challenge of the social, cultural and technological changes facing pupils in the twenty-first century. When this is set in the context of ‘all aspects of the child’s life – health and wellbeing, safety and developing the wider experience and skills that characterise a good childhood and set a young person up for success in adulthood’ (DCSF 2008b DCSF. 2008b. *Being the best for our children: Releasing talent for teaching and learning*, London: DCSF. , 5), it illustrates the complex canvas on which, and in which, schooling has to operate. Yet we sense that these issues are not new. Our interest is in understanding better the nature of some of these problems in order that we might be better enabled to resolve them.

In this paper, therefore, we argue that there has been a lack of a crossover between parallel literatures, one from the field of planning, design and design education which has been adopted by those involved in research into health, and the other from education and schooling. Both focus on aspects of the nature of problems and the development of creativity, but from different angles. Inherent in and common to both is the role of the professional. The first of these literatures relating to planning, design and design education focuses on understanding the nature of problems (see Rittel and Webber 1973 Rittel, H.W.J. and Webber, M.M. 1973. Dilemmas in a general theory of planning. *Policy Sciences*, 4: 155–69. ; Coyne 2005 Coyne, R. 2005. Wicked problems revisited. *Design Studies*, 26: 5–17. ; Conklin 2006 Conklin, J. 2006. *Dialogue*

mapping: Building shared understanding of wicked problems, Chichester: John Wiley & Sons.) at a broader societal or macro level. The label ‘wicked’ was coined for this typography of problem by Rittel and Webber.

The other literature tends more to consider approaches to solutions, ‘street level bureaucracy’ and ‘reflective practice’ (see Lipsky 1980 Lipsky, M. 1980. *Street-level bureaucracy: The dilemmas of the individual in public services*, New York: Russell Sage Foundation. ; Schön 1987 Schön, D. 1987. *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions*, San Francisco: Jossey-Bass Publishers.) which can be understood at a more individualistic, micro level. In seeking to address wicked problems, proponents from the first perspective have tended to focus on ‘reflective practice’ as a way forward without realising some of the criticisms of reflective practice, yet in education and schooling, the emphasis has been on developing reflective practice, often without appreciating some of its problems and, furthermore, not realising that the problems to which it is being applied are more ‘tame’ in nature than wicked.

A wicked problem, according to Blackman et al. (2006 Blackman, T., Elliott, E., Greene, A., Harrington, B., Hunter, D.J., Marks, L., McKee, L. and Williams, G. 2006. Performance assessment and wicked problems: The case of health inequalities. *Public Policy and Administration*, 21(2): 66–80.) is one that is not easily defined, has many causal levels and cannot be solved by generic principles or linear heuristics. Tame problems, on the other hand, are well-defined, stable and belong to a class of problems which can be resolved generically. In contrast to wicked problems, the solutions to tame problems are easily recognised as being either right or wrong. In education and schooling, wicked problems are considered erroneously to be tame and as a result illegitimate ‘solutions’ are attempted with the result that many simply do not work.

In England, educational policy in the recent past has focused on developing creativity (see Department for Education and Employment and Qualifications and Curriculum Authority 1999 Department for Education and Employment, and Qualifications and Curriculum Authority. 1999. *National curriculum for England: Science*, London: DfEE and QCA. ; Department for Education and Skills 2003 Department for Education and Skills. 2003. *Every child matters. Green Paper*, London: The Stationery Office. ; Qualifications and Curriculum Authority 2003 QCA. 2003. *Creativity: Find it! Promote it!*, London: QCA/DfEE. ; Ofsted 2006 Ofsted. 2006. *Creative partnerships: Initiative and impact (ref no HMI 2517)*, London: Ofsted.). At the same time, many longer-term problems and issues are appearing to be increasingly intractable, at a macro or system level, a meso or institutional level, as well as at a micro or

professional level. A key part of our argument is that the misunderstanding of the nature of problems, emphasising application in the micro context, which we contend is the position in education, to the exclusion of the macro and meso (see Bottery and Wright 1996 Bottery, M. and Wright, N. 1996. Co-operating in their own deprofessionalisation? On the public and ecological roles of the teaching profession. *British Journal of Educational Studies*, 44(1): 82–98. , 2000 Bottery, M. and Wright, N. 2000. *Teachers and the state: Towards a directed profession*, London: Routledge.) produces attempted solutions which are inappropriate, and leads to unrealistic expectations, failure and demotivation in the profession.

Several authors contest that complex social problems such as health inequalities, health behaviours or global warming can be described as ‘wicked issues or problems’ (Clarke and Stewart 2000 Clarke, M. and Stewart, J. 2000. “Handling the wicked issues”. In *Changing practice in health and social care*, Edited by: Davies, C., Finlay, F. and Bullman, C. 377–86. London: Sage. ; Blackman et al. 2006 Blackman, T., Elliott, E., Greene, A., Harrington, B., Hunter, D.J., Marks, L., McKee, L. and Williams, G. 2006. Performance assessment and wicked problems: The case of health inequalities. *Public Policy and Administration*, 21(2): 66–80. ; Briggs 2007 Briggs, L. 2007. *Tackling wicked problems: A public policy perspective*, Barton ACT: Australian Public Service Commission.), but as yet the term has not been applied to educational issues. If the volume of education legislation in England in the last two decades, often referred to as ‘initiative overload’ (Curtis 2003 Curtis, P. 2003. Teachers put off by initiative overload. *The Guardian*,), signifies anything, it indicates that some fundamental aspects of education such as pedagogy, accountability, curriculum, pupil achievement and schooling generally, are all issues which emerge continually as being problematic, difficult to resolve and therefore wicked. Indeed, a quick foray into a couple of key reports will demonstrate that many of these problems are simply not new, just perpetually recurrent (Bullock 1975 Bullock, A. 1975. *A language for life*, London: HMSO. , 3; Cockcroft 1982 Cockcroft, W. 1982. *Mathematics counts*, London: HMSO. , xii). For two decades teachers have been exhorted to apply the principles of ‘reflective practice’, to develop ‘action research’ as professional responses to such issues and problems. In our view, many of the aspects of reflective practice and action research have been targeted at problems which are presented as tame when in fact they are wicked, particularly at the meso and macro levels.

