Curriculum (as) Theory: Nine non-exclusionary principles and some brief commentary

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Abstract

In this paper I shall establish an isomorphism between curriculum and theory and derive nine principles for the elaboration of both. In doing so, I shall be working with reference to my own organisational language, social activity method, and will recruit agenda items from the work of Basil Bernstein. In deriving the principles, I will generate some collateral commentary on the school and university curriculum. Whilst the examples will be drawn, mainly, from mathematics, I maintain that both principles and commentary have relevance for the wider curriculum and, indeed, for educational theory.

Prologue: The Tenth Principle

If I'm saying anything at all, then you won't be able to understand the nine principles of the title of this paper until you know the whole thing. This is to say that a theory (or a curriculum) can only ever be recovered from its narrative recontextualising at the end of the story; at which point, some of the diverse commentaries that the theory has been producing in its revelation might also usefully be pulled together. This principle is, of course, commonplace, which is why it can be placed at the fore. Strange, then, that curricula of the relay kind—as opposed to curricula of the apprenticeship kind—often have a marked tendency to present principles at all points along the way. In this paper I shall not, but will gather them at the end of my discourse.

Theory as Technology

Some time ago (Dowling, 1991) I published an article that set out to challenge determinist interpretations of technology—quite common at the time—by viewing specific technologies as signifiers of a particular, stable (to an extent and for a time) social organising. In 1991 I referred to this social organising as a global division of labour and my technology was 'the computer'. More recently (2007a), I have reflected on 'the windmill' and 'the internet' and described the social organisings as alliances (and associated oppositions), describing, for example, the Trends in International Mathematics and Science Studies website[1] as signifying a division between a legitimate public form of rationality—'mathematicoscience'—and governance—'democracy'—and pragmatic private modes that, we might imagine, get much of the job (whatever it is) done. It is possible, however, to reverse the direction of the gaze. Here, I want to view technologies from different perspectives within the

[1] http://nces.ed.gov/timss/.

alliances and oppositions that they signify (or are made to signify). And here my technologies of choice are of a more discursive kind. One term that we might use for these technologies is 'theory', but there are alternative terms that might be recruited alongside or instead ot 'theory'. Basil Bernstein (2000) has used the expression, 'language of description'; I (2007b, in press) prefer, 'organisational language'; Foucault's (1978) *dispositif* is translated as both 'apparatus' and 'device' and both are perhaps more heterogenous in their extensions than theory or language, though Bernstein's 'pedagogic device' is more linguistic; perhaps even 'discipline' might do. For me (though not necessarily for other authors) these categories are intended to refer to regularities of practice that are emergent upon social action that is strategic in respect of the formation, maintenance or destabilising of alliances and oppositions and they might be identified at any level of analysis. My own organisational language can be thought of as a theory/technology, as might Bernstein's language of description or Foucault's genealogy. Members of alliances that recruit these theories/technologies in an earnest way see themselves as operating *within* them (or *from* within them); of course, there will be disagreements and equilibration, but let me propose that we can generally constitute, at any given level of analysis, an alliance as a field of generation of the theory/technology, within which subjects recognise each other as legitimate members.

So I now want to propose that an exteriority with respect to any given theory/technology is established via a gaze cast from another theory/technology.[2] The effect is a recontextualising, sometimes realised as the reduction of a field of debate or exploration to a sign. We sometimes see this in the use of 'epistemology' in the sociology of knowledge (eg Maton, 2000) and of 'sociology' outside of this discipline. We certainly see it in the recontextualising of sociology by 'sociology'; the bastardising of *habitus*, for example, as an explanatory entity rather than, in its own field of production, as a terrain to be visited and re-visited in iterative theoretical/empirical transaction. Picking up de Certeau's (1984) terminology, we might describe actions within an institutionalised field of practice (alliance—theory/technology) as strategic; actions from outside must be understood from the inside as tactical, plundering. I want to define *apprenticing* pedagogy as limited to strategic action; tactical action—action that originates outside of the apparent field of acquisition—generates *relaying* pedagogy. I should emphasise, here, that what appears to be tactical action from the point of view of one theory/technology, might be strategic from the perspective of another, to the extent that this other theory/technology is strongly institutionalised.[3] I want to propose, then, that apprenticing pedagogy is a necessary condition for the constitution of subjectivity within the field of acquisition.

I am clearly building elements of my own organisational language in this presentation. I want, though, to make a strategic invasion into another in order to establish an agenda for the remainder of the paper. For this purpose, I shall purloin Bernstein's (2000) 'pedagogic' device'. This is an entity that is (to me, see Dowling, 1999 and in press) of uncertain providence within Bernstein's own language, but, no matter, I am committing a 'misreading' or misprision of his language in order to assist

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[2] The ideas in this paragraph arose out of discussion with Soh-young Chung.

