

Reconceptualising ‘obstacles’ to teacher implementation of curriculum reform: beyond beliefs

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Abstract: Teachers’ beliefs about mathematics, teaching and learning are often identified as an obstacle to the successful implementation of curriculum reforms. Rather than locating reasons for such lack of success with the psychology of individuals, we adopt a social perspective as we seek to develop a way of understanding teachers’ interaction with reforms, drawing on critical discourse theory and Bernstein’s notion of recontextualisation. This approach is illustrated by a study of mathematics curriculum reform in China.

Keywords: *beliefs, curriculum reform, discourse, recontextualisation*

1 Introduction

Studies of attempts to reform curriculum and pedagogy consistently show the difficulty of implementing reforms in the ways intended by the designers of the reform (Cuban, 1993; Fullan & Hargreaves, 1992). Those studies in mathematics education that have demonstrated success in changing teachers’ practices in fundamental ways have generally involved extensive and intensive intervention, often engaging teachers in action research or reflection on their practice in close interaction with researchers (Fennema, et al., 1996; Jaworski, 2007). Such intervention is clearly beyond the resources of most reform programmes and is certainly not possible on a large scale, for example to support national reforms such as the NCETM *Standards* in the US or the *National Strategy* in the UK. Rather, major reforms tend to be supported by much shorter and often unevenly distributed training opportunities together with dissemination of resources for use by individuals or groups of teachers. Where the recommendations of such reforms are taken up in schools, the reform ideas, principles and methods tend to be transformed or distorted, often resulting in little genuine change from previous practices (e.g. Jacobs, et al., 2006; Stoll, et al., 2003).

Attempts to understand processes of reform have demonstrated the complex nature of attempts to change educational practices, and have noted factors at institutional levels and at the level of the individual teacher that serve as obstacles to the authentic implementation of curriculum innovation (Fullan, 2001). At institutional level, for example, the alignment of assessment with curriculum has been a focus for many reformers, with assessment practices, especially those associated with high stakes, seen as a major influence (whether for good or bad) on teachers' implementation of curriculum (Burkhardt, 1988; Burkhardt, Fraser, & Ridgway, 1986). At the level of the individual, teachers' personal knowledge and beliefs about mathematics and about teaching and learning have been identified as a strong influence on the ways that teachers implement, interpret or resist change (Handal & Herrington, 2003; Pajares, 1992).

Yet relationships between teachers' beliefs and their classroom practices have been notoriously hard to determine. While some researchers have claimed close connections, other studies have shown much more ambiguous results (see review by Fang, 1996). The consistency of research in this field has been affected by difficulties both in achieving an agreed definition of 'beliefs' and in agreeing on effective and valid methodologies for studying them. Nevertheless, this area of research is founded on a fundamental agreement that beliefs exist, that they are psychological phenomena and that, while they may be affected by context, including social factors, they are individually held. As Maasz and Schlöglmann note in their forward to a recent edited book on the topic:

Common to all research into affect is the idea that the categories of affect are based on mental systems, and that these mental systems have a crucial influence on all the processes of students' mathematics learning and teachers' mathematics teaching. (2009, p.iv)

It is possible, however, to adopt alternative perspectives on beliefs that do not make these assumptions. Indeed, Sfard (2008) rejects the notion of belief as an object of study, arguing that the use of a reifying term such as *belief* itself creates the object it speaks of and hence provides "rather shaky ground" for research (p.56). A discursive psychology approach (Edwards, 1997) also rejects the idea that beliefs are based on individual mental structures, rather conceiving of them as

constructed within discursive interactions. In this paper, we intend to explore an alternative conceptualisation of the phenomena commonly labelled beliefs and of the relationship between these and the implementation of curriculum reform. We will propose a way of understanding the transformation of intended curriculum changes as they are implemented by teachers that draws on discourse theoretical and sociological rather than psychological explanations. We contend that such an approach not only provides alternative insights into teacher implementation of curriculum change but also avoids some of the methodological problems associated with studying beliefs as individual psychological phenomena.

2 From teachers' beliefs to discursive resources

2.1 Beliefs and implementation of curriculum reform

Teachers' beliefs about mathematics, teaching and learning have been identified as one of the key obstacles to curriculum reform. Researchers and reformers have proposed a need to work to change beliefs in order for reforms to be effective (e.g. Handal & Herrington, 2003). Attempts to effect such change, usually through involvement in sustained programmes of professional development, demonstrate a complex relationship between changes in beliefs and practices (Smith Senger, 1998) and even such programmes, involving reflection and action research, may suffer from apparent contradictions between teachers' professed agreement with the principles of the reform and their actual practice (e.g. Jones & Tanner, 2002).

Most frequently, studies of curriculum reforms have found the implemented curriculum to be different from that intended. Common themes are the persistence of 'traditional' forms of pedagogy and the partial adoption of those aspects of a reform that can be accommodated into teachers' existing practices and systems of beliefs. For example, evaluation of the implementation of the *National Numeracy Strategy* in primary schools in England indicated that it had some influence in the vast majority of classrooms and that most teachers used the format and structure of the 'three part lesson' (Earl, et al., 2003), but detailed research studies of the practices of primary teachers identified qualitative differences in the nature of activities implemented (Askew, Denvir, Rhodes, & Brown, 2000) and persistence

of 'traditional' forms of classroom interaction (Hardman, Smith, Bramald, & Mroz, 2002). Similarly in English secondary schools, evaluations suggest that schools and teachers adopted some aspects of the *Key Stage 3 Strategy* (for lower secondary school students aged 11-14) and that, while there were some successes in focusing attention on teaching and learning, the nature of the changes implemented did not always match the intentions of the *Strategy* (Ofsted, 2002, 2003; Stoll, et al., 2003). While acknowledging some evidence of change at an early stage of the implementation, Stoll et al. reported that many teachers were "tweaking" rather than radically changing practice" (2003, p.1).