What we argue for is a fresh understanding of the underlying nature of problems and issues in education so that more appropriate solutions and techniques can be developed or devised for their resolution. Our argument is in two main parts. First we begin with the context of social complexity, including literature on wicked problems, complexity and chaos. Our second section explores

implications for those involved in policy formation and then for those responsible for implementation and service provision. Given the range of stakeholders involved in education, we argue for the development among professionals of a trans-disciplinary approach, recognition of multiple perspectives and methodologies, hence the acquisition of reticulist skills, i.e., a rather special skill-set reflecting an awareness of other disciplinary domains and an ability to recognise the significance of these, rather than just being some form of social engagement implied by networking, and the knowledge essential in order to boundary-cross.

Review

The context of social complexity

History provides us with a useful ‘rear view’ of complexity. As Herbert Butterfield (1931 Butterfield, H. 1931. *The Whig interpretation of history*, London: Bell.) observed decades ago, history is full of ‘accidents and conjectures and curious juxtapositions of events’ (66) demonstrating the ‘complexity of human change and unpredictable character of the ultimate consequences of any given act or decision of men’ (21). If that is a perspective given by the study of history, then our analyses of the present and its complexity ought to be undertaken with greater caution.

Heterogeneity in the contemporary world is significant for the social nature of problem-solving. This is alluded to by both Conklin writing about design issues and by Ragin (2000 Ragin, C.C. 2000. *Fuzzy-set social science*, Chicago: University of Chicago Press.) writing about methodology. Not only does each player or stakeholder/holder have an individual view, they also have the perspective of their own discipline, with its specialised language and culture. Significantly, Conklin (2006 Conklin, J. 2006. *Dialogue mapping: Building shared understanding of wicked problems*, Chichester: John Wiley & Sons.) identifies that in the field of design problems there must be a balance between what is needed by marketing, and what can be built, or done, by the production team. If this fundamental polarity is applied to the social context, it represents on the one hand what is needed by government, i.e., electability, and on the other what can be done at the lowest level of policy implementation, what we have termed the micro level, by the social actors on the shop floor, the professionals and those for, and with, whom they work. This situation was described by Lipsky (1980 Lipsky, M. 1980. *Street-level bureaucracy: The dilemmas of the individual in public services*, New York: Russell Sage Foundation. , 211):

If such concern (for more humane service provision) is likely to be evident in the future it will be because place by place and issue by issue people effectively demand respect for themselves and their proper claims on government.

In the social context, however, the shop floor is a whirlpool of the many social attractors around different disciplines operating in a pluralistic context. In fact there may be many shop floors, outlined by Lipsky (1980 Lipsky, M. 1980. *Street-level bureaucracy: The dilemmas of the individual in public services*, New York: Russell Sage Foundation. , xi) as:

... the schools, police and welfare departments, lower courts, legal services offices and other agencies whose workers interact with and have wide discretion of the dispensation of benefits or the allocation of public sanctions each with unique properties and systems.

In the methodological literature, complexity is recognised in many ways. Approaches to research in education and the social sciences tend to revolve around issues relating to the recognition of social complexity. Qualitative researchers (Miles and Huberman 1994 Miles, M.B. and Huberman, A.M. 1994. *An expanded sourcebook: Qualitative data analysis*, Thousand Oaks, CA: Sage. , 26) claim that the emphasis on case based research enables them to deal with complexity, offering ‘the researcher an even deeper understanding of processes and outcomes of cases’.

Furthermore, Ragin (2000 Ragin, C.C. 2000. *Fuzzy-set social science*, Chicago: University of Chicago Press.) comments on the over-assumption of homogeneity and inflexibility in populations because of the close interplay between their constitution and analysis of the relationships between the variables. A danger would be ‘one size fits all’ solutions. Instead, he suggests that in variable based research, researchers should be more prepared to recognise heterogeneity in populations. An absence of the recognition of key elements of social complexity can lead the policy developer and the professional practitioner into misunderstanding both the problem they wish to address and the possible ‘solutions’ they might apply. This is because such problems need to be recognised as ‘wicked’.

Wicked issues: what do we know?

The term ‘wicked’ was coined initially by Rittel and Webber (1973 Rittel, H.W.J. and Webber, M.M. 1973. Dilemmas in a general theory of planning. *Policy Sciences*, 4: 155–69.) to explain the complex problems encountered in urban planning, where every problem is essentially unique and every solution is a one-shot operation which is either better or worse. Wicked problems are ill understood until a solution is found, according to Rittel and Webber (1973

Rittel, H.W.J. and Webber, M.M. 1973. Dilemmas in a general theory of planning. *Policy Sciences*, 4: 155–69.). Their analysis has been interpreted as reflecting a philosophical shift in the field of planning and design, from a modernist or ‘Fordist’ paradigm to a ‘postmodern’ perspective. Indeed, Coyne (2005 Coyne, R. 2005. Wicked problems revisited. *Design Studies*, 26: 5–17.) argues that Rittel and Webber’s paper was written as a rebuttal to an earlier piece by Simon (1969, cited in Coyne 2005 Coyne, R. 2005. Wicked problems revisited. *Design Studies*, 26: 5–17.) who had proposed a science of design with a teachable, partly formalizable, doctrine. Rittel and Webber, according to Coyne (2005 Coyne, R. 2005. Wicked problems revisited. *Design Studies*, 26: 5–17.), countered this technical–rationalist approach by arguing that professional skill is better expressed as the framing of the problem to be addressed, and that wicked problems may be resolved by the time the problem is identified, conjectured and defined. This debate, according to Coyne (2005 Coyne, R. 2005. Wicked problems revisited. *Design Studies*, 26: 5–17.), also reflected the challenge occurring in the late 1960s and early 1970s to the authority of science, presented in Kuhn’s work on scientific revolutions (Kuhn 1970 Kuhn, T.S. 1970. *The structure of scientific revolutions*, Chicago: University of Chicago Press.). Moreover, Briggs (2007 Briggs, L. 2007. *Tackling wicked problems: A public policy perspective*, Barton ACT: Australian Public Service Commission.) suggests that although Rittel and Webber’s landmark article was written to address the difficulty of tackling social planning with traditional linear, analytical approaches, more recently the concept has been applied to broader social and economic policy problems.