[3] To maintain some consistency with de Certeau: tactical action is that which is associated with the everyday in the sense of weakly institutionalised practices; the flaneur as opposed to the architect.

in the construction of my own (see Dowling, in press; Bloom, 1973). In particular, I am dislocating the pedagogic device from its articulation with the division of labour and principles of control within society, and from 'classification' and 'framing'. This leaves me with the rules of Bernstein's device, principles of recontextualisation, distribution, and evaluation; a not insignificant residue insofar as it is difficult to imagine a pedagogic situation that does not entail these three modes of action. I shall focus on recontextualisation and distribution in the following example.

Let's take mathematics as a kind of theory. Figures 1 and 2 are two tasks taken from a now rather elderly school mathematics scheme.[4] I have discussed these texts elsewhere (for example, Dowling 1998) and will do so only briefly here in order to illustrate my point. In Figure 1, we can see evidence of a recontextualising device that is common in school mathematics texts that are distributed to high 'ability' students. Specifically, the task first indexes a non-mathematical context, introduces a mathematising of the context, and then swiftly moves away into something that looks much more like conventional mathematics qua mathematics. Figure 2 is very different. The use of a photograph rather than a drawing and the locating of the viewpoint at the policeman's shoulder rather than at an objectifying distance suggests a greater degree of identification with the non-school context; there is a sense in which this task appears to be for the non-school context, whereas the task in Figure 1 starts out by being about the context, but then the context is all but left behind in subsequent text. The task in Figure 2, but contrast, never really leaves the non-school context, though the final part of the task involves using a drawing of a skid mark rather than inviting students to go out into the road and observe (or cause) real accidents. From the point of view of the technologies of traffic policing, both texts would be seen as tactical recontextualisings and so, to a greater or lesser extent, alienating. However, whilst Figure 1 entails a degree of apprenticing pedagogy *vis a vis* mathematics, Figure 2 might almost be taken for a page from a police training manual rather than a mathematics textbook (if, of course, we didn't know better).

I have referred to the kind of text that appears towards the end of Figure 1 as *esoteric domain* text (Dowling 1998); it is a form of text in which both expression and content are strongly institutionalised or, crudely, instantly recognisable as mathematics *per se*. The text in Figure 2, whilst, in certain respects, organised by the content of the mathematics curriculum, is clearly not mathematics *per se*; this is *public domain* text. Figure 1 begins in the public domain, but moves quickly towards the esoteric domain; Figure 2 remains in the public domain. It will come as no surprise that Figure 2 is from a book that is directed at low 'ability' students. Both kinds of text have been constituted by/within what I have referred to as a kind of theory—school mathematics. I shall now pursue this theorising of theory into the curriculum more generally.

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[4] SMP 11-16, Books Y1 and G1 respectively, School Mathematics Project, Cambridge University Press, Cambridge.

M13

When measuring skid marks, the police can use this formula to estimate the speed of the vehicle.

$s = \sqrt{(30fd)}$

s is the speed in miles per hour (m.p.h.).
d is the length of the skid, in feet.
f is a number which depends on the weather and the type of road.

This table shows some values of f.

		Road surface	
		Concrete	Tar
Weather	Wet	0·4	0·5
	Dry	0·8	1·0

(a) A car travelling on a wet concrete road makes a skid mark of length 80 feet. How fast was it travelling?

(b) (i) When the road surface is tar and the weather is dry, the formula may be written

$s = \sqrt{(30d)}$

Complete this table to show the values of s for the given values of d, to 1 decimal place.

d	50	100	150	200	250
$30d$	1500				
$s = \sqrt{(30d)}$	38·7				

(ii) Draw axes, with d from 0 to 250 (use 2 cm for 50) and s from 0 to 100 (use 1 cm for 10).
Draw the graph of (d, s).

(iii) Use your graph to find how many feet a car would skid on a dry tar road at 75 m.p.h.

181

Figure 1
From SMP 11-16 Book Y1

F Skids

When a car is in an accident,
there are often skid marks on the road.
The police measure the length
of the skid marks.
Then they can work out how fast
the car was going when it started to skid.

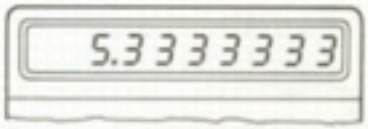
This formula tells you roughly how long a skid will be.

$$\text{length of skid} = \frac{\text{speed} \times \text{speed}}{75}$$

The car's speed must be in **miles per hour** (m.p.h.).
The skid length will be in **metres**.

F1 A car is moving at 30 m.p.h. and then skids to a stop.
Roughly how long will the skid marks be?

F2 (a) Work out how long a skid will be from 20 m.p.h.
Check you get this display on your calculator.



(b) **Roughly** how many metres long will a 20 m.p.h. skid be?

F3 (a) Copy and complete this table.
It shows the length of skid from different speeds.

