MAPPING MATHEMATICAL COMMUNITIES: CLASSROOMS, RESEARCH COMMUNITIES AND MASTERCLASS HYBRIDS

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We want to explore what it means to learn mathematics within different communities of practice and, in particular, to consider how changes to these communities might be likely to affect the resultant learning. In doing so, we aim to lay the theoretical groundwork for an empirical study which explores the idea of *hybrid* communities - that is, situations which are deliberately designed to exhibit features of two or more idealised communities. We adopt Wenger's (1998) theoretical framework of *communities of practice*, taking the view that learning is as much part of our human nature as eating or sleeping and that communities of practice are informal and pervasive aspects of our daily lives, which rarely come into explicit focus. However, unlike Wenger, we view terms such as 'learning' and 'community of practice' as constructions offering a useful starting point for the shared negotiation of meaning, rather than suggesting that they faithfully capture an essential aspect of the world. In this sense, we use the *idea* of a community of practice as a metaphor, or lens, for better understanding social situations

The article proposes the following:

- from a 'communities of practice' perspective, formal learning communities such as schools make use of mathematical knowledge in the norms, discourses and practices of schooling, and so participants come to know mathematics as teachers or students
- as a result, it is dilemmas of performance which preoccupy participants rather than 'mathematical dilemmas' (Lave, 1997)
- it is mathematical dilemmas which preoccupy participants in communities of mathematics researchers
- it is possible to form a *hybrid* community between that of formal schooling and that of mathematical research, which supports student learning whilst focusing on mathematical dilemmas.

These propositions are of particular relevance to the current English education system, which has seen a tightening of control over children's mathematical activity and a greater emphasis on test outcomes over the last fifteen years. Recently, the government has introduced the notion of *extended schooling* (DfES, 2005) where students will take part more regularly in out-of-school activity. Clearly, this raises the question of what such activity, positioned partially within and without school, might offer students in terms of mathematical experiences. It is our view that the idea of hybrid communities - where the socio-cultural features of school classrooms and mathematical research communities are deliberately mixed to varying degrees - might provide possible models for extended schools. More widely, we believe that this notion of hybridisation might offer some solutions to the difficulty of persuading students in England to take mathematics at advanced and undergraduate level. If school mathematics is not attracting students, one practical approach might be repositioning the subject through alternatives linked to, but not replicating, school. We would assert that one of the outcomes of recent changes to the education system in England is that schools focus so specifically on the act of learning mathematics that students often do not get a chance to experience what it is to do mathematics. The notion of hybrid communities, positioned between formal (school) and non-formal situations, might offer a means of managing mathematical activity such that students come to know the subject in ways that are attractive to them.

Socio-cultural views of expertise

Socio-cultural views of learning have important implications for those involved in deliberately promoting learning in disciplines such as mathematics. When viewed through the socio-cultural lens, expert teachers and students participate fully in the discourse, norms and practices of classrooms. For example, students and teachers often use "educational discourse" (Mercer, 1995), which conforms with required classroom conventions; they recognise the things which are valued and rewarded in classrooms, often by the assessment system, and focus on meeting these particular requirements (Bennett, Desforges, Cockburn and Wilkinson, 1984; Desforges and Cockburn, 1987; Doyle, 1983, 1986). In this scenario, neither teachers nor students are merely passive participants responding to events. Through negotiation, students and teachers actively co-construct the norms, discourses and practices of their classroom community through ongoing negotiation.

Schoenfeld (1985) suggests that students' expectations have an influence on their activity in classrooms. Students often consider mathematics to be received, not co-constructed, perceiving it as a body of knowledge rather than a form of activity, argumentation and social discourse. In short, students tend to regard mathematics as what experts know to

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be true, which is taught to them in preparation for examinations. It is not seen as a process; that is, as what mathematicians do. Instead, students are preoccupied with, "[...] dilemmas about their performance rather than with mathematical dilemmas" (Lave, 1997, p. 31) and these dilemmas influence learners' everyday mathematical activity in the classroom "[...] as they strive to succeed and in the process generate appearances of understanding" (ibid., p. 31).