Briggs (2007 Briggs, L. 2007. *Tackling wicked problems: A public policy perspective*, Barton ACT: Australian Public Service Commission.) claims that wicked problems in the social policy context are difficult to define since the nature of the problem depends on the perspective of the stakeholder as beholder. As such there can be several versions of the problem with none being entirely right or wrong. Furthermore, Briggs (2007 Briggs, L. 2007. *Tackling wicked problems: A public policy perspective*, Barton ACT: Australian Public Service Commission.) suggests that wicked problems have multiple causalities and internal interdependences which necessitate a range of coordinated and interrelated responses. Briggs (2007 Briggs, L. 2007. *Tackling wicked problems: A public policy perspective*, Barton ACT: Australian Public Service Commission.) extends this description of the complex nature of wicked problems by proposing that they are not stable and may be evolving; as leading to unforeseen, possibly negative, consequences elsewhere as a result of internal interdependence; as being socially complex and as hardly ever sitting within the responsibility of one organisation.

Finally, wicked problems involve changing behaviour and may be characterised by chronic policy failure (Briggs 2007 Briggs, L. 2007. *Tackling wicked problems: A public policy perspective*, Barton ACT: Australian Public Service Commission.). However, as Briggs (2007 Briggs, L. 2007. *Tackling wicked problems: A public policy perspective*, Barton ACT: Australian Public Service Commission.) suggests, in reality policy problems may lie on a tame–wicked continuum and she illustrates this by using the example of tobacco control in Australia. Their National Tobacco Strategy utilises a range of measures such as controls on promotion, sale, taxation, warnings, cessation services, therapies and information campaigns. The broad consensus on the harm caused by tobacco use has grown over time, yet there are still aspects of tobacco control that remain wicked, such as persistently high smoking rates in indigenous people, pregnant teenagers or those with mental illness (Briggs 2007 Briggs, L. 2007. *Tackling wicked problems: A public policy perspective*, Barton ACT: Australian Public Service Commission.). These issues remain unsolved, illustrating how, as Rittel and Webber (1973 Rittel, H.W.J. and Webber, M.M. 1973. Dilemmas in a general theory of planning. *Policy Sciences*, 4: 155–69.) identify, social problems are never solved, they are simply re-solved over and over again.

Another feature of Rittel and Webber’s (1973 Rittel, H.W.J. and Webber, M.M. 1973. Dilemmas in a general theory of planning. *Policy Sciences*, 4: 155–69.) seminal work is that they focus attention on the growing influence that the differentiation of values and publics in open, interacting systems has on the increasing difficulty in resolving once tame problems. They also conclude that ‘Newtonian’ or mechanistic solutions will no longer work in a complex, pluralistic world. Indeed, Briggs (2007 Briggs, L. 2007. *Tackling wicked problems: A public policy perspective*, Barton ACT: Australian Public Service Commission.) adds that globalisation, the expansion of democracy, travel and social exchange promote further ‘dissensus’ rather than consensus, and this heterogeneity is compounded even further if virtual exchange is added into the equation.

Narrow linear perceptions of the nature of the physical sciences and by extension, the social sciences, are increasingly unhelpful. The comments of a recent UK Education Secretary exemplify the problem:

One of our prime needs is to be able to measure the size of the effect of A on B. This is genuine social science and reliable answers can only be reached if social scientists are willing to engage in this endeavour. We are not interested in worthless correlations based on small samples from which it is impossible to draw generalisable conclusions. (Blunkett 2000 Blunkett, D. 2000. Influence or

irrelevance: Can social science improve government?. *Research Intelligence*, 71: 12–21.)

What would help understanding are comments by Feyerabend (1975 Feyerabend, P. 1975. *Against method: Outline of an anarchistic theory of knowledge*, London: New Left Books.) about the nature of scientific enquiry which enable us to see commonalities with Rittel and Webber's 'wicked problems': 'Science is an essentially anarchic enterprise: theoretical anarchism is more humanitarian and more likely to encourage progress than its law-and-order alternatives' (9).

He proceeds to assert also that the only principle that does not inhibit progress is that of 'anything goes' (Feyerabend 1975 Feyerabend, P. 1975. *Against method: Outline of an anarchistic theory of knowledge*, London: New Left Books.). The scientific method simply will not work in societal systems and explains to some extent, the inadequacy of political promises based on tame solutions. In addition to the foregoing, the conundrums of wicked problems for policy makers and professionals are developed further through the lens of complexity.

Complexity

Albrecht et al. (1998 Albrecht, G., Freeman, S. and Higginbotham, N. 1998. Complexity and human health: The case for a transdisciplinary paradigm. *Culture, Medicine and Psychiatry*, 22: 55–92.) alert us to the importance of acknowledging heterogeneity when addressing wicked health problems resistant to resolution. They argue that the emergence of complexity theory in the 1970s resulted in a challenge to mechanistic models of the world by those that were dynamic and process-oriented. The failure of the homogeneous, one-size fits all, approach of health policy at the time, and arguably still, is the result of failing to recognise heterogeneity, or, in the words of Rittel and Webber (1973 Rittel, H.W.J. and Webber, M.M. 1973. Dilemmas in a general theory of planning. *Policy Sciences*, 4: 155–69.) the differentiation of values, in societal systems. Albrecht et al. (1998 Albrecht, G., Freeman, S. and Higginbotham, N. 1998. Complexity and human health: The case for a transdisciplinary paradigm. *Culture, Medicine and Psychiatry*, 22: 55–92.) acknowledge the importance of applying trans-disciplinary thinking which the complex systems philosopher, Jantsch (1972, cited in Albrecht et al. 1998 Albrecht, G., Freeman, S. and Higginbotham, N. 1998. Complexity and human health: The case for a transdisciplinary paradigm. *Culture, Medicine and Psychiatry*, 22: 55–92.) envisioned as offering insight into the unpredictability of complex problems. This element of complexity has been further developed in organisational terms through the emergence of the idea of a complex adaptive system (CAS) (Plsek and Greenhalgh 2001 Plsek, P.E. and Greenhalgh, T. 2001. Complexity science:

The challenge of complexity in health care. *BMJ*, 323(7313): 625–9.) and models of the zone of complexity (Stacey 1996 Stacey, R. 1996. *Strategic management and organisational dynamics*, London: Pitman.).

