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IS MATHEMATICS EDUCATION A PRACTICE? MATHEMATICS TEACHING?

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Practice is a rich and complex notion whose nuances remain elusive for many practitioners, researchers, policy-makers and administrators. As this paper shows, the question of whether teaching is a practice is contested. The theoretical density of practice is frequently underestimated by researchers who too frequently view it from narrow and limited perspectives. The paper presents a framework that aims to illuminate the richness of practice in particular cases and in research on practice. It is also argued that the practice of education is corrupted and impoverished when education is viewed in mechanical and instrumental terms, as has happened in recent years as states have acted to administer, regulate and assess teaching more closely.

In 2002, the *Journal of Philosophy of Education* initiated a debate about whether teaching is a practice. The source of the debate was this statement from Alasdair MacIntyre (MacIntyre and Dunne, 2002) the philosopher whose work on practice has been central for many in education and other fields:

... teaching itself is not a practice, but a set of skills and habits put to the service of a variety of practices. The teacher should think of her or himself as a mathematician, a reader of poetry, an historian or whatever, engaged in communicating craft and knowledge to apprentices. It follows that you cannot train teachers well, until they have been educated into whatever discipline it is they are to transmit... (p. 5)

In the dialogue with MacIntyre reported in the article, Joseph Dunne responds to this challenge by showing how teaching appears to involve a number of features central to MacIntyre's conception of practice, first elaborated in his (1982) *After Virtue* — quoting MacIntyre against MacIntyre (pp. 7–8) to argue that teaching

- is 'a complex form of socially established cooperative human activity',
- has its own 'standards of excellence', and through teaching 'human powers to achieve excellence are systematically extended',
- has characteristic 'internal goods' (realised in students' learning and development) which are in tension with 'external goods' (like money, power, status, which accrue both to teachers and those they teach),
- that "teaching is 'the good of a certain kind of life'" (p.7), which is to say that it is a principal good in the life of a teacher when that life is understood as a whole,
- that teaching, like other practices, has a history of its own furnishing it with "a wider tradition of exemplary figures and indeed of fundamental debate, with its proper ends being defined and redefined in canonical writings" (p. 8) and that
- "the dialectic between 'practice' and 'institution' seems to be faithfully reflected in the case of teaching and the school" in which "'the ideals and creativity' as well as the 'cooperative care for common goods' of teaching are always

'vulnerable to the competitiveness of the institution' of school and its 'corrupting power'" (p. 8).

To this, MacIntyre responds

It's not clear to me how far we disagree. You say that teaching is itself a practice. I say that teachers are involved in a variety of practices and that teaching is an ingredient in every practice. And perhaps the two claims amount to very much the same thing; but perhaps not. For it is part of my claim that teaching is never more than a means, that it has no point and purpose except for the point and purpose of the activities to which it introduces students. All teaching is for the sake of something else and so teaching does not have its own goods. The life of a teacher is therefore not a specific kind of life. The life of a teacher of mathematics, whose goods are the goods of mathematics, is one thing; the life of the teacher of music whose goods are the goods of music is another (p. 9).

So: on MacIntyre's view, it appears that mathematics teaching, for example, is not worthwhile in and of itself, but only as a means to the practice of mathematics which is worthwhile in and of itself.

Now this is not just a matter of status — in the sense of the relative worth or reputational standing of mathematics (or other practices like medicine or law or chess or farming) and teaching. What hangs on this is whether teaching is the kind of activity which, among other things, deserves to be taught in universities, whether it is or has its own distinctive disciplinary knowledge, for example. Early in their dialogue, Dunne had put this proposition to MacIntyre:

... you have developed the notions of a 'practice', the 'narrative unity of a life' and 'tradition' as together providing the conceptual matrix for a reconstruction of 'virtue'. I'm wondering whether you would see these three ideas as *also* offering resources for a fruitful reconceptualisation of education (p. 3).

And now it appears that MacIntyre has ruled out teaching being a practice, so the conceptual matrix seems unlikely to provide a platform for building a new conceptualisation of education.

In the dialogue that follows, it seems to me that not enough is made of the conceptual differences between 'teaching' and 'education' and 'schooling'. Had these distinctions been made, perhaps other conclusions might have been drawn by the protagonists.

A year or so after the publication of the MacIntyre-Dunne dialogue, in a special issue of the *Journal of Philosophy of Education* edited by Joseph Dunne and Pádraig Hogan (37(2), 2003), several commentators on and respondents to the dialogue nudged the argument a few steps further. Nel Noddings, for example, who initially felt that not much was to be gained through debating the terms, came to the conclusion that teaching is a practice of a special kind which she called a 'relational practice'. Like others, she also believes that it is important to the standing of teaching as a profession that its work be describable as a practice. David Carr takes issue with MacIntyre's conceptions of practice and (especially) virtue from the "more mainstream Aristotelian virtue-ethics concepts of moral character and agency" (p. 253). He proceeds to show that teaching does indeed involve moral character and

agency, and that it cannot be reduced to technical-managerial expertise. He also distinguishes more carefully between 'education' and 'schooling' (as the institutionalised form of education), to make a strong case that many (perhaps all) people — like parents — teach even if they are not teachers by profession or occupation.