Speed (m.p.h.)	Skid (metres)
20	
30	
40	
50	
60	
70	
80	

(b) The police measure some skid marks.
They are 27 m long.
About how fast do you think the car was going?

F4 Here is a picture of some skid marks.
1 cm on the picture is 1 m on the real road.
About how fast do you think the car was going?

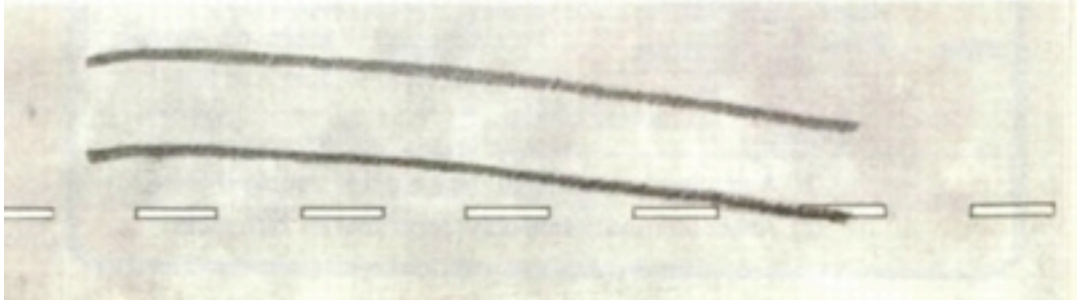


Figure 2
From SMP 11-16 Book G1

Curriculum as Technology

It may, then, come as no surprise that I want to add the term 'curriculum' to the list of alternatives introduced for the term 'theory'. I propose that the recontextualising and distributing action going on in and between Figures 1 and 2 can be taken to suggest that school mathematics might be construed as a hybrid kind of theory/technology, comprising mathematical (say) content and pedagogic theory. I have argued elsewhere (Dowling, 1994, 1998, in press) that all practices (technologies) vary internally and in comparison with other practices in terms of the extent to which their principles are made available within discourse. I refer to this variable as *discursive saturation*, which may be high (DS^+)—a tendency towards more explicit principles—or low (DS^-)—more tacit. Pedagogic theory, in other words, does not necessarily signify something explicit and complex, such as Piagetian constructivism. Essentially, pedagogic theory achieves at least what Bernstein's pedagogic device is supposed to achieve, which is to say, recontextualising, distribution and evaluation. In terms of recontextualisation, pedagogic theory is that which enables a curriculum technology—or, rather, the subject of a curriculum technology—to look beyond itself, to create a public domain. Essentially, the theory/curriculum casts a gaze on texts or contexts—such as domestic scenarios—generating a commentary; this simple schema is represented in Figure 3.

The technology in Figure 3 must be hybrid in some sense precisely in order to see beyond itself. In the context of a curriculum, I have described this hybridity as incorporating a content and pedagogic theory. In other forms of technology, the hybridity may be described as comprising a metaphorical apparatus, consisting of the potential to be referred to texts beyond itself, and a method, that deploys devices ($DS^{+/-}$) of selection and recontextualisation etc. Often, of course, the 'text' is imaginary. It is not at all certain, for example, that the authors of school mathematics textbooks generally observe actual domestic practice in generating public domain commentaries as mathematical tasks. The same is true for research theory, which may sometimes constitute imaginary data in order to explicate or illustrate itself. In the case of school mathematics, the range of (real/imaginary) texts may be constituted as the terrain of mathematical use-value. Insofar as there is continuity in the mathematical content as deployed over diverse non-mathematical texts, then pedagogic theory is mythologising transferable skills and discourses; mythologizing, because precisely what constitutes orthodox action within the non-mathematical texts is determined by the technologies that respectively produce them and not by the commentary manufactured by the mathematical gaze. Alternatively, the range of texts may be constituted as a range of potential metaphors for mathematical objects that may be recruited in the facilitating of a route into mathematics itself; under this scenario, the texts/contexts are arbitrary—whatever works as a metaphor will do—and is, like Wittgenstein's (1961) ladder, nonsensical and disposable.

In the case of academic sociology, for example, the range of texts and contexts constitutes the empirical field (see Brown & Dowling, 1998) of sociology as discipline. Depending upon what the sociologist thinks that they are doing, this may be interpreted as the terrain over which sociology might legitimately be held (by sociologists) to provide descriptions, explanations, critiques and so forth. Again, sociological commentaries will be more or less radically distinct from those produced

within the technologies of generation of the empirical field texts and contexts. Where the texts and contexts are being recruited as illustrative of sociological objects, then they are pedagogic resources and, again, the texts and contexts themselves are disposable.