The concept of a complex adaptive system offers a good description of a school or college as: ‘a collection of individual agents with freedom to act in ways that are not always totally predictable, and whose actions are interconnected so that one agent’s actions changes the context for other agents’ (Plsek and Greenhalgh 2001 Plsek, P.E. and Greenhalgh, T. 2001. Complexity science: The challenge of complexity in health care. *BMJ*, 323(7313): 625–9. , 625ff.).

The unpredictability of complex adaptive systems is a consequence of the individual agents operating within it, according to Plsek and Greenhalgh (2001 Plsek, P.E. and Greenhalgh, T. 2001. Complexity science: The challenge of complexity in health care. *BMJ*, 323(7313): 625–9.), where one agent’s actions change the context for other agents in the system. Evolution of one system influences and is influenced by others, and agents within systems are ‘nested’. Crucially in a CAS, surprise, creativity and emergent behaviour are not the problems they are in reductionist systems. It is suggested that in CAS, creativity and emergent behaviours happen most in the zone of complexity (Stacey 1996 Stacey, R. 1996. *Strategic management and organisational dynamics*, London: Pitman. ; Lewin 1993 Lewin, R. 1993. *Complexity: Life on the edge of chaos*, London: Phoenix.) where actors and agents are located near the boundary of anarchy, far from certainty and agreement.

Figure 1 The Zone of Complexity and the edge of chaos (after Stacey 1996 Stacey, R. 1996. *Strategic management and organisational dynamics*, London: Pitman.).

The only way to know what a complex system will do is to observe it (Plsek and Greenhalgh 2001 Plsek, P.E. and Greenhalgh, T. 2001. Complexity science: The challenge of complexity in health care. *BMJ*, 323(7313): 625–9.).

Implications of ‘wickedity’¹ in the arenas of policy formulation and professional practice

Issues in developing policy

Skelcher (2000 Skelcher, C. 2000. Changing images of the state: Overloaded, hollowed-out and congested. *Public Policy and Administration*, 15: 3–19.) introduced the term ‘congested state’ to describe the situation when there is a desire by the state to deliver policies to tackle wicked problems. In England, this is exemplified by an educational policy agenda which attempts to address issues such as social exclusion, perceived pupil under-achievement, urban

deprivation, teenage pregnancy, violence in schools, levels of literacy and numeracy to name a but a few. All represent problems that match Brigg's characteristics of the 'wicked', and the introduction of an over-arching policy *Every Child Matters* (Department for Education and Skills 2003 Department for Education and Skills. 2003. *Excellence and enjoyment*, London: DfES.) by the UK government in 2003 marked the recognition that these cannot be resolved by one agency alone. The tame approach, such as that in a unitary organisation (like an army) with a clear hierarchical chain of command, is not workable if there is more than one organisation each with its own agenda. Hood (1976 Hood, C. 1976. *The limits of administration*, London: John Wiley & Sons. , 17) described this as a way to achieve sub-optimisation that is to 'render the total administrative effect ineffective or counter-productive'.

Exworthy and Powell (2004 Exworthy, M. and Powell, M. 2004. Big windows and little windows: Implementation in the congested state. *Public Administration*, 82(2): 263–81.) therefore propose a three-stream policy model, that of policy, process and resources, and illustrate that interplay between these strands is crucial if a policy is to be implemented successfully. The policy stream represents the goal or objective, the process stream, the feasibility, and the resource stream represents the financial, and human, resource implications. There is a clear parallel here with the polarity described by Conklin (2006 Conklin, J. 2006. *Dialogue mapping: Building shared understanding of wicked problems*, Chichester: John Wiley & Sons.) between 'what is needed and what can be done' in the field of design.

Nevertheless, Exworthy and Powell (2004 Exworthy, M. and Powell, M. 2004. Big windows and little windows: Implementation in the congested state. *Public Administration*, 82(2): 263–81.) suggest that when there is confluence between these three streams, then implementation of the policy is more likely to be successful. However, in addition to confluence, there are some key contributors to the success of the policy at each stage. As Exworthy and Powell (2004 Exworthy, M. and Powell, M. 2004. Big windows and little windows: Implementation in the congested state. *Public Administration*, 82(2): 263–81.) identify, ownership of the policy problem is critical to success in the process stream. Stakeholders must believe that it is their problem, but, perhaps more significantly, they must believe that they can contribute to its resolution through what Conklin (2006 Conklin, J. 2006. *Dialogue mapping: Building shared understanding of wicked problems*, Chichester: John Wiley & Sons.) identifies as their conversation with the process. However, it must be questioned whether true ownership and belief can be achieved in a state that, whilst it formulates policy to address wicked problems, adheres to tame solutions, such as that of the target culture in both education and health, and which attributes blame to, rather than confidence in, the stakeholders (Bore 2006 Bore, A. 2006.

Creativity, continuity and context in teacher education: Lessons from the field. *Australian Journal of Environmental Education*, 22(1): 31–9.). Leadership in education is a further example of a wicked problem for which many illegitimate or ‘bastard’ (Wright 2001 Wright, N. 2001. Leadership, ‘bastard leadership’ and managerialism: Confronting twin paradoxes in the Blair education project. *Educational Management and Administration*, 29(3): 275–90. , 2003 Wright, N. 2003. Principled ‘bastard leadership’: A rejoinder to Gold, Evans, Earley, Halpin and Collarbone. *Educational Management and Administration*, 31(2): 137–41.) tame solutions have been proffered.