To my mind, more might have been gained by distinguishing more clearly between 'education' and 'teaching'. MacIntyre's argument that *teaching* (especially if in the even more limited sense of 'instruction') is a means to the end of some other practice seems good to me — indeed we *do* teach things in the interests of having our students be able to do or be the things we teach (e.g., to program a computer or to be morally responsible for their actions). But it seems to me that the same cannot be said about *education*. Properly understood, teaching is one among a number of means to education — the education of the learner, or even more, 'the educated person'. Something more is meant by the education of learners than simply that they have learned this or that which we either taught or did not teach them. We may say of Sally "I taught her quadratic equations", but not "I educated her quadratic equations" or even "I educated her in quadratic equations". Because, to the extent it could be true, one might only say (immodestly and wrongly) "I educated *Sally*". The nub of it is this: the point of Sally's education is, on the one hand, *her self-development as a person and her learned capacity to continue her self-development*, and, on the other, *the development of the society and world in which she lives through her educated, civil and capable participation in it*.

These two interrelated aims — contributing to the self-development of learners as persons and contributing to the development of the good society through the participation of educated persons — are the distinctive aims of education, associated with distinctive goods — the notions of the good person and of the good society. Though other people, practitioners and professionals might value these aims and goods or contribute to them in the conduct of their own distinctive work, no other practice or profession has, as its central aim and good the double task of contributing to the self-development of learners as persons and to the development of the good society through the participation of educated persons. This double aim seems to me to parallel what is distinctive about farming which MacIntyre rightly regards as a profession — in my view, it is parallel with the interrelated aims and goods of farming in contributing to the sustenance of people and the sustenance (sustainability) of the land being farmed. Such a view also shows affinities with the character of other practices like medicine which concerns itself with people's health through action against ill-health (as against their self-development in the case of education), or the practice of nursing which concerns itself with providing care in the interests of the well-being of those cared for.

On this view, *teachers*, insofar as they regard themselves as *educators*, may indeed live a distinctive kind of life — one committed to the service of those ends and goods, and against which they may offer themselves to be judged. In other contexts, I have remarked on my lack of success as an educator, since, through my

work in teacher education and research on education I have not apparently 'produced' a sufficient number of teachers/educators committed to these goods through whose work better persons and a better society might thrive. Indeed, it seems to me, there is much to bewail about our contemporary society, and I would agree with MacIntyre about many aspects of his diagnosis of what our society has become in the absence of a more educated public, to the extent that the notion of an educated public remains viable in our contemporary, compartmentalised, fragmented and fractious world — a world in which technical, functionalist and managerial reason everywhere ignores and attempts to displace moral and practical reasoning, and to empty politics of its moral content in favour of policies that can be 'sold' as slogans to a harried, disbelieving, and often cynical public that seems no longer to expect governments to be legitimate or act legitimately. In short, one of the yardsticks by which I measure the *technical* success of my work as an educator is whether or not I appear to have contributed to the 'production' of more educated persons and a better, more civil society, but this is overridden by the *moral* imperative which gives my work meaning and significance to me as an educator. I may take a little comfort in the thought that things might be even worse without my efforts and those of others committed to these educational aims and goods, but my moral task as a teacher seems to me to have been badly disfigured — not so much by other teachers or educators who hold other views, but by governments and state agencies which have acted contrary to these profound goods that give my life meaning as a "certain kind of life", as MacIntyre puts it — that is, the life of an educator committed to ends and goods which are distinctive to the practice of education. Commitment to these ends and goods in turn gives rise to a distinctive conception of what counts as a virtuous life for an educator, including, for example, modelling commitment to the self-development of others and enacting civility in relationships with students, their families, colleagues and others.

An audience of mathematics educators will no doubt be interested that MacIntyre — and Dunne and Noddings and Carr — uses the example of mathematics education. MacIntyre says teaching is not distinctive as a practice because it is only a means to the practice of mathematics; the others resist this view. In my view, mathematics education is but one subspecies of the distinctive practice of education, and mathematics teaching is but one means to the distinctive and enduring ends and goods of education (namely, the self-development of learners and the societies in which they live) — something that can be attained only through the education of citizens, including education in fields and practices as important as mathematics.

As a preliminary answer the questions in the title to my paper, I thus conclude that, yes, mathematics education is a practice (in the sense that it is a subspecies of the more general practice of education), and, no, that mathematics teaching is not in itself a practice, being only one of a variety of means to (a) the distinctive ends of education (participation in the practice of education as the self-development of learners and the societies in which they live), and (b) the practice of mathematics (though only some learners will go on to participate in mathematics as a practice — they will simply use mathematics in other pursuits and practices). And, in both cases,

one other means to those ends, and to the conduct of those practices, is learning in the absence of explicit or implicit teaching (instruction or self-study of instructional texts, for example).