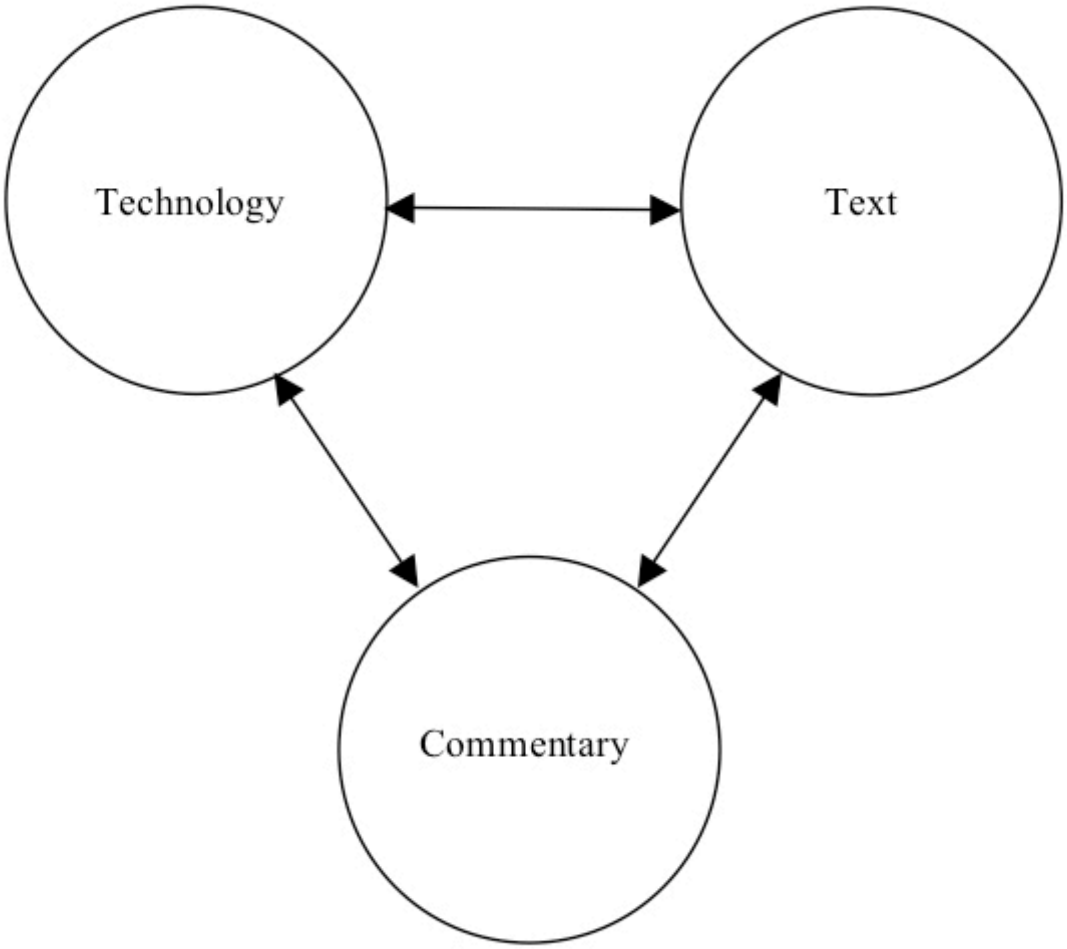


Figure 3
The Technological Gaze

The hybridity of a technology might be described as a composition of an internal and an external language (see Bernstein, 2000). As I have suggested, each may exhibit DS^+ or DS^-. This gives rise to the schema in Figure 4 that defines four *grammatical modes* of technology. I have already introduced two of these, metaphorical apparatus and method, that might describe, respectively, the mathematical content of a curriculum and its pedagogic theory or a sociological theory and research methods. The mathematical content or sociological theory is explicitly coherent, but needs the addition of a method in order to be able to see beyond itself. A metonymic apparatus, by contrast, already has explicitly coherent internal and external languages; astrophysics might be a candidate for such a mode insofar as it articulates highly developed theory with highly developed and explicitly regulated inscription devices (cf Latour & Woolgar, 1979; see also Dowling, in press,

c. 1 for an example). Fiction has weakly developed internal and external languages; candidates here would be certain forms of literary theory, for example, the 'mildly deconstructive' approach adopted by Hartman (1987) in his reading of the key phrase, 'a timely utterance', from Wordsworth's Ode, though not the New Historicism of Louis Montrose (1989), which would more appropriately be described as a metaphoric apparatus.