Some of the difficulties encountered by curriculum reforms may be explained by teacher resistance to new ideas but even when teachers profess beliefs consistent with those of the reform it seems that their practices may not change significantly or in the ways intended. In the United States, in spite of substantial evidence that mathematics teachers are familiar with the NCTM *Standards* and profess support for its principles, Jacobs et al. (2006) nevertheless report widespread lack of alignment of teaching practices with the reform principles. In the context of *Standards*-based reforms in the US, researchers have repeatedly found that teachers who express conceptions of good teaching compatible with the reform (for example, they believe they should teach mathematics for understanding) and even seem willing to experiment with instructional innovations nevertheless maintain the focus of their teaching on factual and procedural based mathematics knowledge (Borko, et al., 1992; Prawat, 1992; Raymond, 1997; Wilson & Ball, 1991). Moreover, teachers' beliefs about the nature of their students in relation to the practices recommended by reform may be a further factor, affecting the extent to which they adopt those practices (Sztajn, 2003).

2.2 Problems with the construct of beliefs

While teachers' beliefs may be seen as an important factor in the success or failure of programmes of curriculum reform, there are difficulties involved in using beliefs as an explanatory factor. Most significantly, studies of teachers repeatedly encounter inconsistencies between beliefs expressed in different contexts and between what teachers state about their beliefs and the theories about

mathematics, teaching and learning that appear to be enacted in their practices. Researchers have sought to deal with these difficulties both theoretically and through methodological critique. Some researchers, following Hoyles (1992), posit that beliefs are situated, varying between contexts. As a consequence it is only to be expected that responses to questionnaires and interviews asking teachers about their beliefs will provide different results from observation of their practices. However, while this may explain inconsistency between contexts, it does not help us to understand resistance to reform.

Alternatively, apparent inconsistencies between expressed beliefs and practices may be conceived as a product of research rather than a real phenomenon. For example, Speer (2005) argues that the dichotomy between professed beliefs (stated by a teacher) and attributed beliefs (identified by a researcher through observation of practice) is false: beliefs apparently professed by teachers are still attributed to them through researcher interpretation. Problems of inconsistency identified by researchers may thus actually be problems of communication between researchers and teachers, e.g. 'problem solving' being used to refer to different types of activity. More positively, Leatham (2006) starts from a position of assuming that teachers' sets of beliefs make sense to them, even if they may appear inconsistent to others. While such approaches move away from characterising teachers as inconsistent, the persistent identification of beliefs as individual constructs and as major determinants of teachers' practices continues to place responsibility for the 'failure' of reforms with individual teachers. Lerman (2002) makes a case for moving away from such individualised conceptions of belief-practice relationships in order to understand the practices of teaching and hence the conflicting ways in which curriculum reforms are interpreted in teachers' practices as social phenomena (see, for example, Morgan, Tsatsaroni and Lerman, 2002).

2.3 Beliefs as a social rather than individual construct

Following Lerman's call, we seek to develop a way of understanding teachers' implementation of curriculum reforms, the ways they talk about teaching and learning and relationships between beliefs and practice from a social perspective.

A promising way of looking at beliefs is offered by discursive psychology (Edwards, 1997). From this perspective, beliefs are not seen as a cognitive property of an individual but as a phenomenon constructed in specific discursive interactions. Rather than attempting to form relationships between beliefs espoused in research interviews and questionnaires and those apparently demonstrated in classroom practices, this approach would focus on the rhetorical function of beliefs as they are constructed in these different kinds of interactions. “By focusing on discursive, rather than mental activity, however, interpretation is at the level of public interaction, rather than the private realm of the mind.” (Barwell, 2003, p.23). As Gellert (2001) demonstrates, using a discursive psychology approach in his analysis of an interview with a pre-service teacher, a focus on the categories and narratives used in interaction reveals the complexity and contradictory nature of attitudes and beliefs about mathematics. Importantly, it also demonstrates how the interviewee’s responses are organised according to her interests within the interaction, in this case to impute the cause of her negative attitude towards mathematics to the behaviour of a teacher rather than to any personal inadequacy on her own part.

Discursive psychology avoids the essentialisation of beliefs as properties of individual minds and allows us to understand teachers’ apparently contradictory statements and behaviours as coherent means of taking action in different situations. This overcomes some of the methodological problems in studying beliefs from more essentialist positions. However, by attempting to interpret all interactions without imposing the researcher’s categories, the approach does not situate or enable explanation of these interactions within historical or broader social contexts. It is an essentially descriptive rather than explanatory or predictive framework; cultural narratives are deduced from identifying similarities across multiple interactions rather than used to explain or predict specific instances.