A MORE ENCOMPASSING VIEW OF PRACTICE

MacIntyre's view of practice is rich in implications for practice. But there are other views of practice which also offer insights and implications for the conduct and development of practices, including the practice of education. I would like to use this opportunity to elaborate on a view of practice described in a paper I presented in Umeå last year (Kemmis, 2004). In that paper, I argued that practice is not best understood in terms of 'professional practice knowledge', as, for example, in the view presented by Higgs, Titchen and Neville (2001) who suggest that professional practice knowledge can be described in terms of

- (1) propositional, theoretical or scientific knowledge – e.g., knowledge of pathology;
- (2) professional craft knowledge or knowing how to do something;
- (3) personal knowledge about oneself as a person and in relationship with others (p. 5).

Against the view that practice can best be understood from the perspective of practitioners' knowledge — that is, what is in the heads of individual practitioners — I argued that practice has a number of *extra-individual features*, and that neither practice itself nor the process of changing practice can be adequately understood without reference to these extra-individual features. I drew on a variety of theorists of practice (like MacIntyre, Bourdieu, Foucault and Habermas) to show that, beyond the individual person of the practitioner, practice is also socially-, discursively-, culturally- and historically-formed.

One reason for making this argument was to address the educators of professionals: to argue that we should not limit our teaching to instilling professional practice knowledge in the form of technical, craft and personal knowledge, but rather to insist that neophyte and developing professionals should understand how practices are constructed in the social and other dimensions just listed. If I might put it this way, understanding and changing practice requires work outside the heads of practitioners as well as inside them. I argued for opening communicative spaces — public spheres constituted for public discourse — in which both communities of practice and practitioners and their clients could thematise and explore problems and issues of practice, and the effects and longer-term consequences of particular kinds of practice.

A second reason for arguing for a more encompassing view of practice is addressed to researchers studying practice in different fields. In our chapters for the second and third editions of *The Handbook of Qualitative Research* (Kemmis & McTaggart, 2000, 2005), Robin McTaggart and I have argued that research on practice has frequently proceeded with impoverished views of practice as an object of study, and that to understand practice in a more multi-dimensional way it must be studied using multi-disciplinary, multi-method approaches which allow it to be

viewed from at least the five perspectives sketched in Figure 1, in part because they characteristically rely on the kinds of research methods and techniques sketched in Figure 2.

Focus:	<i>The individual</i>	<i>The social</i>	Both: <i>Reflexive-dialectical</i> view of individual-social relations and connections
Perspective:			
<i>Objective</i>	(1) Practice as individual behaviour, seen in terms of performances, events & effects: behaviourist and most cognitivist approaches in psychology	(2) Practice as social interaction - e.g., ritual, system-structured: structure-functionalist and social systems approaches	
<i>Subjective</i>	(3) Practice as intentional action, shaped by meaning and values: psychological <i>verstehen</i> (empathetic understanding) and most constructivist approaches	(4) Practice as socially-structured, shaped by discourses, tradition: interpretive, æsthetic-historical <i>verstehen</i> & post-structuralist approaches	
Both: <i>Reflexive-dialectical</i> view of subjective-objective relations and connections		(5) Practice as socially- and historically-constituted, and as reconstituted by human agency and social action: critical theory, critical social science	

Figure 1. Relationships between different traditions in the study of practice.

Focus:	<i>The individual</i>	<i>The social</i>	Both: <i>Reflexive-dialectical</i> view of individual-social relations and connections
Perspective:			
<i>Objective</i>	(1) <i>Practice as individual behaviour:</i> Quantitative, correlational-experimental methods. Psychometric and observational techniques, tests, interaction schedules.	(2) <i>Practice as social and systems behaviour:</i> Quantitative, correlational-experimental methods. Observational techniques, sociometrics, systems analysis, social ecology.	
<i>Subjective</i>	(3) <i>Practice as intentional action:</i> Qualitative, interpretive methods. Clinical analysis, interview, questionnaire, diaries, journals, self-report, introspection	(4) <i>Practice as socially-structured, shaped by discourses and tradition:</i> Qualitative, interpretive, historical methods. Discourse analysis, document analysis.	
Both: <i>Reflexive-dialectical</i> view of subjective-objective relations and connections		(5) <i>Practice as socially- and historically-constituted, and as reconstituted by human agency and social action:</i> Critical methods. Dialectical analysis (multiple methods).	

Figure 2. Methods and techniques characteristic of different approaches to the study of practice.

These characteristic approaches to the study of practice mean that the practice one researcher 'sees' is likely to be very different from what is 'seen' by a researcher from a different tradition. These differences betray profound disagreements about what *research* is, which in turn give rise to disagreements about what *practice* is — whether practice in general, or in the case of particular professions or occupations, or in the case of particular practitioners.

In our chapter for the second edition, we therefore argued for 'symposium research' — drawing on different disciplines and employing multiple methods — in the study of practice. I hope that some researchers studying mathematics teaching as a means to mathematics education and education in general will explore the possibility of multi-disciplinary, multi-method 'symposium research' of this kind.