	Internal language	
External language	DS^+	DS^-
DS^+	*metonymic apparatus*	method
DS^-	*metaphoric apparatus*	*fiction*

Figure 4
Grammatical Modes
(Adapted from Dowling, in press)

Referring, then, to Figure 4, school mathematics, as I have described it, articulates a metaphoric apparatus—mathematical content—with pedagogic theory. The latter may combine more than one and possibly all of the grammatical modes, though I suspect that, in the practice of task design, the dominant mode is that of *fiction*. For example, the mathematical content deployed in the tasks in Figures 1 and 2 is concerned with handling formulae, in one way or another. In the school mathematics curriculum, kinematics and kinetics are familiar areas in which 'formulae' are derived, deployed and represented, so the role for pedagogic theory is to identify non-mathematical settings within which simple (but, perhaps, not too simple) formulae are used and to shape tasks that either establish an apprenticing move into mathematics (Figure 1) or that present (mythologise) the use value of mathematics within the recontextualised setting (Figure 2). It would seem likely that the internal language of such theory would be more tacitly than explicitly principled insofar as, for example, it is unlikely that the author of either task would describe either the recontextualisation or distribution principles in the way that I have here. The recognition principles of the external language of the pedagogic theory seem also to be unlikely to have been developed explicitly; in my own experience of formulating such tasks, serendipity would seem to be a suitable word to describe the way in which settings are arrived at. Thus this kind of pedagogic theory satisfies the conditions of *fiction*.

Arguably, the same often applies in the construction of assessment tasks. The items in Figures 5 and 6, for example, are taken from the Trends in International Mathematics and Science Studies website as instances of test items used in the studies. On the basis of the image in Figure 5, the 'correct' answer, 14 m, appears, at first glance, to be reasonable. However, because no account is taken of the width of the car, its distance from the wall, or the distance of the observer from either, there is at least one alternative that is equally reasonable. If the nearest side of the car is about 1.6 m from the building and the viewer about 7 m away from the car and in line

with the rear of the car and the end of the building, then 18 m is a better answer. Again, serendipity is the most likely answer to the question, how was the setting selected—cars parked in front of buildings are common enough sights. As with the case in Figure 2, a task has to be constructed that fits the curricular item, estimation of comparative lengths, but that is also consistent with a paper or two-dimensional screen environment; a rather context-dependent recontextualisation.

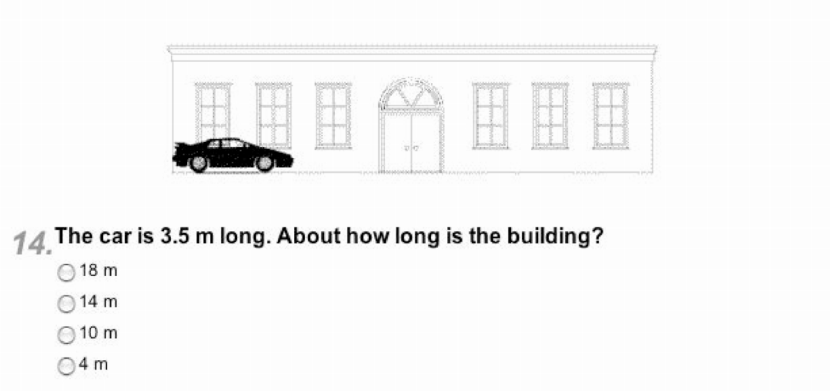
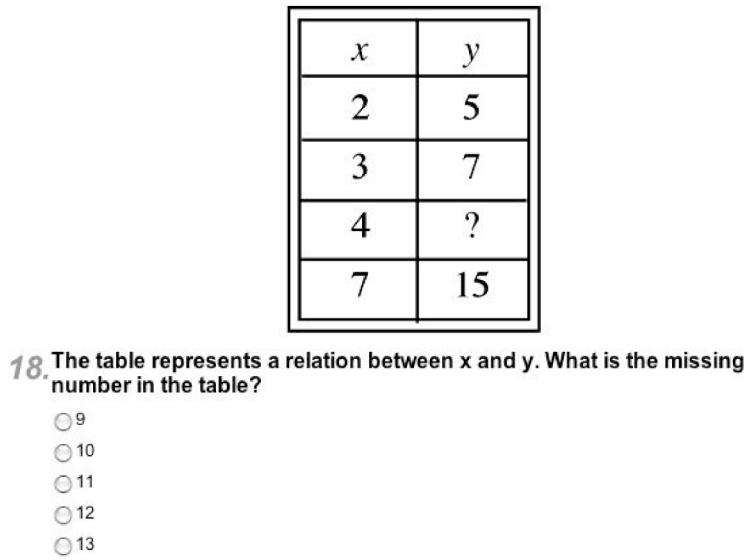


Figure 5
TIMSS Test Item from Grade 8 Mathematics

The situation in Figure 6 is a little different in that this is essentially an esoteric domain item. However, pedagogic theory must constitute the mathematical content as exterior to itself in order to construct assessment items. The site registers 9 as the sole acceptable answer. Had the question in Figure 6 asked, simply, 'what is the missing value for *y*', then the answer might have been anything at all as 'relation between *x* and *y*' does not specify any necessary form of regularity, but simply asserts that the selection of a particular value of *x* will have implications for the value of *y*. So *y* might be a large blue frog! Of course, the actual formulation of the question indicates that the answer is a number, so this narrows things down a bit, but only to the cardinality of the continuum! The question would have to specify that the relation is linear in order to force 9 as the correct answer. Again, it would seem that unlikely that there has been any application of explicit internal principles—a general theory of pedagogy—or external principles relating to how such a theory is to be operationalised—fiction.