We wish to propose an alternative way of conceptualising apparent inconsistencies between teachers’ ‘professed’ beliefs and their teaching and to apply this conceptualisation to understand differently the problems of curriculum implementation. Rather than focusing on the characteristics of mental structures

of individual teachers, it is possible to interpret their utterances and their actions as forms of participation in social practices, making use of the resources of those practices. Unlike a discursive psychology approach, which focuses attention only on discursive constructions within a specific interaction or set of interactions, we seek to understand how such constructions arise within a broader historical and cultural context, identifying sources for the discursive resources deployed by teachers. Critical Discourse Theory provides a multi-layered way of thinking about language use in context that supports this kind of understanding. Texts (for example: responses to questionnaires; interview conversations; classroom interactions) are considered as the linguistic elements of social events. These events are shaped by more general social practices (of which ‘orders of discourse’ are the language-related elements) and by social structures (Fairclough, 2003). Unlike in discursive psychology, analysis from a Critical Discourse perspective focuses at three levels: the communicative interaction itself; the discursive resources used in the interaction and the orders of discourse from which they are drawn; the social structures and socio-cultural practices within which the interaction is situated (Chouliaraki & Fairclough, 1999, p.113).

In order to understand how teachers relate to curriculum reforms, it is therefore necessary not only to identify the constructs and values they deploy in their interactions in interviews or classroom situations but also to determine the various orders of discourse that may be providing resources to shape these interactions. In addition it is necessary to form an understanding of the social structures that play a role in forming these discourses and the relations between them. To do this, we turn to Bernstein’s notion of recontextualisation and recontextualising fields.

3 From distortion to recontextualisation

The conventional discourse of curriculum reform privileges the intended curriculum as the original, correct, principled version in contrast to the implemented curriculum, which is transformed, distorted, corrupted by the obstructive action of institutional factors and by teachers with the ‘wrong’ sets of beliefs. This discourse of corruption may be compared to debates about the

authenticity of school mathematics itself as it is contrasted with mathematics as done in the academy (see, for example, Schoenfeld, 2004; Wells, 1993).

In the case of school mathematics, it is widely recognised that its purposes and the interests of those participating in it are different from those of academic mathematics. Although we would agree with those mathematics educators who argue that students can and should engage in types of activity such as exploration and reasoning, similar to the activity of mathematicians, this is principally to enable them to learn (a particular variety of) school mathematics, developing their personal knowledge, rather than expanding the public field of mathematical knowledge. It remains the case that the vast majority of students are not seeking to become mathematicians. As Adler (1996) argues, their activity may not therefore be conceived, in terms of Lave and Wenger's (1991) notion, as legitimate peripheral participation in academic mathematics. While mathematicians (in general) work to produce new mathematical knowledge, teachers and students (in general) work to reproduce knowledge that has been produced elsewhere. This difference in purposes and interests demands different forms of participation. In Bernstein's terms, school mathematics is a pedagogic discourse, formed by the recontextualisation of other discourses, including academic mathematics but also other discourses such as, for example, theories of learning and teaching. This recontextualisation "selectively appropriates, relocates, refocuses and relates other discourses to constitute its own order" (Bernstein, 2000, p.33). This is an inevitable consequence of movement between contexts with different functions: from the field of production of mathematics (the academy) into the field of reproduction (the school).

A parallel can be drawn with the transformation that takes place between the field of production of research and theory development in mathematics education, and the field of their reproduction. However, in contrast to the case of school mathematics, the field of reproduction is not clearly located in a classroom where teachers learn about theory and research. Rather, the field of reproduction is embedded in many areas of teachers' professional life and the pedagogic knowledge acquired is realised in their own classroom practice.¹ While researchers and teachers may share concerns about the quality of education of students, their

purposes and interests as they engage in the two fields are different. Teachers are not in general concerned with the production of new ideas and knowledge about teaching and learning but with acquiring the knowledge and skills that will enable them to teach in ways recognised (by themselves or by others) as effective – whether motivated by conviction or by institutional requirements.ⁱⁱ

In the process of recontextualisation, theoretical and research knowledge of mathematics education is transformed for the purposes of practical teaching. The development and dissemination of curricula, the production of curricular materials, initial teacher education and professional development activities all play a role in this transformation: selecting from the theoretical and research knowledge and refocusing it for practical purposes. Various fields and agents are involved in this process, each producing discursive resources that teachers may draw on as they develop and talk about their practice. Bernstein (2000) distinguished between the official recontextualising field (ORF), “created and dominated by the state for the construction and surveillance of state pedagogic discourse”, and the pedagogic recontextualising field (PRF), involving more or less autonomous agents independent of the state such as teacher educators and publishers. The relationship between ORF, PRF and a curriculum reform process varies according to the degree of autonomy of the PRF, the extent to which the discourses it produced resemble or differ from those of the ORF and the source of production of the reformed curriculum.

Teachers, as agents in the field of reproduction, have a function of reproducing the official pedagogic discourse produced in the ORF and thereby expressing the dominant principle of society. However, teachers’ practice cannot be wholly determined by external regulations. What is reproduced in the school/classroom depends on recontextualising principles arising out of “the specific context of a given school and the effectiveness of external control over the reproduction of official pedagogic discourse” (Bernstein, 1990, p199). There is, therefore, potential for conflict and resistance between the field of reproduction and the other recontextualising fields and further possibilities for change in the official pedagogic discourse occurring in the field of reproduction.