Wicked issues: what might we do? A new synthesis

Exworthy and Powell (2004 Exworthy, M. and Powell, M. 2004. Big windows and little windows: Implementation in the congested state. *Public Administration*, 82(2): 263–81.) argue that it takes more than just confluence of the three streams if a policy requiring more than one agency is to be successful. They propose that joined-up government at the centre *and* at the periphery permits a move away from a silo mentality in partners expected to collaborate. There has been a developing literature on inter-sectoral collaboration reflected in *Every Child Matters*, where the difficulties associated with expecting separate communities of practice to understand each other’s perspectives fully has been highlighted (Anning 2001 Anning, A. . Knowing who I am and what I know: Developing new versions of professional knowledge in integrated service settings. Paper presented to the British Education Research Association Annual Conference. September 13–15, Leeds. University of Leeds. www.eduonline.co.uk; Glaseby and Lester 2004 Glaseby, J. and Lester, H. 2004. Cases for change in mental health: Partnership working in mental health services. *Journal of Interprofessional Care*, 18(1): 7–16. ; Frost et al. 2005 Frost, N., Robinson, M. and Anning, A. 2005. Social workers in multidisciplinary teams: Issues and dilemmas for professional practice. *Child and Family Social Work*, 10(3): 187–96. ; Robinson and Cottrell 2005 Robinson, M. and Cottrell, D. 2005. Health professionals in multi-disciplinary and multi-agency teams: Changing professional practice. *Journal of Interprofessional Care*, 19(6): 547–60.).

In drawing together arguments from the literature on complexity, wicked problems, and the implementation of policy to address them, it becomes clear why wicked issues, such as pupil achievement in socially deprived communities, are resistant to tame policy initiatives such as target setting. Through a trans-disciplinary perspective utilised by Albrecht et al. (1998 Albrecht, G., Freeman, S. and Higginbotham, N. 1998. Complexity and human health: The case for a transdisciplinary paradigm. *Culture, Medicine and Psychiatry*, 22: 55–92.) it becomes clear that each community will have its own

unique set of social attractors causing and perpetuating behaviours. The many sets of social attractors are a consequence of plurality and heterogeneity resulting in the differentiation of values noted by Rittel and Webber (1973 Rittel, H.W.J. and Webber, M.M. 1973. Dilemmas in a general theory of planning. *Policy Sciences*, 4: 155–69.), by Feyerabend (1975 Feyerabend, P. 1975. *Against method: Outline of an anarchistic theory of knowledge*, London: New Left Books.) and by Ragin (2000 Ragin, C.C. 2000. *Fuzzy-set social science*, Chicago: University of Chicago Press.). Furthermore, these values will be constantly evolving as new values are integrated or re-integrated into communities as a result of the social complexity of the contemporary world. Wicked problems according to Briggs (2007 Briggs, L. 2007. *Tackling wicked problems: A public policy perspective*, Barton ACT: Australian Public Service Commission.) need inter-related, trans-organisational responses as a consequence of their multi-causality, and internal interdependence. Whilst Exworthy and Powell (2004 Exworthy, M. and Powell, M. 2004. Big windows and little windows: Implementation in the congested state. *Public Administration*, 82(2): 263–81.) propose that the big and little windows of policy implementation must be congruent for a policy to work it is suggested here that a new window, that of joined up disciplines or professionals should be added to their horizontal dimension to address wicked problems (see Figure 2).

Figure 2 Extending the big and little windows of policy implementation model, adapted from Exworthy and Powell (2004 Exworthy, M. and Powell, M. 2004. Big windows and little windows: Implementation in the congested state. *Public Administration*, 82(2): 263–81.).

From a policy formation perspective, it is important to recognise that wicked issues are context dependent and it is suggested here that they need to be viewed through the lens of knowledge of that context. This contextual knowledge can only be gained by using trans-disciplinary approaches which incorporate not only disciplinary observations, and the practice perspectives of the professionals involved, but also the actors at the social or community level. Every stakeholder/beholder has to be involved. Consequently, it is vital for those who formulate policy to recognise that there may be no one-size fits all solution. What can be done in one context may not be possible in another. The failure of some school ‘superheads’ (sometimes also described as executive heads, whereby a successful headteacher has been ‘parachuted’ into a failing school with the axiomatic implication that they will be able to effect rescue) is a good example of this. It is essential also to recognise that wicked problems may not be solved but that utilising this approach is a way of *re-solving* recurrent wicked issues.

The view from the local, context specific might be represented by the model shown in Figure 3, where D represents members of a particular discipline and P represents a profession. Using education as an example in the case of a school facing challenging circumstances where literacy and numeracy levels fall below current government targets for what is considered average or desirable for access to the curriculum D might represent historians, psychologists, health promoters, sociologists, geographers who can all interpret the local environment, P might represent teachers, health visitors, educational psychologists, social workers, special educational needs specialists, who are familiar with the children in that school and S represents the other stakeholders in the wicked problem such as parents, grandparents, community actors and local government agents.

Figure 3 The context-by-context view through the inter-professional policy window.

In this section we have argued for an approach to policy formation which takes greater account of the local and contextual dimensions. Dealing with wicked problems is not solely an issue for policy makers but such problems need to be understood by professionals at the ‘sharp end’, in schools, children’s centres and other locations of ‘service provision’. Some of the implications for professionals in dealing with wicked problems are considered below.

Trans-disciplinary views

Pre-service and in-service professional preparation in education have for many years been provided within discrete service areas, in relatively closed academic frameworks and within a context of ‘reflective practice’. In this section we explore considerations about trans-disciplinary working and some limitations of ‘reflective practice’ for professionals dealing with ‘wicked issues’.

A silo mentality can exist not only at departmental level, as illustrated by Exworthy and Powell (2004 Exworthy, M. and Powell, M. 2004. Big windows and little windows: Implementation in the congested state. *Public Administration*, 82(2): 263–81.), but it actually forms part of the development of academic and professional identity at individual practitioner level (Bernstein 1971 Bernstein, B. 1971. “On the classification and framing of educational knowledge”. In *Knowledge and control: New directions for the sociology of education*, Edited by: Young, M.F.D. 47–69. London: Collier Macmillan. ; Anning 2001 Anning, A. . Knowing who I am and what I know: Developing new versions of professional knowledge in integrated service settings. Paper presented to the British Education Research Association Annual Conference. September 13–15, Leeds. University of Leeds. www.eduonline.co.uk) which

renders roaming across disciplines or between professional areas virtually impossible. Within the silo mentality model, academic boundaries are reinforced by epistemologies and professional boundaries by technical language and practice; the focus is upon the discipline or profession, not the problems with which it has to deal. Indeed Delaney et al. (1998) suggest that for inter-sectoral coordination of activity to occur successfully, reticulist skills (as defined above) and knowledge are essential in order to boundary-cross. 'Trans-disciplinary' approaches mean that boundaries have to be crossed if the skills and knowledge are to be developed so that the focus is on the complexity and wickedness of the problems under consideration. Trans-disciplinary approaches observe social problems from the pluralist perspectives of several disciplines and so the coordination of activities at all levels when addressing a problem is crucial. Significantly, Albrecht et al. (1998 Albrecht, G., Freeman, S. and Higginbotham, N. 1998. Complexity and human health: The case for a transdisciplinary paradigm. *Culture, Medicine and Psychiatry*, 22: 55–92.) argue that exploring the complex causal connections in health problems resistant to more homogenous solutions will result in more culturally sensitive and effective solutions.