In Figure 3 below, I identify a range of different features of practice all of which seem to me significant in adequately understanding a practice. I would like to claim that there are no other interesting categories to consider about practice than the ones pointed to in my summary — but no doubt I have missed aspects of practice just as important as the ones identified here, or have inadequately expressed some of the ideas intended. Repairing some such omissions, the Figure also includes aspects of practice not explicitly discussed in my Umeå paper — particularly (in column 2 of the Figure) the material-technical aspects of practice as behaviour assumed in that paper. I hope the key words listed in each cell provide sufficient pointers to the work of other thinkers and theorists of practice; clearly, there is not time or space here to provide a comprehensive justification of all of the elements included — that task would require a book.

Before I proceed to my list of key features, it might be useful as a thought-experiment if you could think of

- (1) a case of successful practice which you know well (e.g., a successful case of mathematics education practice), and
- (2) an example of an excellent research study examining practice in some field (e.g., an excellent study of mathematics education practice).

I invite you to consider (1) the extent to which my list captures what you regard as the most significant aspects of your example of successful practice, and (2) the extent to which my list of key features provides a framework for identifying presences and absences in the example of research into practice you have in mind, thus suggesting a framework for critique of particular studies of practice and identifying how other studies might complement and strengthen the research undertaken in the example you have chosen. I hope my list (1) touches on aspects of your practice that you will agree are significant — and that it does not leave out the things you believe are most significant, and (2) indicates how different research studies of practice illuminate particular aspects of practice even though they may overlook others.

These features are summarised in Figure 3 on the pages that follow.

	Extra-individual features of practice			
	(1) Individual features of practice	(2) Material-technical features	(3) Social features	(4) Cultural features
A Meaning and purpose	Practice is not just activity: it involves meaning and intention , and draws on professional practice knowledge (including technical, craft and personal knowledge)	Practice involves action and interaction in and on the world (with others and objects) to address identified needs or problems in pursuit of characteristic goals and ends	Practice involves and expresses values (value-laden), social norms (guided by moral and ethical concerns) and virtues .	Practice is always 'theoretical' – it refers to theory that informs it (of which practitioners may or may not be aware)
B Structured	Practice is always experientially-formed – it realises and is realised in the identity of the practitioner as a practitioner	Practice involves the use of learned skills and techniques (that have themselves developed and evolved over time) in structured systems of relationships between people (e.g., practitioners-clients) and people and things (e.g., practitioners-instruments)	Practice is always socially formed and socially structured – it realises and is realised in social interactions and relationships (incl. characteristic role relationships like practitioner-client, teacher-student, nurse-patient) (cf. Bourdieu's social capital)	Practice is always culturally and discursively formed and structured – it realises and is realised in language, words, ideas, specialist discourses and theories (cf. Bourdieu's cultural capital)
C Situated	Practice is always embodied – it is what particular people do, in a particular place and time – inevitably involving identity work and emotional work (e.g., as a painful consequence of caring)	Practice involves action on the material world in the material here-and-now (particular times, places, objects)	Practice realises and is realised in characteristic forms of social integration (e.g., care via nursing, education via teaching, sustenance of people and land via farming)	Practice is grounded in the agreements and debates that form the discursive histories and social relations of relevant communities of practice
D Systemic	Practices are frequently preserved, maintained and developed through the development of the professional role of the practitioner	Practices involve material and economic interactions, exchanges and transactions (e.g., role-related functions, payment for services, professional status relations) (cf. Bourdieu's economic capital)	Practices are frequently preserved, maintained, developed and regulated in institutions and organisations , and the cooperative work of professions	Practices are frequently subject to accreditation and regulation through law and policy and professional standards and guidelines
E Temporally-located	Practice is always dramaturgical in character – it unfolds in human and social action, against the narrative background of individuals' lives (biographies)	Practice occurs in/over time , through processes (transformation of raw materials into end products via labour), against a technical background of education, training and development	Practice is always historically formed and structured – it is always the product of a local history (in this situation, among these people) and history in the wider sense	Practice is always culturally-located against backgrounds of symbolic and discursive tradition characteristic of particular groups, societies and histories

		Extra-individual features of practice		
		(3) Social features	(4) Cultural features	
		(1) Individual features of practice	(2) Material-technical features	
F Forms of reasoning		Practice always involves practical reasoning , using knowledge in the face of uncertainty, and understanding that action is always a kind of exploration of what might be done (exploratory action in the face of the dialectic of the actual and the possible) – guided by a practical knowledge-constitutive interest in acting wisely and prudently in given circumstances	Practice always involves technical reasoning about the (most appropriate and efficient) use of means for given ends in particular material contexts, and functional reasoning about organisational capacities to achieve organisational goals – guided by a technical knowledge-constitutive interest in achieving particular ends using appropriate means	Practice always invites critical reasoning in which participants collaboratively explore the nature and consequences of what they do against the criteria of comprehensibility, truth (in the sense of accuracy), truthfulness (sincerity) and moral appropriateness – guided by an emancipatory knowledge-constitutive interest in identifying and overcoming incomprehensibility, irrationality, deception (including false consciousness or self-deception) and injustice (including suffering, domination and oppression)
		Practice is always reflexive , in the sense that the act of doing the practice invites practitioners to bring to mind and treat as problematic the relationship between themselves as knowing subjects, the (new) situation of their practice in the here-and-now, and their practice as <i>praxis</i> (informed committed action)	Practice is materially or strategically reflexive , in the sense that it makes transformations of the world (e.g., raw materials to end products), and in the sense that the operations and interactions involved can themselves be transformed (redesigned, re-engineered, improved)	Practice always invites communicative action (i.e., collaborative action oriented towards mutual understanding, intersubjective agreement and consensus about what to do)

Figure 3. Key features of practice.