In England, the curriculum is strongly controlled by the state and is regulated by high stakes examinations and inspections. There also exists a well-established unofficial PRF with a high degree of autonomy, located mainly in university education departments and teachers' professional associations, which produces alternative discourses about the curriculum, deploying different sets of recontextualising principles and playing a major role in recontextualising the curriculum discourse produced in the ORF through teacher education and the production of classroom resources. Although structurally independent, the two fields also influence each other, with significant agents playing roles within both fields (for example, university mathematics educators serving on working groups to design the curriculum or producing national tests to state-determined specifications). The structure of relationships between fields in the recontextualising process in England is shown in Figure 1. This complex relationship creates differences between pedagogic discourses produced at different levels of recontextualising fields; therefore there are differences between the pedagogic texts, between the practices realised by these different pedagogic discourses and between the ways that teachers may seek to legitimise their practices. As the first author demonstrated in an analysis of a text produced in the ORF (Morgan, 2010), the struggle between the recontextualising fields and the interpenetration of their discourses creates a space and resources for teachers to position themselves as 'good teachers' in a range of ways, legitimating a range of different classroom practices. Brown et al. (2000) similarly identify ambiguities in the discourse of the *National Numeracy Strategy* allowing alternative interpretations of recommended pedagogy, while McNamara and Corbin (2001) found primary teachers using a variety of, sometimes contradictory, 'legitimizing discourses' to justify their practices.

In the case of Standards-based reforms in the US, the relationships between the fields are slightly different in that the NCETM *Standards* themselves were produced in the PRF. Moreover, reform curricula are produced at local levels of the ORF rather than nationally, recontextualising the ideas of the *Standards*.ⁱⁱⁱ The ORF also produces other educational discourses, for example, at national level, that of *No Child Left Behind*, that both transform and regulate the curriculum discourse. In both England and the US, however, the ORF and PRF appear to

have similar degrees of autonomy, providing a space for overt struggle over the nature of the curriculum and other aspects of pedagogic discourse.

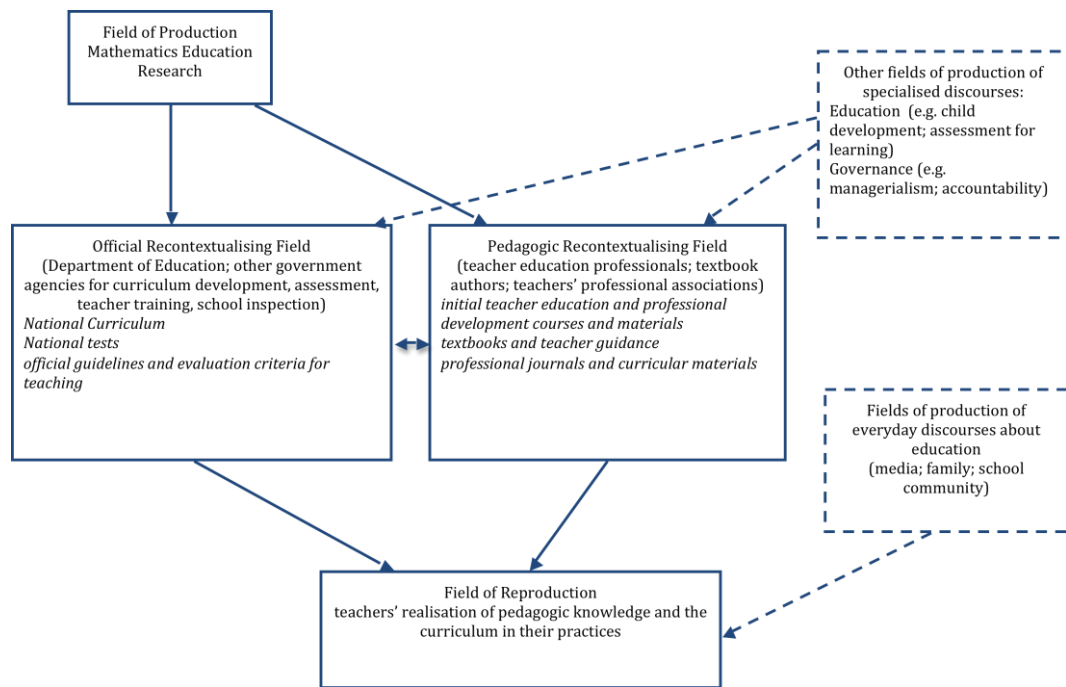


Figure 1: Structures of recontextualisation of curriculum discourse (England)

A contrasting situation is found in the People's Republic of China. Here the extent of state control of the curriculum, the production of curriculum materials and the training of teachers mean that there is no independent Pedagogic Recontextualising Field. Textbooks are produced by a small number of state sanctioned publishers, while teacher training and further resources to support teachers are produced by local government agencies, which also produce public examination papers. The second author Xu's doctoral study of the reform to the mathematics curriculum implemented in China since 2000 identified the layers of governmental administrative control as shown in Figure 2.^{iv} As may be seen, agents in different locations within this structure are involved in recontextualising the curriculum with different interests and different relationships to schools and teachers.