Trans-disciplinary thinking involves the acceptance of pluralism and its exponents (Albrecht 1990, cited in Albrecht et al. 1998 Albrecht, G., Freeman, S. and Higginbotham, N. 1998. Complexity and human health: The case for a transdisciplinary paradigm. *Culture, Medicine and Psychiatry*, 22: 55–92. ; Rosenfield 1992 Rosenfield, P. 1992. The potential of trans-disciplinary research for sustaining and extending linkages between the health and social sciences. *Social Science and Medicine*, 35: 1343–57.) create a meta-theory that weaves multiple ways of knowing, into a coherent whole, where differences in approach are complementary rather than contradictory (Albrecht et al. 1998 Albrecht, G., Freeman, S. and Higginbotham, N. 1998. Complexity and human health: The case for a transdisciplinary paradigm. *Culture, Medicine and Psychiatry*, 22: 55–92.). Furthermore, they suggest that one particular aspect of complexity, that of chaos theory, can illustrate how disorder can be vital in the creation of order in many dynamic systems. Complex systems can form patterns around attractors which then follow predictable patterns of development and Albrecht et al. (1998 Albrecht, G., Freeman, S. and Higginbotham, N. 1998. Complexity and human health: The case for a transdisciplinary paradigm. *Culture, Medicine and Psychiatry*, 22: 55–92.) extend this explanation of the emergence of patterns in the natural world to the social world. By utilising a trans-disciplinary approach to investigate the resistance of Australian coalfield workers to health messages about heart disease, they exposed the social attractors creating an anti-authoritarian worldview that was resistant to traditional health promotion strategies. In the words of Rittel and Webber (1973 Rittel, H.W.J. and Webber, M.M. 1973. Dilemmas in a general theory of

planning. *Policy Sciences*, 4: 155–69.), a surprise solution was found which defined the problem.

Reflective practice

Working in the spheres of architecture, design and music Schön adumbrated the principles of ‘reflective practice’. He categorised problems as inhabiting two distinct arenas, the ‘high ground’ of ‘manageable problems [solved] through the application of research-based theory and technique. [And] the swampy lowland [of] messy confusing problems [which] defy technical solution’ (Schön 1987 Schön, D. 1987. *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions*, San Francisco: Jossey-Bass Publishers. , 3).

For the professional he identified two sources of a dilemma ‘first, the prevailing idea of rigorous professional knowledge, based on technical rationality, and second, awareness of indeterminate, swampy zones of practice that lie beyond its canons’ (Schön 1987 Schön, D. 1987. *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions*, San Francisco: Jossey-Bass Publishers. , 3).

Technical rationality in his view is an ‘epistemology of practice derived from positivist philosophy... [and here] practitioners are instrumental problem-solvers’ (Schön 1987 Schön, D. 1987. *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions*, San Francisco: Jossey-Bass Publishers. , 3).

The difficulty with Schön’s epistemology is well documented by Gilroy (1993 Gilroy, P. 1993. “Reflections on Schön: An epistemological critique and a practical alternative”. In *International analyses of teacher education*, Edited by: Gilroy, P. and Smith, M. 125–42. London: Carfax.) and Newman (1999 Newman, S. 1999. Constructing and critiquing reflective practice. *Educational Action Research*, 7(1): 145–61.). It is interesting to note that Schön makes no reference to Rittel and Webber’s work and suggests that whilst there are ‘high grounds’ of manageable problems it is in the ‘swampy lowlands’ where the problems approach something which could be likened to ‘wicked’. What seems to be lacking is a view that some of the problems of the ‘high ground’ are also ‘wicked’.

By contrast, the problem setting aspect from the swampy lowlands is an ontological process. These views are consistent with those of Rittel and Webber, yet in education problems have for so long been considered as being in need of technical rational solutions and devoid of the ontological perspective required in the process of problem definition. In the field of design, creativity

and novel solutions are valued and wicked problems are addressed by a conversation with the process. Conklin (2006 Conklin, J. 2006. *Dialogue mapping: Building shared understanding of wicked problems*, Chichester: John Wiley & Sons.) uses this term to illustrate how social complexity is a force for fragmentation which requires new understandings attuned to the social and conversational nature of addressing wicked problems. Problem wickedness is misunderstood if the tools to solve tame problems are used (Conklin 2006 Conklin, J. 2006. *Dialogue mapping: Building shared understanding of wicked problems*, Chichester: John Wiley & Sons.). Experienced designers create many possible solutions using unpredictable leaps, so the pattern of problem solving resembles a seismograph, with many explorations, many trials and many errors, rather than a linear waterfall. As Conklin (2006 Conklin, J. 2006. *Dialogue mapping: Building shared understanding of wicked problems*, Chichester: John Wiley & Sons.) observes, this wandering pattern is not a mark of stupidity, but an intelligent and creative learning process.

Conklin (2006 Conklin, J. 2006. *Dialogue mapping: Building shared understanding of wicked problems*, Chichester: John Wiley & Sons.) indicates that attempting to tame 'wicked' problems, although appealing, is doomed to failure in the long run. The problem reappears, possibly in a different form or even exacerbated by the tame solution. Tame policy solutions to address wicked problems are doomed to failure. So, the paradox is that other disciplines (design, architecture) which have recognised wicked problems are seeing an aspect of reflective practice as an appropriate approach. Yet in education lip-service has often been paid to reflective practice without really acknowledging the complexity and ontology of the underlying problems for which it is offered as providing a resolution. In education, policy streams from the centre in wave after wave of initiative with scant regard for any local tectonic activity (Bore 2006 Bore, A. 2006. Creativity, continuity and context in teacher education: Lessons from the field. *Australian Journal of Environmental Education*, 22(1): 31–9.).