I look forward to hearing discussion of the adequacy of my list of key features of practices, and to discovering whether the table helps to identify the features of practice observed in different kinds of research on practice.

If the list does provide a provisional framework for understanding and researching practice, it shows how rich and complex practice is, stretching out from the here-and-now of particular episodes of behaviour and action in time and physical, semantic, social and cultural space. It suggests what *lies behind* or *may lie behind* particular acts, in the minds of those participating in them. It suggests what cannot be 'seen' by research that limits its purview just to the actions seen by an observer, or in the perspectives of particular participants. It suggests a kind of illimitability of practice, for example in the dimension of history and tradition, even though it points towards a genealogy of connections between these people and acts and others long gone and far distant. And this illimitability of *practice* makes a mockery of most 'measures' of practice that observe only particular behaviours or acts.

It is possible, however, to explore at least the nearby regions of the illimitable space occupied by a practice, for example, by considering the relationship between practitioners' and clients' perspectives on practice — a topic to which I shall now turn.

PRACTITIONERS' AND CLIENTS' PERSPECTIVES ON PRACTICE

In the time that remains, I would like to invite you to consider some further questions about practice which I believe are central to understanding them as practices — namely, that they involve social interactions in which 'clients' are not merely 'objects' operated on or influenced by practitioners, but persons-in-themselves who are, to a greater or lesser degree, *knowing subjects* who are co-participants in practice. Thus, for example, learners are not merely 'objects' on which teachers 'operate', but persons-in-themselves who are co-participants in the joint activity better described as 'learning and teaching' than merely 'teaching' (which directs our attention to just one of the players in the game of learning and teaching).

To a greater or lesser degree, 'clients' of different practices — patients or students for example — are knowledgeable about the practices and know something about how they are to participate in them. Even an acute hospital patient meeting, say, an occupational therapist for the first time knows something about how to interact with this person — for example, that they are to get some kind of help through some kind of 'therapy', that the conversation between them will probably be conducted in a 'professional' manner, and that this is a service somehow linked to an institution (like a hospital) and a profession with relevant professional bodies and a distinctive specialist discourse (sometimes perceived as jargon). The acute patient meeting the occupational therapist for the first time thus begins learning how the particular 'game' of occupational therapy is played, in terms of the languages and discourses appropriate to it, the kind of activities and work processes involved, and the social relations and organisational and institutional goals, roles and rules that apply to their interactions.

I want to suggest that one might explore the client's perspective on practice using the table of key features of practice presented in Figure 3. Indeed, I would like to suggest that 'learning the game' of the practice involves the client (patient, student) in aligning their perspective on the practice with the perspective implied in the words and actions and social relationship offered by the practitioner. Sometimes practitioners must re-align their presuppositions about the conduct of their practice to connect with those of their clients, and almost assuredly clients will need to re-align their presuppositions to connect with those of the practitioner.

Without the detail of Figure 3, Figure 4 below is intended to portray the juxtaposition of practitioners' and clients' perspectives, though inadequately demonstrating that both have some ideas and experience related to all or most of the cells in the matrix.

	Extra-individual features of practice			
	(1) Individual features	(2) Material-technical	(3) Social	(4) Cultural
A Meaning & purpose				
B Structured				
C Situated				
D Systemic				
E Temporally-located				
F Forms of reasoning				
G Reflexivity & transformation				

Figure 4. Clients' and practitioners' perspectives on practice in relation to the key features of practice.

Of course neither practitioners nor clients exist in a social vacuum. On the one side, from the perspective of a professional practice, we might readily point to the community of practice of the practitioner — the professional bodies and institutions, frequently including universities, carrying the knowledge and traditions of the practice of that profession, and may be responsible for accreditation and regulation of members of profession. On the other side, from the perspective of the client, we may also point to those social groups, including family, community and other kinds of affiliations and connections that furnish a background of meanings, purposes, values and the rest brought by the client to the practice situation. And it should be noted that the practitioner also has a background of family, community and other connections that she or he brings to the situation. These backgrounds are roughly portrayed in Figure 5.

	Extra-individual features of practice			
	(1) Individual features	(2) Material-technical	(3) Social	(4) Cultural
A Meaning & purpose				
B Structured				
C Situated				
D Systemic				
E Temporally-located				
F Forms of reasoning				
G Reflexivity & transformation				

Figure 5. The widening social context of clients' and practitioners' perspectives on practice.

As suggested in relation to practitioners' and clients' perspectives, the presuppositions and perspectives of communities of practice and the social groups to which clients belong may also be considered against the framework of key features of practice listed in Figures 3 and 5. Here, this is simply at the level of a thought-experiment. Perhaps the example of successful professional practice you considered earlier allows you to speculate about the relationships between practitioners' and clients' perspectives in that case (cf. Figure 4); the task becomes far more demanding in relation to the variety of perspectives depicted in Figure 5.