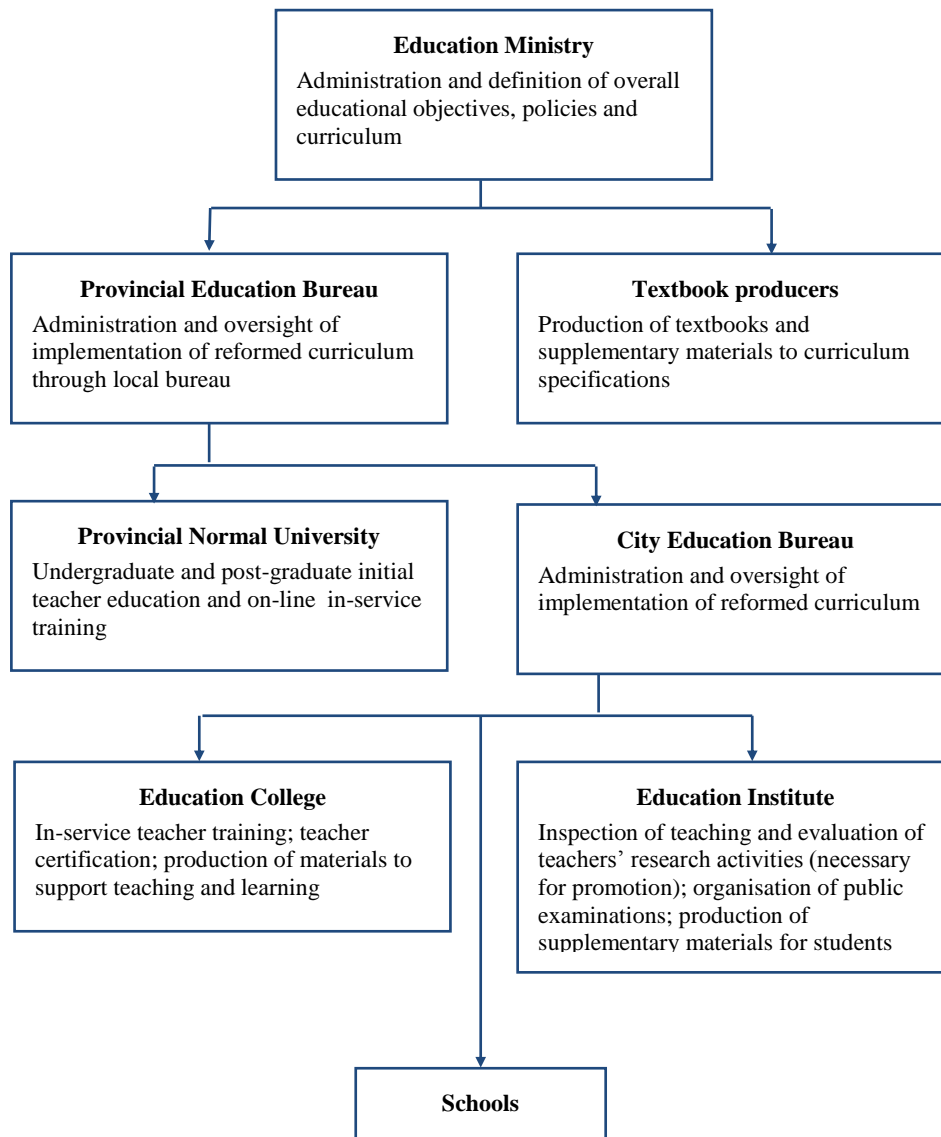


Figure 1: Administrative structure for education in a major city in China

Compared to the education systems in western societies such as England and the US, where the recontextualising field is made up of two sub-fields, the official and the pedagogic recontextualising fields, the Chinese recontextualising field may be seen to comprise three sub-fields, all of them official in nature:

- Official Recontextualising Field (ORF) – the curriculum itself and its principles are produced at national level by the Education Ministry.
- The production of textbooks takes place in the Official Pedagogic Recontextualising Field (OPRF). This is directly controlled and legitimated at national level by Education Ministry.

- The implementation at school level is interpreted for schools and teachers through training and supplementary resources produced at local level in the Local Pedagogic Recontextualising Field (LPRF).

Although both the OPRF and the LPRF have some degree of autonomy, determined by China’s particular political system, this is quite limited. The discourses produced by the agents in these two fields in the form of mathematics textbooks and public examination papers have to be approved by the Education Ministry, and teacher training programs have to satisfy official criteria. These two sub-fields are thus not independent of the control of the Education Ministry. An important difference between the Chinese system and that of most western countries is that in China there is no pedagogic recontextualising field independent of the regulation and authority of the state.

However, even where the state prevents independent development of curriculum discourses, there are differences between the interests of the various sub-fields of the recontextualising field and in the discourses they produce, providing varying resources for teachers to deploy in their interpretation of the curriculum in the field of reproduction. Additionally, teachers may draw on previous discourses of mathematics, teaching and learning encountered during their own education and earlier teaching experience as well as on everyday discourses produced in the local school and community. The fields and discourses identified by Xu in the Chinese context are summarised in Table 1.

Field	Subfield	Discourse produced
	ORF	Official-Discourse
Recontextualising Field	OPRF	Professional-Official-Discourse
	LPRF	Local-Official-Discourse
		Conventional-Discourse
Field of Reproduction		Local-Discourse

Table 1: Fields, sub-fields and discourses of the reformed Chinese curriculum

In the next section, we illustrate how the various discourses transform the principles of the reformed Chinese curriculum and are present in the discourse of teachers.

4 Example: “Efficient mathematics learning”

4.1 Official Discourse

The Chinese *Mathematics Curriculum Standards (MCS)* not only specify the content of the curriculum but also principles of teaching and learning. In common with many curriculum reforms elsewhere, it constructs its new ways of teaching and learning (labelled as “efficient mathematics learning”) in opposition to so-called traditional forms involving “imitation and memorising”. This new approach should comprise three components: “hands-on practical task”, “independent exploration” and “cooperation and communication”. Through engaging in these types of activities, “students will then understand and master basic mathematical knowledge and skills, mathematical thinking and methods, as well as gain experience of taking part in mathematical activities” (Chinese Education Ministry, 2001, p2). The examples provided to exemplify the recommended approach mostly emphasise visual representations and physical manipulation.