Now, insofar as mathematics in school is generally fictionalised by pedagogic theory, then pedagogy is relaying rather than apprenticing and the acquisition of mathematical content is devolved to that which is mythologised by pedagogic theory, which is to say, the acquiring subject as constituted by pedagogic theory. In the case of these two test items, the student taking the test must embody the recognition principles (presumably tacit) that enable them to recognise the mathematics that is being signalled or, alternatively and to the extent that these items are instances of a well-rehearsed repertoire of similar test items, to recognise the general case and the appropriate approach to its solution. In the latter case, the student is constituted in an similar way to the student targeted by the task in Figure 2, which is to say, as being confined to a mythologised, non-mathematical context: a public domain practice, in the case of Figure 2; a pedagogic practice, in the case of the TIMSS items. The public domain setting of Figure 2 is, by comparison with the majority of the settings in

this series, a little unusual; in maany cases, the settings are likely to be very familiar to the student—school and domestic settings etc. But precisely because these texts rarely leave the public domain (Dowling, 1998), the curriculum is being constituted as being about/for the everyday activities that these public domain settings recontextualise. The student of this series, then, is being constructed as incompetent in respect of their own lives, but nevertheless potentially competent in terms of making the move from the recontextualised public domain to the everyday.



x	y
2	5
3	7
4	?
7	15

18. **The table represents a relation between x and y. What is the missing number in the table?**

- 9
- 10
- 11
- 12
- 13

Figure 6
TIMSS Test Item from Grade 8 Mathematics

Moving through the phases of public schooling in the UK (and probably in many other places as well) we can identify variation in the nature of the hybridity of curriculum technology. The curricula in both elementary and secondary schools is specialised in terms of their contents. However, whilst secondary school teachers are generally also specialists, elementary school teachers are, in the main, generalists. We might expect to see, then, a greater emphasis on pedagogic theory (as defined here) in the elementary school and a greater emphasis on curriculum content in the secondary school. In particular, in school mathematics, at least, we tend to find, since the influence of progressivism in the 1960s, an emphasis on practical activity; this is from another rather elderly school mathematics text, this time *Nelson Mathematics*, which is directed at elementary school level:

- children need concrete experiences if they are to acquire sound mathematical concepts;
- like adults, children learn best when they investigate and make discoveries for themselves;
- children refine their understanding and develop conceptual structures by talking about their own thinking and what they have done;

(Published by Thomas Nelson & Sons, Walton on Thames, 1992; p. 5)

The recontextualisation of Piaget in and by elementary school mathematics is very familiar (see Walkerdine, 1984; Dowling, 1998). Here, though, the text seems to imply that children will not have relevant experiences unless they are provided in the school. If, indeed, Piaget is a part of the basis of this kind of pedagogic theory, then, whilst the sequence, sensori-motor, symbolic, operational (Dowling, 1998), is clearly present, Piaget's (1995) radical separation of these systems is elided. Another likely source of inspiration is the ancient Chinese proverb often quoted in relation to elementary school education:

> I hear and I forget;
> I see and I remember;
> I do and I understand.
>
> (See, for example, http://www.vermontcommunityworks.org/cwpublications/journal/cwjexpreflect/watson/watson.html)

Here is a theory that is quite clearly empiricist in tone and rather at odds with the position being adopted in this paper, which is to say: the nature of the understanding of any action is given by the particular technology that is being deployed in its interpretation; mathematics does not come from the ground up, but from the casting of a mathematical gaze, which must be acquired in order for this to happen. Nevertheless, to the extent that elementary school pedagogic theory is broadly consistent with *Nelson Mathematics* and with the proverb, then a key task for the mathematics teacher is a search for new activities in line with this theory.

The shift of emphasis towards mathematical content in the secondary school does not entail that pedagogic theory goes away, far from it. Firstly, there is still a substantial emphasis on practical activities—tearing the corners off triangles and laying them along a pencil line or straight edge to 'prove' that the angles of a triangle add up to 180^{o} and so forth—much of this is confined to the early parts of the secondary curriculum and to activities directed at the 'lower ability' students, but there are plenty of graph drawing exercises throughout—see, for example, Figure 1. One major effect of pedagogic theory is, as Bernstein clearly recognised, the chunking, sequencing, and pacing of the curriculum so that, in one way or another, secondary school mathematics is constituted as a series of themed chunks, which are generally re-visited to develop ideas that are thereby constituted as more advanced. This revisiting pattern resonates with Jerome Bruner's (1966) 'spiral curriculum', though there is a certain necessity to it, at least in the mathematics curriculum, given that just about any theme that might be the focus of a chunk is capable of being developed within mathematics well beyond the anything that is currently taught in schools.