In my view, pursuing an analysis of the kind suggested by Figure 5 takes us, reflexively, back into the key features of practice presented in Figure 3. It begins to show, at greater depth, what the columns referring to the social and cultural features of practice refer to, and what the rows referring to forms of reasoning and reflexivity refer to. Perhaps it is to suggest something about the 'forms of life' practices represent, as a Wittgensteinian analysis of practice might begin to show. Some steps towards such analyses have been taken in some recent writing on practice (for example, Shotter, 1996).

Applied to the case of mathematics education, we might think of the relationships depicted in Figure 5 in terms of the perspectives of a mathematics teacher, her or his students, any community or communities of practice with which the teacher is involved, and the families, communities and other connections of the students. Clearly, the social networks brought into contact at the point of learning and teaching stretch far beyond the teacher and students in physical and social space, in time, and in terms of discursive resources and relationships. As Shotter suggests, in the poetics of conversations like those between students and teachers, *worlds* of meaning connect or collide, occasionally re-orienting both students and teachers as they glimpse aspects of each others' realities through the windows of their words in the here and now, sometimes yielding surprising insights into how each construes their apparently-shared world. Of course, this refers in one way to the "aha!" experience that teachers revel in whenever they see it, and to the idea of "the teachable moment" that teachers aim to construct or respond to when they find it. But it also refers to the "aha!" of the teacher who makes sense of the nature of a student's misunderstanding, or is surprised

by facts about a student's family life or background that explain why there have been difficulties 'connecting' with John or Jane.

What I hope to do by juxtaposing the practitioner's and client's perspectives on practice with the framework of features of practice sketched in Figure 3, however, is to say more than that the world of the mathematics teacher and student are *different* — I hope also to suggest some of the *ways* they differ. If we think about a case of practice like the example of successful practice you considered earlier, involving some practitioner — perhaps a mathematics teacher or teacher educator — and a 'client' or 'clients' — perhaps that teacher's students — we can explore the richness of the space of practice by considering each of the rows and columns in the framework presented in Figure 3. We can begin this task here — just pointing to topics referred to in the framework, but I think it will also show, in practice, how practice richly understood is illimitable.

INTENTION AND MEANING

Reading the labels of the rows in Figure 3, teachers and students may have different *intentions* and draw on different resources of *meaning* — as individuals, and, reaching out from their encounter as people, in their modes of interaction with the material world, the social world, and the discursive and symbolic resources of culture.

STRUCTURE

In terms of the *structure* of their reciprocal participation in the practice of mathematics learning and teaching, clearly they are also quite differently oriented in and to the practice by personal experience, by familiarity with and expertise in relevant skills, the social relationships characteristic of the practice, and the nature and history of the discursive and cultural forms relevant to the practice (which is experienced not only as mathematics learning and teaching, but also, for example, learning or enacting rules of participation in this class or learning setting, behaving civilly, learning or enacting the value of persistence and "getting it right", and many other things).

SITUATEDNESS

In terms of the *situatedness* of practice, clearly student and teacher live in their own bodies, with their own identities, doing emotional work of different kinds in their encounter. They act on different aspects of the material world — for example, the teacher at the whiteboard and the students at their desks. They probably have different views about and responsibilities for the work of social integration in the classroom, and for the exercise of care in the conduct of their activities as part of the practice of mathematics education. And of course, teacher and students bring different backgrounds of *situated* discourses, and different chronologies and experience, to their encounter. One wonders about the extent to which these dimensions are made explicit in the life of most classrooms in schools, colleges and universities, and in workplaces in which education occurs — about how social class

and gender and cultural differences are recognised and handled in the caring relationship of the practice of mathematics education.

SYSTEMIC

In terms of the *systemic* character of the participants and their relationship, clearly teacher and students occupy different and reputedly reciprocal roles — ones very ill-captured by the notion of the student as a client receiving services or a consumer exchanging money for goods, though these ways of framing learning and teaching have become increasingly prevalent in the discourses of educational administration and policy in recent decades. Teacher and students are also reciprocally enmeshed in material exchanges of work for grades, for example, as part of larger institutional systems of schooling, educational administration, teacher professional development and educational research and evaluation, with different perspectives on the nature of schooling (at all levels) as an institution and education as the practice schooling is intended to promote and nurture. And both students and teachers find themselves enmeshed in institutional processes of evaluation, assessment, accreditation and regulation as part of the social system they jointly inhabit, with characteristically different, sometimes cooperative and sometimes mutually-resistant perspectives on what it means to be enmeshed (or entrapped) together in these systems.