4.2 Professional Official Discourse

The official discourse of the curriculum is transformed in the OPRF, realised in textbooks and teachers’ books supporting the use of the textbooks. At the time of Xu’s study, there were three producers of textbooks approved by the Education Ministry. The schools she worked with used the books produced by the Beijing Normal University. The textbooks and teachers’ books clearly include aspects of the three components of “efficient mathematics learning” but the words used to refer to each component have been transformed as shown in Table 2.

According to the teachers’ books, the activities labelled “let’s do it”, “let’s think about it” and “let’s discuss it” are purposefully designed to give students opportunities to “manipulate”, “think” and “communicate”. These transformations allow changes in the types of activity presented as fulfilling the principles of the

curriculum. For example, the transformation of “hands-on practical task” to “manipulate” allows that what is done with “hands” may not necessary be a “practical task”. Indeed, under the title of “let’s do it”, there are some activities which require students to cut shapes or pick balls from a box, in which handling of concrete objects is involved, but there are also activities under the same title involving pure mathematical manipulations such as: “Find the value of the algebraic expression $-3x^2+5x-0.5x^2+x-1$, when $x=2$. Explain how you worked it out” (BNUP, 2002, p97). All these activities involve students using their hands, but in very different ways. While the *MCS* emphasises physical manipulation of concrete objects, though without explicitly excluding other interpretations, the textbook gives the notion a broader meaning, including sketching or writing.

Official Discourse	Professional Official Discourse	
	<i>for teachers</i>	<i>for students</i>
hands-on practical task	manipulate	let’s do it
independent exploration	think	let’s think about it
cooperation and communication	communicate	let’s discuss it

Table 2: Transformation of "efficient mathematics learning" in the OPRF

Similar transformations are made to the other two components. The activities that constitute “let’s think about it” such as cutting up solid shapes and investigating their nets, exploring a sequence of numbers and finding mathematical relationships, or deducing a mathematical formula, are hard to distinguish from those under the title of “let’s do it”. The third learning component “cooperation and communication” is transformed into just “communication” and the tasks called “let’s discuss it” are supposed to promise opportunity for communication. For some of the activities, it is made clear that students should discuss. In others, the tasks could easily be conducted individually, for example: “Through a point which is not on the line AB, draw lines parallel to AB, how many lines can you draw and what do you notice?” (BNUP, 2002, p127). The vagueness in the concept of “efficient mathematics learning” as presented in the official discourse has created space for multiple representations of each of the ideas, as they are recontextualised in the textbooks.

4.3 Local Official Discourse

The LPRF has two main agencies, the Education College and the Education Institute, both of which produce materials for teachers and students, though their roles are slightly different as shown in Figure 2 above. The College produces training materials for teachers. Part of this is simply reproduction and distribution of texts originally produced in the official discourse but the College also produces examples of complete lessons and episodes describing in detail and commenting upon the exploratory activities and group discussions carried out in mathematics classrooms. A common characteristic of these examples and commentaries is a heavy emphasis on the three components of “efficient mathematics learning”, highlighting students’ constructive and dynamic involvement (for example, cutting, partitioning and assembling shapes, picking balls from bags, or counting sticks to discover mathematical patterns etc.) and communication with each other (usually discussion in groups). At the same time, the teacher’s role in organising and guiding students in carrying out these activities is stressed. With respect to this part of the new curriculum the College speaks the voice of the official discourse strongly.

The content of the curriculum is the focus of the Education Institute, which guides teachers in analyzing the content of the textbooks and produces supplementary books for students as well as setting public examinations. The preface to the student books states that they are compiled based on the principles of the *MCS* and the Beijing version textbooks as well as considering the practical needs of teaching and learning mathematics. However, the Institute texts select from the principles of the official discourse, omitting reference to “efficient mathematics learning”. The tasks provided for students are exercises, not significantly different from those in the student books used under the old curriculum.

While the texts of the local professional discourse produced by the College and the Institute explicitly claim support for the principles of the new curriculum and exhort teachers to follow these principles, their recontextualisation of these principles is selective and, in some cases, even oppositional to the official and the professional official discourses. The Institute, for example, identifies topics omitted from the new curriculum that need to be taught and criticises the spiral

ordering of topics in the textbooks and recommends that teachers should teach chapters in a different order.^v The process of recontextualisation in the LPRF has produced two different local official discourses, both purporting to support the principles of the official discourse but realising them in different ways in the materials they provide to support work in the classroom.

4.4 Teachers' discourse in the field of reproduction

The recontextualisation of the discourse of the new curriculum in the field of reproduction was investigated through interviews with 12 teachers in two comprehensive schools and observation of their teaching. The interviews explored how teachers talked about the principles of the curriculum both in theory and in relation to their practical teaching. The observations sought to identify how the principles were enacted.

Where teaching and learning approaches were concerned, the teachers, by and large, did not view the principles underlying the concept of “efficient mathematics learning” devised by the *MCS* as novel. All the teachers asserted that they had always opposed the approach characterised by students passively receiving knowledge through teachers lecturing, or (to use the term of the *MCS*) students learning through “imitation and memorising”, and they tended to claim that they had been following the principles of “efficient mathematics learning” in their teaching practices in their pre-reform classrooms. The teachers thus positioned themselves overtly with the official discourse.