This is Basil Bernstein's view of where the school curriculum content comes from, here talking about physics:

> … the authors of textbooks in physics are rarely physicists who are practising in the field of the production of physics; they are working in the field of recontextualization.
>
> As physics is appropriated by the recontextualizing agents, the results cannot formally be derived from the logic of that discourse. Irrespective of the intrinsic logic which constitutes the specialized discourse and activities called physics, the recontextualizing agents will select from the totality of practices which is called physics in the field of production of physics. There is selection in how physics is to be related to other subjects, and in its sequencing and pacing

> (pacing is the rate of expected acquisition). But these sections cannot be derived from the logic of the discourse of physics or its various activities in the field of the production of discourse.
>
> (Bernstein, 1996; pp. 48-9)

Now it's not entirely true that practising physicists or mathematicians are not involved in the writing of school textbooks and they have certainly been involved in the construction of the school curriculum. For example, a particular group of mathematicians—the self-styled 'bourbakiists'—were highly influential in the development of the modern mathematics movement of the 1960s (Cooper, 1985; Dowling, 1998; Moon, 1986). Nevertheless, Bernstein is right about the effect of recontextualisation. The bourbakiists were attempting to counter the fragmented nature of school mathematics, which, especially in the US, was widely taught as separate courses in algebra, geometry, general math (arithemetic etc), calculus and so forth. They attempted to organise a curriculum around a particular philosophy of mathematics that viewed the discipline in terms of 'mother structures'. In particular, the mathematics of sets was to generate coherence in the whole of the new math/modern mathematics curriculum. But such content coherence clashed with the curricular technologies already in place in both. The result of progressivism in the elementary schools in confrontation with set theory was the generation of a whole new reservoir of resources for activities, largely associated with sorting objects into sets. The chunked curriculum of the secondary school recontextualised set theory as just another chunk. Thus, the pedagogic theory of elementary and secondary school mathematics recontextualises mathematics itself in two particular ways, neither of which is consistent with mother structure coherence.

Public and Private Curriculum Technologies

I have proposed (and see Dowling, 2007a, in press) that high profile, international comparative studies, such as TIMSS contribute to the constitution of a hegemonic, public discourse that I have referred to as 'mathematicoscience'. I would suggest that this is also supported by the particular constructions of popular and school mathematics and science. The scientific dimension of this technology regulates the legitimate mode of relationship to the empirical, which is characterised by the exclusion of the subjective. The mathematical dimension regulates the legitimate form of argumentation that, again, eliminates the subjective via its insistence on syllogism. Of course, the subjective, the apparently arbitrary, characterises just about all of our activities, not least because of the affective and because of perceptual differences between participants; decisions at all levels of significance are, we might suppose, frequently taken according to very private kinds of discourse. This will often obtain even in the case of collaborative action; what else is negotiation, compromise, bargaining, seduction. But, being called to account for one's actions seems to entail the invoking of a putatively universal, public discourse. The subjective must be strategically eliminated precisely to avoid the accusation of arbitrariness; decisions must be recontextualised in rational form; this is a general principle of all evaluative action and not just of mathematics and science: the subjectivity of the object of evaluation must be eliminated. So, the nature of the private authority claim is very different from that of the public authority claim. The former mode may tend to predicate authority on closing the category of authority claimant, or author (this is *my*

choice …), leaving open the category of practice (and I may choose whatever I want …). The public authority claim, by eliminating subjectivity, opens the category of author (anybody would do the same …) whilst closing the category of practice (… for the following reasons). I (Dowling, 2000, 2007a, in press) have referred to these respective modes as 'charismatic' and 'bureaucratic', respectively. This is clearly a 'misreading' of Max Weber (1964), but this particular misreading opens up the strategic space shown in Figure 7.

Category of author	Field of Practice	
	Open	Closed
Closed	*Charismatic*	*Traditional*
Open	*Liberal*	*Bureaucratic*

Figure 7
Modes of Authority Action

This space introduces two other modes of authority claim, 'traditional'—another misreading of Weber—and 'liberal', which is not a Weberian mode of authority. Indeed, this last mode effectively eliminates authority, leaving open both author and practice. This is the Piagetian (1995) utopian form that he constitutes as the condition for the development of operational thinking, which might otherwise be inhibited by authoritative pedagogy. We might associate the 'traditional' mode with Piaget's 'gerontocratic' societies in which traditional practices are sustained by community elders, closing the categories of both authors and practices and inhibiting social evolution. The traditional mode might also be associated with secondary schooling during periods and in disciplines in which there is a good supply of graduates having directly relevant qualifications. Under such circumstances, for example, mathematics teachers may teach mathematics, but not science and *vice versa*. Where, as in mathematics teaching in the UK, arguably since the 1970s, there is a shortage of 'suitably qualified' teachers, bureaucratic authority strategies take over and the emphasis shifts to the production of 'teacher-proof' materials, such as the SMILE scheme.[5] The production of official curricula also bureaucratises the teacher insofar as the prescription of what is to be taught is imposed upon all appointed teachers.