Recent educational reforms in the UK, including national mathematics strategies (DfEE, 1999; DfES 2006), performance management relating to test data and inspection procedures, have all focused on elements of performance, be it of teachers or students. Kelly (2006) suggests that teacher expertise is defined by the working practices to which it pertains and argues that the current instrumental climate renders more likely the adoption by teachers of instrumental stances to their work. Teachers set targets for student improvement, provide students with short-term, achievable learning objectives, manage lessons efficiently to address these objectives and thereby raise students' test scores. This is explicitly an assessment driven model, with assessment embodied in pencil and paper tests. In such a climate, it is much less likely that teachers will feel inclined or able to focus on what Lave (1997) calls "mathematical dilemmas".

Gaining expertise in communities of mathematicians differs from gaining expertise as a student or teacher, involving becoming a full participant in the norms, discourse and practices of what mathematicians do rather than of what students and teachers do. Of course, what it means to do mathematics is not universally agreed (*e.g.*, Hersh, 1998), but here we take a view in line with Solomon (1998) that

> we can picture mathematics as a unified practice constituted by socially recognised aims, methods and solution types which are operationalised via specific rules of calculation. (Solomon, 1998, p. 380)

This concurs with Schoenfeld's (1985) and Lave's (1997) view that mathematics is a form of activity, argumentation and social discourse. Since mathematics is seen as fundamentally a social enterprise, access to ideas comes through social means and hence,

> the teacher's task is not merely to point out what already exists, but to induct children into talking mathematically about it [...] they do not learn *from* talk, they learn *to* talk. (Solomon, 1998, p. 384, emphasis in original)

In addition, learning mathematics needs to include learning to see the opportunity to do mathematics (Stewart, 1997) and giving children access to a mathematical *genre* (van Oers, 2001). Thus, the picture of schools as communities of practice differs greatly from what might be considered to be a community of mathematicians (Schoenfeld, 1996).

Ways of knowing

In order to understand the implication of these differences between formal learning communities and communities of mathematicians it is necessary to make a distinction between knowledge and knowing within them. Lave and Wenger (1991), Wenger (1998) and Billett (2001) argue for a view of both *coming to know* and *knowing-in-practice* as processes which, rather than lying entirely with the individual, are distributed across all participants in social settings (including, in the case of the mathematics classroom, teachers and students). These ways of knowing relate both to the conceptual and the physical resources available. Within any situation, negotiations of meaning result in knowledgeable activity on the part of participants in the lesson, which we call *knowing*, and which is socially shared and distributed across participants and resources. In relation to formal learning in schools, teachers in classrooms teach their students knowledge of mathematics through the practices of classrooms. Thus, their students come to know mathematics as students placed as learners in mathematics classrooms - as pupils. Their way of knowing is that of pupils because they engage with mathematical knowledge through the working practices of pupils. As Wenger (1998) puts it, all too often, "school learning is just learning school". (p. 267)

There will, of course, be different ways of knowing mathematics; as a pupil, an academic, a researcher, an accountant, an engineer and so on. Each situation has, associated with it, a different set of resources, affording opportunities and constraining the participants in different ways in terms of their negotiation of meaning. From each context come different ways of knowing mathematics. In the English education system differences have been played out in an apparent tension in the school curriculum over the last 150 years, namely, "between accurate use of calculating procedures and the possession of 'number sense' which underlies the ability to apply such procedures sensibly" (Brown, 1999, p. 3). The distinction between different ways of knowing mathematics also raises a point to do with the *authenticity* of different forms of mathematical activity. That the situation described by Brown *vis-à-vis* the school curriculum is seen as a tension is the result of holding a view regarding the relative authenticity of each stance. If some forms of mathematical behaviour are seen as more authentic, then others must, *per se*, be seen as less so. It is important to state that, here, we view all forms of mathematical behaviour as equally authentic *when viewed from their own perspective*. However, one of the purposes of the work we are undertaking is to examine the tensions that can arise when there is a mismatch between the situational context and the espoused purposes of a mathematical activity. Our question is not, *which form of mathematics is better?* It is, rather, *what are the characteristic features of different forms of mathematics and what do they offer?* In carrying out a theoretical exploration of these issues here, we use the three (idealised) contexts of school classroom, research community and mathematics masterclass.