However, it is recognised that this argument will not sit comfortably with those for whom accountability is of paramount importance. In the public arena those for whom electability is a key issue need the promise of quick resolutions offered, albeit erroneously, by tame policy solutions. Notwithstanding any shortcomings in implementation, the value of an overarching policy objective such as those of *Every Child Matters* (2003) cannot, and should not, be underestimated. We simply argue here for value to be placed on multiple, local, contextual activities.

The UK government's recent initiative to make teaching into a masters level profession provides an opportunity to develop professionals who are educated

and equipped to work in social and educational contexts where many of the meso and micro problems are wicked. In the light of our analysis and arguments, a key element of the new programme for masters level teaching should surely reflect a move away from 'competence', a concept the limitations of which have dogged initial training (Bottery and Wright 2000 Bottery, M. and Wright, N. 2000. *Teachers and the state: Towards a directed profession*, London: Routledge.), to one of capability. In Figure 4 below, Stacey 1996 Stacey, R. 1996. *Strategic management and organisational dynamics*, London: Pitman. develops a model reflecting aspects of decision-making in a complex environment.

Figure 4 Relationship between change context and decision making/control modes (Stacey 1996 Stacey, R. 1996. *Strategic management and organisational dynamics*, London: Pitman. , 47).

We have taken this a stage further to suggest that what will be needed for a masters level teaching profession is greater *capability*. This is intended to reflect higher levels of expertise as suggested in the model proposed by Dreyfus and Dreyfus (1986 Dreyfus, H. and Dreyfus, S. 1986. *Mind over machine: The power of human intuition and expertise in the era of the computer*, New York: Free Press.) where competence, in their view, was merely the stage at professional entry level; the candidate having moved beyond 'novice' and 'advanced beginner'. Capability in our view can be located in the following model as outlined in Figure 5.

Figure 5 From competence to capability.

Education for capability will necessitate an understanding of the complexities of inter-agency working, the features of problems which should be identified as wicked, trans-disciplinary perspectives, and reticulist skills and knowledge. A teaching profession educated for capability in this manner will be far better enabled to deal with the challenges of schooling in the twenty-first century where change is one certainty and greater reflection of local contextual factors (freedom) will be another. In this way the education of teachers can be one of genuinely masters level in accordance with the QAA benchmark which states that holders of a masters degree should:

- Deal with complex issues both systematically and creatively, make sound judgements in the absence of complete data, and communicate their conclusions clearly to specialist and non-specialist audiences.

- Demonstrate self-direction and originality in tackling and solving problems, and act autonomously in planning and implementing tasks at a professional or equivalent level.
- Continue to advance their knowledge and understanding, and to develop new skills to a high level.

And particularly we note the skills necessary for:

- Decision-making in complex and unpredictable situations. (QAA 2008 QAA. 2008. *The framework for Higher Education qualifications in England Wales and Northern Ireland* www.qaa.ac.uk/academicinfrastructure/FHEQ/EWN108/default.asp, 5)

Conclusion

In the field of education the bottom professional window (see Figure 3) requires that value is placed on reticulist, trans-disciplinary and social dialogue as well as on the conversations with the problem which Conklin (2006 Conklin, J. 2006. *Dialogue mapping: Building shared understanding of wicked problems*, Chichester: John Wiley & Sons.) asserts is so valued in design. As Blackman et al. (2006 Blackman, T., Elliott, E., Greene, A., Harrington, B., Hunter, D.J., Marks, L., McKee, L. and Williams, G. 2006. Performance assessment and wicked problems: The case of health inequalities. *Public Policy and Administration*, 21(2): 66–80.) indicate when waiting list targets were set, the result was dysfunctionality and game playing and they warn that this may extend to the health inequalities agenda. Those in education face the same dilemma. The target and test culture endemic in education parallels that of waiting list targets in the health service. However, the contextual lens approach proposed here is a way of giving purpose to professional activity and will result in ownership of the problem, a key feature of success in the process stream window according to Exworthy and Powell (2004 Exworthy, M. and Powell, M. 2004. Big windows and little windows: Implementation in the congested state. *Public Administration*, 82(2): 263–81.). The context specific lens does not mean that the central purpose or value of a policy objective is undermined, it simply means that the views of the problem from the bottom window might be multiple like that of a compound eye. Information from each lens can still be integrated into the central thrust of the policy, but there will be multiple interpretations and, it is also a view that is changing constantly. It is one that acknowledges pluralism, and accepts the fact that there are no right or wrong answers as Rittel and Webber (1973 Rittel, H.W.J. and Webber, M.M. 1973. Dilemmas in a general theory of planning. *Policy Sciences*, 4: 155–69.) identify, just those which are better or worse.

Only by re-solving the problem repeatedly, in each context, might we begin to gain, and re-gain repeatedly, an understanding of wicked problems in the social domain and an avoidance of the stresses and misery occasioned by inappropriately providing tame solutions to wicked problems. In conclusion, our purpose in this paper has been to outline a new and challenging theoretical framework through which we intend to explore further a wide range of educational problems (leadership, health education, sustainability, curriculum, pedagogy and assessment), relevant to the professional development and education of teachers. By developing capability through refining and sharpening our epistemology in this way, we may more hopefully develop ontologies of more legitimate solutions.

Notes

1. In order to avoid the moral and theological connotations of the term 'wickedness', we have coined the term 'wickedity' to encapsulate the ideas behind a 'wicked problem'.