TEMPORALLY-LOCATED

Clearly, too, in terms of the *temporal location* of practices, teachers and students have characteristically different perspectives on the unfolding drama of education offered and received, through all its episodes, and at the different stages in the lives of each — and the careers of each. It is composed on multiple timescales — the 'period', the unit of work, the term or semester, the year, the stage or level, and so on. Is the teacher just teaching third grade, or this particular subject in the vocational education and training trade certificate course, or this particular subject in the bachelor's degree, or is each teaching a person with their own narrative understanding of the unity of their life and career, and their own personal goals and ideas of the good for humankind? And is the student experiencing *only* Mr Jones the mathematics teacher, or *also* Mr Jones the person, with his own character, background and view of life. Student and teacher also have very different views of how the present class, the present episode of practice can be viewed against the background of history. Is Mr Jones merely old-fashioned, or does he believe that his social constructivist view of mathematics education has roots reaching back as far as, and perhaps beyond John Dewey, and so he teaches in a way some regard as 'progressive' but that he regards as justified because it is necessary to draw on students' experience to make explicit the relationship between the students' knowledge and experiences and the topic now before them? Of course the students also bring a history to the class — a history of success and failures in schooling, of interests inflamed and extinguished, of expectations raised or lowered in a history of attainments in schooling and outside it. Some, of course, experience their greatest educational successes in educational episodes outside the school — in workplaces, social clubs, family life, and the

adventures of adolescent peer group activities that raise the ire or eyebrows of adults. And each draws in different ways on the historically-given store of meanings in words, discourses and theories available to them, and each draws on these resources in different ways, for different purposes which may, in the end, converge in something like the practice of mathematics or ideas about the good life or the good society — but which may not converge, and will probably diverge as students go on to live their lives by other lights than the ones that guide their teachers.

FORMS OF REASONING, AND REFLEXIVITY AND TRANSFORMATION

I will not say more about the differences in the use, or opportunity to use, different forms of reasoning available to students and teachers in the mathematics classroom — though differences there are — nor about the different views of reflexivity or transformation available and accessible to students and teachers in those roles, especially in the context of compulsory schooling. You can read the opportunities and differences off the table, and give them shape and substance in relation to examples of practice you have in your mind. These are important topics, however, and they go to the heart of what it means to teach or to learn, especially in formal education, and they shape quite different views of pedagogy, by which I mean not merely the science or art of teaching, but the *transformative* point and purpose and goods of education, for individuals and for societies.

READING VERSUS MEASURING PRACTICE

These purposes and goods, in the end, are what *education* is for, and they are the things to which *teaching* may be *one* means. They are things to which mathematics teaching may be *one* means. They are the things which give a more profound measure of the quality of mathematics education and mathematics teaching than can ever be given than by results of students or classes or schools and colleges on examinations or standardised tests. And they give a more profound reading of practice than can be gained by assessing the 'quality' of teaching against performance measures created by proponents of 'authentic' or 'productive pedagogies', no matter how well-researched, 'scientific' or well-intentioned they may be. We may hope such measures point towards those unmeasurable aspects of quality, but they cannot capture the quality of practice in the more encompassing sense outlined in Figure 3 — *nor can they be expected to do so*. Making some assessment of the outcomes of learning and the conduct of teaching may be technically-necessary if one is to have an idea of whether one is achieving one's aims as a student or teacher, but that is pretty much as far as they go. The quality of learning and teaching in the richer sense of participation in the practice of *education* is simply unmeasurable.

One can make a reading of an act, an episode, or a life of learning and teaching, against a framework of features of practice like the one I have offered here, and make one's own judgement — which may disagree with the judgements of others — of the quality of education 'given' or 'received', but such a reading is not a measure or an assessment, it is an elucidation of the way in which the act or episode or life holds up

as a consistent, developing effort to realise moral and educational goods in one's own life, in the lives of others with whom one works in education (not only students), and in a society. And it is *one's own* elucidation of the 'facts' of the act or episode or life with which one is presented. The judgement tells as much about the judge as what is judged. This is what makes the ruthless and reckless drive to performance measurement throughout schooling the more appalling — it aims to make judgements about quality of education through technical measures which cannot grasp its materiality, its practicality, its morality, or its actual or likely contribution to the self-development of individuals and the development of the societies in which they live. Indeed, this is what makes the drive to performance measurement *anti-educational* and *anti-intellectual*. It mistakes form for substance, the measurement for the thing measured. At best, it may provide technical assistance; at worst, it subordinates the practice of education to the imperatives of administration (itself no longer a worthwhile practice of public administration conducted by a civil or public service, but a technical tool for policy-makers and states).

Against the objectification of the practitioner and the practice constructed through the instruments of performance measurement, consider the figure of the educator as a moral agent, a person. These are persons bound to model and enact the values and virtues for which they stand, evolving over a career or a lifetime. And they are bound to do so despite this commitment being merely assumed or noted in passing by institutions and the state, and in general being irrelevant to institutional decision making of almost any kind — though what makes a person admirable or genuinely morally worthwhile may be noticed in decisions about promotion or new appointments, and more frequently in interviews than in reading a *curriculum vitae*. Against the performance measures, remember the person, their history, their commitments, their aspirations. And consider the extent to which any of these are essential to the job specification statement, the functions described in association with a role in an organisation. The latter are generally expressed in so-called 'neutral' and 'objective' language, and they have their purpose — assigning duties, enabling incumbents to be held to account. They have institutional administrative purposes that intend discreetly and dispassionately to overlook the personhood of the person to see them only in terms of functionality — capability to function in the role. It is the amplification of this administrative gaze through our institutions, corporations, state and society that empties them of moral content and significance. And this, in turn, endangers practice, as Joseph Dunne so aptly put it in the title of his paper to the (2004) Umeå *Participant Knowledge and Knowing Practice* conference.