Nevertheless, the ways in which they talked about and enacted the ideas of “efficient mathematics learning” diverged from the official discourse considerably. A key resource drawn upon by the teachers appeared to be the titles, “let’s do it”, “let’s think about it” and “let’s discuss it” found in the textbook. The ways in which the teachers described the components of the learning process matched the titles of the activities in the textbooks, though they did not explicitly discuss the differences in the nature of activities under each of these titles. Different teachers focused on different components, and they drew on alternative discourses to interpret them.

4.4.1 Hands-on practical task

Although, the textbooks included various types of activities under the heading “let’s do it”, the teachers mentioned only tasks that required students to use their hands, such as picking balls from a bag, cutting a carrot or folding a piece of paper, as “hands-on practical task” or “manipulate” activities, consistent with the local official discourse of the College. While accepting that tasks of this type could interest and engage students, most of the teachers called them ‘games’ and expressed doubt that they would lead to mathematics learning. They identified two main problems with activities of this type. First, the result from manual ‘doing’ and visually seeing is not mathematically accurate and cannot be treated as a rigorous mathematical principle. Second, the outcome of a physical activity is only a localised instance and is not generalisable. The teachers were seen to be particularly concerned that students would accept what they had ‘seen’ or ‘guessed’ as generalised mathematical principles or rules. In their practice, teachers used hands-on activities sparingly, describing them as more or less decorative features for their lessons, like a starter to give students some appetite, or as a way to promote visual intuition. According to the head of year 7 at one of the schools, teachers tended to use the “let’s do it” activities when their lessons were observed, or when they taught a lesson that was entered for a teaching competition. The teachers have acquired the realisation rules for producing legitimate teaching according to the regulation of the local official discourse. However, in their everyday teaching and in their interviews, they drew strongly on an alternative discourse about the nature of mathematics as a rigorous and abstract discipline, which we identify as “Conventional Discourse”, derived from their own mathematical education and experience with the previous curriculum. This mixture of compliance and opposition was only explicitly expressed by one teacher, who positioned himself as resisting the official discourses, though complying on a surface level: “If the activity is just a matter of a form, you carry out activity because you have to, then what is the point of doing it?”.

4.4.2 Independent exploration

All the teachers strongly supported the idea that exploration is an important learning strategy and, indeed, claimed to have always included this in their

practice prior to the new curriculum, although several also said they had increased their use of exploration under the influence of the *MCS* and that they used the “let’s think about it” activities in the textbooks. Although in this sense the teachers appeared to speak with the voice of the official discourses, they diverged in the extent to which exploration might be independent. In particular, they explicitly opposed the official discourse idea that students should be “masters of their own learning” as demanded by the *MCS*, making it very clear that teachers’ authority must be retained in the classroom. Only in this way would students’ exploration follow the direction the teachers intended and arrive at the conclusion the teachers desired.

Examining the reasons given for this opposition to independent exploration, two types of issue emerge as significant. In the first place, control over the pace of lessons was a concern, as teachers feared being left behind their colleagues and failing to prepare students adequately for examinations. These fears may be seen to be drawn from a “Local Discourse” of the school that provides resources with which teachers may position themselves as successful teachers in the eyes of their colleagues, the school management, parents and students. Of course, this local discourse is strongly related to discourses about education current in the broader society. Secondly, the teachers expressed scepticism about the success of independent exploration in achieving the desired learning. This scepticism was often expressed in terms of the capabilities of the students. For example, a teacher whose class was mainly formed by the children of migrant families and was regarded as one of the lower performing classes in the year group objected:

For me, these ideas of the Standards depend on, um, if students really take the initiative in learning, they have desire to explore and teachers guide them well, then these ideas should be good to put into practice. However, for students who are less bright it is a big challenge, this is why I am frustrated, you know. [...] If these conditions are met, it should be very good, but I tell you, it is true, especially like the class I teach, to be honest, it is very difficult.

Again, the reasons for opposing independent exploration draw on a local discourse, this time about the capabilities of the students.

4.4.3 Cooperation and communication

Only three teachers interpreted “cooperation and communication” in a way consistent with the official discourse as an approach promoting interaction between teachers and students and between students themselves. The rest of the teachers referred simply to students discussing in groups. This interpretation is consistent with the professional official discourse of the textbooks in which “cooperation and communication” is transformed into “communication” and materialised in tasks under the heading “let’s discuss it”. Furthermore, when teachers enter for teaching competitions organised by local educational authorities, they must make sure that their lessons contain group working and discussions, because this is one of the criteria for a lesson of high quality. There is thus consistency between the recontextualising action of the OPRF and the LPRF with respect to this aspect of the curriculum. Coupled with the regulative power of the competitions as a path to promotion, it is unsurprising to find teachers drawing on these resources rather than directly on those of the official discourse.

While the teachers aligned themselves with the official discourses in seeing “cooperation and communication” as a legitimate approach to teaching, they nevertheless interpreted it as difficult to put into practice. As in the case of independent exploration, the objections drew primarily on local discourse about the nature of the classes, especially class size, and the pressure of time. Some of the teachers also drew on the conventional discourse of mathematics as a discipline that, because of its absolute nature, does not always lend itself to discussion:

For example, calculation, it is impossible to discuss about calculation. I can only ask them to make judgements on it, it is wrong or right. If it’s wrong, where and how it got wrong, if it is right, they need to explain the reasoning.