Learning, identity and situation

Another insight from communities-of-practice perspectives, helpful for further understanding the implication of differences between formal learning communities and communities of mathematicians, concerns how learning in a community relates to participants' changing identities. Wenger (1998) claims that "because learning transforms who we are and what we can do, it is an experience of identity" (p. 215). Furthermore,

> forms of identification also shape what is negotiable

> and to what extent it is so. Membership is therefore both enabling and limiting of identity; it is both a resource and a cost. (Wenger, 1998, p. 207)

Accordingly,

> our identities form in [a] kind of tension between our investment in various forms of belonging and our ability to negotiate the meanings that matter in those contexts (*ibid.*, p. 188)

As Bakhtin (1981) has proposed, the implicit and explicit goals of any community tend to create either an *authoritative discourse*, "which comes as a given, fused with the authority to which it gives expression" (Barnes and Todd, 1995, p. 157) or an *internally persuasive discourse*, in which ideas are developed jointly from the differences of opinion brought to the discourse.

For Wenger (1998), the process of identification is a process of becoming. However, since identities are formed through participation in a community, learning also requires a 'place' within which to participate – learning and situation are also entwined. Consequently,

> to support learning is not only to support the process of acquiring knowledge, but also to offer a place where new ways of knowing can be realized in the form of such an identity. (p. 215)

In addition to notions of membership and place, Boaler (2005) suggests subject disciplines have a role in shaping communities through their *disciplinary agency*. Novice mathematicians do not, initially, have access to this agency, implying a role for the expert in modelling the discipline with them and so affording them the agency it offers (Solomon, 1998)

In the case of English mathematics classrooms, recent curricular initiatives, especially the *National Numeracy Strategy* (DfEE, 1999) and its successor the *Primary National Strategy* (DfES, 2006), have encouraged teachers to focus on promoting specific behaviours in an attempt deliberately to increase students' mathematical discourse. However, contrary to expectations, such attempts seem to have compounded the situation, increasing the structure of classroom activity and behaviour, and decreasing opportunities for children to participate freely and extensively (Brown, Askew, Millett and Rhodes, 2003; Burns and Myhill, 2004; Hardman, Smith, Mroz and Wall, 2003; Pratt, 2006a). From the socio-cultural perspective, two related issues result. First, the attention of the classroom community tends to be on the learning seen to take place within (individual) minds as a result of the task undertaken. It is not on the engagement with, and practices involved in, the task itself. Put another way, the purpose of classroom tasks is to learn something that can be understood *from* the task, not to learn how to achieve the task itself. The focus is on engaging with mathematical knowledge through knowing *how* to be a pupil in order to become better at *being* a pupil.

The teacher does not, therefore, on the whole, act as a model mathematician for mathematical practices for the student to imitate and become; rather they model teaching – or at best they model how the abstract mathematical objective for the lesson can be learnt from the task undertaken, and for which it was designed. In this sense, expert teachers are not the same as expert mathematicians (Lave and Wenger, 1991, p. 99). Of course, this is inevitable, and teachers will always be forced to balance the extent to which they can operate as expert mathematicians, as expert teachers and as a 'model' for how to be an expert pupil.

To summarise the argument so far, learning, in the form of identity-transformation, is related to both 'place' and 'expertise', and changes in these elements will alter the affordances and constraints for participants in terms of their identification with certain practices and as particular participants in a situation. Furthermore it will affect their negotiability within the same situation (Wenger, 1998). In the case of mathematics, the particular issue of interest relating to variation in affordances and constraints is the extent to which this changes the participants' view of the purpose and nature of the subject – between knowing it as a rule-bound collection of knowledge, or as a way of coming to know a discipline. Pimm (1987) has suggested a useful analogy here between learning mathematics and learning a foreign language. He points out that a new language can be learnt by means of memorising vocabulary and grammatical rules and then trying to apply these, or by attempting simply to speak it and learning it through use. The key distinction, he suggests, is one of intent. In the former situation the learning is driven by a desire to accumulate information, and success is seen in terms of quantity and application; in the latter it is driven by a desire to *communicate effectively*. Learning mathematics can similarly be driven by a desire to accumulate knowledge for the benefit of test scores, or by the desire better to be able to communicate mathematical ideas (either to others or, with increasing clarity, to oneself), thus, engaging in meaning making.