At the end of *After Virtue* MacIntyre wrote a wonderful passage comparing the 1980s to the fall of the Roman Empire:

A crucial turning point in that earlier history occurred when men and women of good will turned aside from the task of shoring up the Roman *imperium* and ceased to identify the continuation of civility and moral community with the maintenance of that *imperium*. What they set themselves to achieve instead — often not fully recognising what they were doing — was the construction of new forms of community within which

the moral life could be sustained so that both morality and civility might survive the coming ages of barbarism and darkness. If my account of our moral condition is correct, we ought also to conclude that for some time now we too have reached this turning point. What matters at this stage is the construction of local forms of community within which civility and the intellectual and moral life can be sustained through the new dark ages that are already upon us. And if the tradition of the virtues was able to survive the horrors of the last dark ages, we are not entirely without grounds for hope. This time however the barbarians are not waiting beyond the frontiers; they have already been governing us for quite some time. And it is our lack of consciousness of this that constitutes part of our predicament (p. 263).

What horrors more of our "new dark ages" have been revealed in the twenty-five years or so since he wrote those words — Iraq, September 11, and so many more. And with what inadequate moral resources most of our governments address them — calculations of national interest, profit, and political polling.

MacIntyre spoke of "new forms of community within which the moral life could be sustained so that both morality and civility might survive", and he has famously addressed the possibility that universities might be such places (1988, 1990). We all know that universities, too, are creatures much domesticated by the state, indeed, creatures of the state in many countries. And schools and schooling are even more so creatures of the state or, all too frequently, of other sectional interest groups.

I put it to you that the task of education and for educators remains the same as it has always been — harder now if we forget the resources of our educational traditions and yield ourselves to the imperatives of the state, to keep alive awareness of the enduring tension between education and schooling, or, one might rather say, the contradiction of education versus schooling. This is not just a call to heroic resistance by teachers — most of us state employees or of state-regulated institutions — but a call to teachers to do their best to enact the practice of education, not just schooling, if necessary in the interstices of state-sanctioned curricula. Most classroom educators — not just teachers — have been conducting this resistance for a long time. Indeed, many classroom educators today believe that teaching is what they do 'on the lines' of their day-to-day work, and that education is what they do 'between the lines'. And it is a call on behalf of students and our society — to work in the interests of the self-development of every single student, and the development of our societies as moral and civil communities — to enact *education* in our classes, not just the *teaching* of mathematics or music or science or studies of society or literacy or literature. For us, as educators, teaching these are merely means by which persons may become educated in the knowledge, morality and civility necessary for our societies to emerge from "the new dark ages that are already upon us".

Responding to this call requires conviction and courage, as it always has. And it requires preparedness for the inevitability of disappointment created by circumstances outside the educator's control — for example, by government policies that reduce the resources available for education, or public housing policies that ghettoise poverty with the effect that particular schools must deal with a greater proportion of students in troubled circumstances. Such disappointments may be

inevitable, but the practice of education also offers a more-than-compensating sense of exhilaration when the teacher *does* connect with students and others in the interests of their self-development and the common good.

In my view, the task of sustaining and defending the practice of education is urgent, and our circumstances dire. I do not expect that modern states, societies or the mass of public opinion will emerge from this crisis in my lifetime. All the more reason, it seems to me, for us to take more seriously, and embrace more fervently, the ends and goods that our traditions of education have bestowed upon us, to keep them alive in and through education *and teaching*. In other times, educators have taken education into the hedgerows and farmhouses to resist the schooling offered by their states. I take it as part of our *moral* task to keep the aims and goods of education alive for a time when the folly of the current ideology of expertise, efficiency and technical reason in the service of interests behind the machinery of the state, is past. I mean to point to no conspiracy here — though of course I refer to the interests of global capital — but rather to suggest that, despite the contrary intentions of many, we ourselves are all too frequently the servants of those self-same interests, when we extend the technical rationality or effectiveness or efficiency of schooling *at the expense of* education and our students as persons and our societies as civil forms of community.

Our Prime Minister, John Howard, famously remarked last year that public schools in Australia do not teach — or was it have? — values. Teachers in those schools were outraged; many felt deeply betrayed. It seems to me that they *do* have values, and the values of education are among them. Perhaps, seen through the Prime Minister's eyes, these are not values but irrelevancies. I fear, however, that the truth is at once more sinister and more explicable: that he believes the values of public education embrace aims that threaten to inoculate people against domestication and submission to the state and the interests of the powerful, and that valuing public education is against the principle of providing every possible service through a market to generate private profit. These are views, I believe, against which every educator must stand opposed, even those in private education. For they are values which undermine the sustainability of morality, civility and the state itself. If we follow the Prime Minister's logic, we are sawing off the branch we are sitting on, messing our own nest, eating our own children. Dear visitors to Australia for this conference, please believe that our Prime Minister intends to be the friend of education even while his government is its nemesis.

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