5 Discussion

The analysis offered above shows that the teachers drew on the resources of the official or the professional official discourses when defining “efficient mathematics learning” and aligned themselves with these discourses but diverged

from the official discourses at the point of interpreting these notions in relation to their own classrooms (whether in practice or talking about their practice). In terms of the individual beliefs-practice paradigm, these teachers could be seen as inconsistent in their beliefs and their beliefs would be seen as obstacles to the success of the reformed curriculum. However, the analysis of the structure of the recontextualising field and the discourses produced in that field provides an alternative way of conceptualising divergence. The discourses of the various official sub-fields provide a range of ways of interpreting the expectations of the reformed curriculum with respect to teaching and learning, while the conventional and local discourses provide further resources for understanding mathematics and students and teachers that also impact upon the options available to teachers in their practice.

Divergence occurred where there was conflict between the discourses of the various recontextualising sub-fields or where these official discourses came into conflict with conventional discourse about the nature of mathematics and local discourses providing narratives about the nature of students and criteria for judging successful teachers. When such conflicts occurred, the teachers generally inclined towards the local official discourse or the conventional and local discourses. This raises the question of why some discourses are more powerful than others in their influence on teachers? In some cases, the forms of regulation of teachers' practices provide at least a partial explanation. Official regulation by examinations and promotion-related competitions, both elements of the action of the LPRF, provide strong reasons for drawing on the discursive resources produced in that field.

The power of the local discourse of the school, colleagues, parents and students may also be related to regulative action by the management of the school, which demands certain standards of student performance. However, the local discourse has a further important immediate relationship to practice. In particular, as the official discourses do not acknowledge difficulties in applying its principles or any variation in its applicability to different students or groups of students (and indeed cannot account for the specific behaviours and needs of particular students), teachers need a means of accounting for and dealing with the

difficulties and differences they experience in their classrooms – a means provided by the resources of the local discourse.

The conventional discourse about mathematics provided a strong alternative to the official discourses about ‘efficient mathematics learning’, though it was consistent with some aspects of the local official discourse produced by the Education Institute and materialised in the examinations produced by that agency. One reason for the strength of the conventional discourse may lie in ambiguities present in the official discourses about the nature of mathematics and the aims of mathematics education, allowing space for older discourses to persist and for teachers to align themselves with them.

As in many studies of the introduction of reforms into schools, the curriculum implemented by the teachers studied by Xu differed from that represented in the official discourse of the *MCS*. We have sought to understand this as a social phenomenon rather than as located in the psychology of individual teachers. Differences between what was envisaged by the reformed curriculum and what is enacted in classrooms are interpreted as the result of recontextualising actions effected by agents with different interests and relationships to teachers. Rather than attempting to discover what teachers ‘believe’ about mathematics, teaching and learning, we have analysed their statements and actions according to the discourses they draw upon and the ways they position themselves in relation to these discourses. Like Leatham (2006), we start from an assumption that teachers’ behaviour makes coherent sense. Where there are inconsistencies or tensions within or between teachers’ words and practices these are interpreted as inconsistencies within or between the various discourses available to the teachers. The challenge is to understand the relationships between these discourses and the reasons why some are more powerful than others in their impact on teachers.

In producing this analysis we have sought to identify the sources of the discursive resources used by mathematics teachers to talk about their practice and to implement a new curriculum in their classrooms. We have also attempted to develop an understanding of the structures of the fields and sub-fields producing these discourses, their relationships to each other and to teachers’ professional

practice. The context of Xu's study in a region of the People's Republic of China gives rise to a particular set of recontextualising sub-fields with the important characteristic that, while differing from one another in their functions and interests and hence in the ways they select from and transform the official discourse of the *MCS*, none is independent of the state. The ways teachers draw from the discursive resources produced in these sub-fields and position themselves in relation to them are clearly influenced by their official nature, which shapes the possibilities for overt resistance and the use of alternative discourses. In other national contexts, especially where an independent Professional Recontextualising Field exists, we would expect to find teachers using a different range of strategies as they position themselves in relation to the discourses of reformed curricula. We suggest that studies of curriculum reform in other contexts would benefit from analysis of the structures of the recontextualising field and its discourses in order to understand (and indeed predict) the selections and transformations of this discourse in teachers' professional practice.

Notes

ⁱ Morais and Neves (2006) also make the move of considering the implementation of curriculum reform as a pedagogic discourse. In their work, the pedagogic nature of the implementation is perhaps more obvious than in larger scale reform as the researchers worked intimately with teachers in an action research programme. While Morais and Neves do not address the question of recontextualisation, they do analyse teachers' responses to the programme in terms of their acquisition of the recognition and realisation rules of the new form of pedagogy.

ⁱⁱ This is not to say that teachers do not produce new knowledge as they engage in their professional practice. However, this is not their main concern.

ⁱⁱⁱ Of course, the local ORF in some parts of the US has rejected the principles of *Standards*-based reform and have produced curricula drawing on alternative or oppositional discourses.

^{iv} This analysis is based in a major city in inland China. While the overall structure is likely to be similar elsewhere in China, the details at local level may differ.

^v The MCS sanctions variability in the ordering of the curriculum so the Institute's action is technically compliant, while implicitly opposing the principle of a spiral curriculum and the official pedagogic discourse manifested in the textbooks. Again the ambiguity of the official discourse allows space for alternatives.

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