Managing situations for learning

Socio-cultural insights suggest that becoming an expert in a particular community involves identifying more closely with that community, and expert students in communities such as mathematics classrooms will differ from experts in other communities that make use of similar mathematical knowledge for purposes other than engaging in school tasks. To explore such differences we might ask how ways of knowing are similar, and how they differ, across participants in communities that engage with mathematical knowledge through different forms of practice. In particular, what is the variation, across communities, of:

- the implicit and explicit goals of participants
- the forms of expertise available to novices
- the forms of practice
- the discourse?

In Figure 1, we use the questions above to map the features of two hypothetical communities, a mathematics classroom and a community of research mathematicians, which engage with mathematical knowledge through different forms of practice, so as to compare the two. This mapping is based on our own analysis as presented in this article, together with those of Schoenfeld (1996), Lave (1997), Julie (2002) and

Wedege (2002). These communities are, of course, idealised constructions; we make no attempt to assert their 'reality' in any sense, or to judge their validity and merits.

Hybrid communities

Such a view is relatively straightforward if we assume idealised communities in which the norms, discourses and practices remain stable. Needless to say, most situations do not fit these ideals and are in a constant state of flux. A number of factors influence change, not least of which is participants' iterative engagement in the work of communities. Furthermore, participants may be members of several such communities and thus bring ways of knowing to bear in different social situations.

We can, of course, intentionally form hybrids of distinct communities, deliberately adopting particular features of each using a Wengerian perspective. Indeed, we believe such a move could help us address some key issues for educators; how to describe a clear role for the teacher in such communities and/or how best to structure educative participation. Though he discusses some "dimensions of educational design", Wenger (1998) tackles neither of these issues in any depth.

An example of one such hybrid is the 'masterclass'. Typically, 'masterclasses' involve novices (pupils, perhaps) working alongside experts (a university mathematics professor, perhaps) within an authentic activity, with the expert providing formative comment, often in the form of modelling of practices, for the novice. Key features of the situation might be: engagement in an activity which is authentic in terms of the working practice of the discipline; the expert selecting appropriate areas for focus so as to allow novices opportunities to consider mathematical dilemmas; the expert demonstrating expertise in the practices him/herself, though also in instructing the novice during this engagement; attention paid to the (developing) quality of performance in the task itself and not solely in relation to the resultant learning, for which the task acts as a vehicle; a focus on the authority of mathematics itself as opposed to the authority of the teacher prevalent in most classrooms (Pratt, 2006b)

Community	Mathematics Classroom	Community of Research Mathematicians
Mathematical knowledge	- National Curriculum, National Numeracy Strategy, etc	- contents of research journals, conference papers etc.
Ways of knowing mathematics	- as a pupil, where the focus of activity is on its management and assessment and on dilemmas of performance	- as a researcher, where the focus of activity is on using the disciplinary tools of mathematics, both conceptual and physical and on mathematical dilemmas
Implicit and explicit goals of participants	- individual pupil learning - recalling knowledge and performing on school tasks, achieving grades, gaining praise from teacher - identification as expert pupil	- doing mathematics - sharing knowledge publicly through conferences - creating new knowledge together, gaining publication, gaining esteem of peers etc. - identification as expert mathematician
Model of expertise	- teacher instructing, facilitating, demonstrating, modelling work of pupils, with limited 'real world' application, for example geographical 'traffic survey' or environmental 'hedgehog survey'	- work with leading researchers in department and visiting researchers in substantive theory building, and viewing published work
Forms of practice	- essentially routine tasks and problems provided by the teacher to rehearse the curriculum	- complex problems sought by individuals and/or groups, set within the disciplines theoretical and historical context
	- tasks usually lead to single outcomes/ answers and rarely form starting point for further investigation - limited negotiability and ownership of meaning	- work leads to multiple outcomes /answers defined by group, perhaps becoming starting points for further activity - considerable negotiability and ownership of meaning
	- individual appraisal through tests	- individual and/or group appraisal through reference to mathematical norms and acceptability and ultimately validated by peer reviewed publication
Forms of discourse	- dominated by teacher control with pupils responding to teachers' direct questioning - mainly 'educational discourse' [1]	- dominated by exploratory talk - other forms through a range of media (email, e-community, journals etc.) - mainly 'educated discourse'

Figure 1: Mapping the features of idealised mathematical communities.