References

- Albrecht, G., Freeman, S. and Higginbotham, N. 1998. Complexity and human health: The case for a transdisciplinary paradigm. *Culture, Medicine and Psychiatry*, 22: 55–92.
- Anning, A. . Knowing who I am and what I know: Developing new versions of professional knowledge in integrated service settings. Paper presented to the British Education Research Association Annual Conference. September 13–15, Leeds. University of Leeds. www.eduonline.co.uk
- Bernstein, B. 1971. “On the classification and framing of educational knowledge”. In *Knowledge and control: New directions for the sociology of education*, Edited by: Young, M.F.D. 47–69. London: Collier Macmillan.
- Blackman, T., Elliott, E., Greene, A., Harrington, B., Hunter, D.J., Marks, L., McKee, L. and Williams, G. 2006. Performance assessment and wicked problems: The case of health inequalities. *Public Policy and Administration*, 21(2): 66–80.
- Blunkett, D. 2000. Influence or irrelevance: Can social science improve government?. *Research Intelligence*, 71: 12–21.
- Bore, A. 2006. Creativity, continuity and context in teacher education: Lessons from the field. *Australian Journal of Environmental Education*, 22(1): 31–9.
- Bottery, M. and Wright, N. 1996. Co-operating in their own deprofessionalisation? On the public and ecological roles of the teaching profession. *British Journal of Educational Studies*, 44(1): 82–98. Taylor & Francis
- Bottery, M. and Wright, N. 2000. *Teachers and the state: Towards a directed profession*, London: Routledge.
- Briggs, L. 2007. *Tackling wicked problems: A public policy perspective*, Barton ACT: Australian Public Service Commission.
- Bullock, A. 1975. *A language for life*, London: HMSO.
- Butterfield, H. 1931. *The Whig interpretation of history*, London: Bell.
- Clarke, M. and Stewart, J. 2000. “Handling the wicked issues”. In *Changing practice in health and social care*, Edited by: Davies, C., Finlay, F. and Bullman, C. 377–86. London: Sage.

- Cockcroft, W. 1982. *Mathematics counts*, London: HMSO.
- Conklin, J. 2006. *Dialogue mapping: Building shared understanding of wicked problems*, Chichester: John Wiley & Sons.
- Coyne, R. 2005. Wicked problems revisited. *Design Studies*, 26: 5–17.
- Curtis, P. 2003. Teachers put off by initiative overload. *The Guardian*
- DCSF. 2008a. New masters qualification to boost teaching Press notice 2008/0044
- DCSF. 2008b. *Being the best for our children: Releasing talent for teaching and learning*, London: DCSF.
- Delaney, F. 1993. *Making connections: Intersectoral collaboration and health*, Leeds: LMU.
- Department for Education and Employment, and Qualifications and Curriculum Authority. 1999. *National curriculum for England: Science*, London: DfEE and QCA.
- Department for Education and Skills. 2003. *Every child matters. Green Paper*, London: The Stationery Office.
- Department for Education and Skills. 2003. *Excellence and enjoyment*, London: DfES.
- Dreyfus, H. and Dreyfus, S. 1986. *Mind over machine: The power of human intuition and expertise in the era of the computer*, New York: Free Press.
- Exworthy, M. and Powell, M. 2004. Big windows and little windows: Implementation in the congested state. *Public Administration*, 82(2): 263–81.
- Feyerabend, P. 1975. *Against method: Outline of an anarchistic theory of knowledge*, London: New Left Books.
- Frost, N., Robinson, M. and Anning, A. 2005. Social workers in multidisciplinary teams: Issues and dilemmas for professional practice. *Child and Family Social Work*, 10(3): 187–96.
- Gilroy, P. 1993. “Reflections on Schön: An epistemological critique and a practical alternative”. In *International analyses of teacher education*, Edited by: Gilroy, P. and Smith, M. 125–42. London: Carfax.
- Glaseby, J. and Lester, H. 2004. Cases for change in mental health: Partnership working in mental health services. *Journal of Interprofessional Care*, 18(1): 7–16.

- Hood, C. 1976. *The limits of administration*, London: John Wiley & Sons.
- Kuhn, T.S. 1970. *The structure of scientific revolutions*, Chicago: University of Chicago Press.
- Lewin, R. 1993. *Complexity: Life on the edge of chaos*, London: Phoenix.
- Lipsky, M. 1980. *Street-level bureaucracy: The dilemmas of the individual in public services*, New York: Russell Sage Foundation.
- Miles, M.B. and Huberman, A.M. 1994. *An expanded sourcebook: Qualitative data analysis*, Thousand Oaks, CA: Sage.
- Newman, S. 1999. Constructing and critiquing reflective practice. *Educational Action Research*, 7(1): 145–61. Taylor & Francis.
- Ofsted. 2006. *Creative partnerships: Initiative and impact* (ref no HMI 2517), London: Ofsted.
- Plsek, P.E. and Greenhalgh, T. 2001. Complexity science: The challenge of complexity in health care. *BMJ*, 323(7313): 625–9.
- QAA. 2008. *The framework for Higher Education qualifications in England Wales and Northern Ireland*
www.qaa.ac.uk/academicinfrastructure/FHEQ/EWN108/default.asp
- QCA. 2003. *Creativity: Find it! Promote it!*, London: QCA/DfEE.
- Ragin, C.C. 2000. *Fuzzy-set social science*, Chicago: University of Chicago Press.
- Rittel, H.W.J. and Webber, M.M. 1973. Dilemmas in a general theory of planning. *Policy Sciences*, 4: 155–69.
- Robinson, M. and Cottrell, D. 2005. Health professionals in multi-disciplinary and multi-agency teams: Changing professional practice. *Journal of Interprofessional Care*, 19(6): 547–60. Taylor & Francis
- Rosenfield, P. 1992. The potential of trans-disciplinary research for sustaining and extending linkages between the health and social sciences. *Social Science and Medicine*, 35: 1343–57.
- Schön, D. 1987. *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions*, San Francisco: Jossey-Bass Publishers.
- Skelcher, C. 2000. Changing images of the state: Overloaded, hollowed-out and congested. *Public Policy and Administration*, 15: 3–19.

Stacey, R. 1996. *Strategic management and organisational dynamics*, London: Pitman.

Wright, N. 2001. Leadership, 'bastard leadership' and managerialism: Confronting twin paradoxes in the Blair education project. *Educational Management and Administration*, 29(3): 275–90.

Wright, N. 2003. Principled 'bastard leadership': A rejoinder to Gold, Evans, Earley, Halpin and Collarbone. *Educational Management and Administration*, 31(2): 137–41.

Young, M.F.D. 1971. *Knowledge and control: New directions for the sociology of education*, London: Collier Macmillan.