'Masterclass' communities offer norms, discourses and practices that are different from those in classrooms, resulting in different affordances and constraints offered to and imposed on participants. Crucially, they might allow for greater negotiability and more discursive ways of knowing. Of course, such elements of any community are difficult to control with any certainty, for a number of reasons: small changes in discourse can create major shifts in terms of affordances and constraints felt by students (Pratt, 2006; Black, 2004); participants may find it hard to change patterns of behaviour that are well embedded - experts drawing back from too much deliberate teaching, or children falling into submissive patterns of behaviour, perhaps. More fundamentally, though, a community gains its coherence from the meanings generated between its participants, with meaning from a socio-cultural perspective seen as "an emergent property of joint coordinated action" (Gergen, 1999, p. 145), not as a product of individual minds.

Nevertheless, this does not prevent attempts being made deliberately to alter an environment, particularly in terms of the individual/social orientation of the learning, and the form and extent of the focus on assessment. The community suggested above would be neither a community of mathematicians nor a school mathematics community; the 'masterclass' is a hybrid, and is mapped in Figure 2. It is important to note that this map represents just one of many different forms that the community might take, and is simply illustrative of the idea. It is therefore one of a range of possible hybrids, the nature of each depending on its position in relation to, amongst other things, the range of features described in Figure 1 and the way that these are (re)fashioned by participants. However, although we have made a number of distinctions in relation to various mathematical communities, we conjecture that assessment is a primary factor and one that is more likely to link the 'masterclass' to a research environment than to a formal schooling environment.

Methodological implications

This theoretical paper has helped us in understanding the nature of mathematical communities. We are now beginning to explore the issues raised empirically and are currently in the early stages of examining the ways in which children come to know mathematics through different kinds of community.

Here is not the place for a full account of the methodological issues we face, but it is perhaps fair to say that researchers adopting socio-cultural perspectives have made more progress in theoretical terms than methodological ones. Such a state is not surprising given the complexities that the stance implies. Socio-cultural perspectives challenge cognitivism on epistemological grounds, reflecting their social constructionist rather than objectivist views of knowledge and knowing. Thus these perspectives are anti-essentialist:

> Since the social world, including ourselves as people, is the product of social processes, it follows that there cannot be any given determined nature to the world or people. (Burr, 1995, p. 5)

Community	Mathematics Masterclass
Mathematical knowledge	- defined by the expert mathematician in negotiation with the students
Ways of knowing mathematics	- as a student mathematician becoming expert - focus of activity is on coming to understand and to use the conceptual and physical disciplinary tools of mathematics - also, to some extent, on the management and assessment of such use - doing mathematics, often together - addressing mathematical dilemmas - creating new (to the student-novice) knowledge - developing particular, mathematical ways of knowing - novice mathematicians becoming more expert in these senses - identification as a mathematician
Model of expertise	- expert mathematician instructing, facilitating, demonstrating and modelling the work of mathematicians
Forms of practice	- identifying with mathematical behaviour
	- complex, extended problems provided by mathematician, set within the discipline's theoretical and historical context
	- work leads to multiple outcomes /answers defined by group, perhaps becoming starting points for further activity
Forms of discourse	- dominated by mathematicians modelling and then facilitating student exploratory talk - use of specialised mathematical symbolism and language - blend of educational and educated discourse, increasingly moving towards the latter

Figure 2: Mapping the features of a hypothetical masterclass community

Indeed, socio-cultural perspectives are also anti-realist: they deny our knowledge is a direct perception of reality, rather, "we construct our own versions of reality [as a culture or society] between us" (*ibid.*, p. 6) Given these observations, developing research approaches that are consistent with the socio-cultural position makes many demands on the researcher. It is our view that any adopted approach needs, somehow, to explore the complexities of communities at the level of structures, group relations and individuals' lived experiences; and focus in these explorations on discourse, interaction and social practices, considering language to be a form of social action.

Final comments

If gaining expertise involves becoming a full participant in a community, then the form of expertise developed by participants is dependent on the nature of the community in question. The socio-cultural perspective adopted in this article provides a framework for understanding dilemmas often associated with schooling, particularly those to do with forms of expertise, transfer and applicability; issues which cognitivist perspectives find hard to resolve. It allows us to consider the dominant characteristics of various mathematical communities, to discern different forms of expertise, and so design hybrid communities according to our preferred features of expertise. However, an important caveat is that this is not to assume a causal link between community and identity. As Wenger (1998) states, and for the reasons outlined in this article:

> [o]ne can design roles, but one cannot design the identities that will be constructed through these roles. (p. 229)

Nevertheless, for such hybrid communities to be successful, a number of tensions need resolving. Particular areas for future exploration by researchers and teachers include:

- the dynamics of such groups - including a recognition of how student non-participation and marginalisation (Wenger, 1998, p. 165) can be met and challenged so as to build mutual trust between participants
- student subversion, which leads to a narrowing and routinizing of the work of such communities, specifically in relation to non-participation, but also in terms of the renegotiation of positions in communities
- conflicting student identities experienced by students working in both formal learning and 'masterclass' situations, and the effect and implications of these, and
- teachers' experiences of attempting to work in both schooling and 'masterclass' contexts, the obstacles they face and the approaches which they find helpful in tackling these obstacles

Considering expertise in this way can offer teachers insights into their role within a formal learning community. Furthermore, by being mindful of the socio-cultural elements of a situation, teachers might be able to exert some influence over the community, consciously altering the forms of knowledge and the ways of knowing available to learners. Evidence that this is possible has already been provided by a number of projects (Boaler, 1997), though these same studies have also pointed to the difficulty of maintaining alternative approaches to teaching and learning in assessment driven climates. Importantly, teachers may be able to perceive more clearly tensions between espoused educational purposes and actual practices and become better able to match the two.

Of course, if mainstream schooling does not allow the flexibility for teachers to take such action, hybrid communities might still be set up alongside school classes in the form of clubs, online environments, 'masterclasses' and so on. If this is to happen, it will be important that we can map out what such opportunities afford learners and thereby have greater confidence that they are making a useful contribution to our students' mathematical learning.

Notes

[1] Mercer (1995) makes a useful distinction between *educational discourse*, the discourse used in the act of teaching and learning, and *educated discourse*, which describes the effective use of language for thinking and communicating within any particular domain.

References

Bakhtin, M. (1981) *The dialogic imagination*, Austin, TX, University of Texas Press.

Barnes, D. and Todd, F. (1995) *Communication and learning revisited: Making meaning through talk*, Portsmouth, UK, Boynton/Cooke Publishers.

Bennett, N., Desforges, C., Cockburn, A. and Wilkinson, B. (1984) *The quality of pupil learning experiences*, London, UK, Erlbaum.

Billett, S. (2001) 'Knowing in practice: re-conceptualising vocational expertise, *Learning and Instruction* **11**(6), 431-452

Black, L. (2004) 'Teacher-pupil talk in whole class discussions and processes of social positioning within the primary school classroom', *Language and Education* **18**(5), 347-360.

Boaler, J. (1997) *Experiencing school mathematics: teaching styles, sex, and setting*, Buckingham, UK, Open University Press.

Boaler, J. (2002) 'The development of disciplinary relationships: knowledge, practice and identity in mathematics classrooms', *For the Learning of Mathematics* **22**(1), 42-47

Brown, M. (1999) 'Swings of the pendulum', in Thompson, I. (ed.), *Issues in teaching numeracy in primary schools*, Buckingham, UK, Open University Press

Brown, M., Askew, M., Millett, A. and Rhodes, V. (2003) 'The key role of educational research in the development and evaluation of the National Numeracy Strategy', *British Educational Research Journal* **29**(5), 655-672.

Burns, C. and Myhill, D. (2004) 'Interactive or inactive? A consideration of the nature of interaction in whole class teaching', *Cambridge Journal of Education* **34**(1), 35-49

Burr, V. (1995) *An introduction to social constructionism*. London, UK, Routledge.

Desforges, C. and Cockburn, A. (1987) *Understanding the mathematics teacher*, London, UK, Falmer.

DfEE (1999) *The national numeracy strategy: framework for teaching mathematics from reception to year 6*, London, UK, DfEE.

DfES (2005) *Extended schools: access to opportunities and services for all. A prospectus*, http://publications.teachernet.gov.uk/eOrderingDownload/1408-2005PDF-EN-01.pdf, accessed 10th November, 2006.

DfES (2006) *Primary framework for literacy and mathematics: introduction*, http://www.standards.dfes.gov.uk/primaryframeworks/introduction, accessed 3rd March, 2007.

Doyle, W. (1983) 'Academic work', *Review of Educational Research* **53**, 159-200.

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