It is perhaps worth mentioning—though I shall not develop this here—that we might also describe recent trends in Higher Education in the UK in the terms of Figure 7. These trends are clearly associated with the massive expansion in Higher Education, which catered for only 6 per cent of under-21s in the early 60s but, forty years later, took 43 per cent of 18 to 30 year olds (Department for Education and Skills, 2003). They are also associated with government recruitment of information handling systems that are continually widening and deepening in terms of their penetration of all governmentally funded activity and—relating to the same technological developments—changes in the publishing industry. Let me simply list a

[5] Secondary Mathematics Individualised Learning Experience, initiated in the Inner London Education Authority in the early 1970s; see Dowling, 2007, in press.

few of these very familiar trends; and I do so without implying any judgement as to their propriety.

1. Abolition of the binary divide in the 1988 Education Reform Act.
2. Modularisation of teaching programmes.
3. Progressive elimination of research methods teaching from masters programmes.
4. Changes in assessment practices, for example.
    - Decline in the importance of unseen examination papers;
    - Decline in the importance of the traditional essay;
    - Increase in the use of multiple choice questions;
    - Increase in the use of coursework.
5. Development of alternative doctorates.
6. Increasing involvement of students in the design and delivery of the university offer through, for example, student representation on course boards, official and unofficial student evaluation of programmes and faculty members, increasing use of complaints procedures and litigation by students.
7. Decreasing significance of the book length monograph in favour of textbooks and shorter works.
8. Increasing emphasis on equal opportunities policies.
9. Increasing importance of inspectorial activity, such as the Research Assessment Exercise, Subject Review and so forth.
10. Introduction of a universal requirement for the formal approval of research on ethical grounds.
11. Increasing dominance of administration and administrators over academics.

I could clearly continue. Now items 1-8 on this list might all be understood as entailing, in one way or another, a reduction in the authority of the university faculty and/or the elite university faculty over students and potential students and, at the same time, an opening of the field of practice. So these are liberalising strategies. Items 9-11 maintain closure of the field of practice, albeit possibly in recontextualised forms, but reduce the authority of the academic, who must increasingly rely on bureaucratic strategies. Both categories of strategy seem set to invade the comparatively private world of the traditional and charismatic academic in the constitution of a public form of academic discourse. This may signal—which is not to say cause—the impending demise of the university in the form that we know it and the return of scholarly work to the private activity of leisured groups, perhaps authoring and engaging on privately funded websites.

The public/private distinction might be approached in a slightly different way. To illustrate this, I'll look at research education in the university, drawing on my own experience of teaching on masters and doctoral programmes and in authoring research methods textbooks. The textbooks are, in a sense, pedagogic recontextualisings of research; they define and theme issues that arise in the production of research outputs. However, whereas school textbooks have, in a sense, nowhere to go—teachers, their surrogate authors, are generally not

practitioners of academic disciplines other than as specifically school subjects—university research methods textbooks are written and used by practitioners of research. There is thus a real possibility of dialogue between the pedagogic text and research practice. Indeed, *Doing Research/Reading Research* (Brown & Dowling, 1998) was deliberately written as a position piece as well as an instructional text, a fact not lost on one complimentary reviewer:

> [the book] goes very close to requiting the notion that you can write successfully for beginners and, at the same time, define the field.
>
> (Davies, 1999; p. 257)

A consequence of this is that research textbooks are not necessarily entirely consistent with each other. Nevertheless, there must be a level of principled coherence that then constitutes, shall we say, the public language of research methods—the language that must be used, for example, in the production of bids for research funding. It is precisely the coherence in this language that enables debates in methodology. This, then, is an institutionalised, DS^+ language; I want to call this 'discourse'.

The situation in the writing of coursework essays, masters dissertations, doctoral theses and so forth is rather different. There still seems to be a strong level of institutionalisation in respect of what counts as appropriate academic writing in the sense that, in my experience, the assessors of such texts do not differ very much, at least in terms of distinguishing between authorial competence and authorial incompetence.[6] However, whilst recognising good and bad academic writing seems to be comparatively easy, laying down the principles for achieving it is somewhat less so, other than in very general terms, and even these are not inviolable. We still have a regularity of practice in public, but this is DS^-; I'll refer to this as 'skill'.

Much of what goes on in research education is more appropriately thought of as private activity—the process of qualitative analysis, for example. Various authors have produced textbooks on this process, most famously, perhaps, Glaser and Strauss (1967, see also Strauss, 1987; Strauss & Corbin, 1990, 1998; Glaser, 1992). However, despite the presentation of a highly developed apparatus for use in analysing qualitative data, all of these authors are silent on what Strauss & Corbin (1998) refer to as the 'art' of analysis (see Walker & Myrick, 2006). In my experience in working with doctoral students and on my own analysis, whilst it is clear that the process of analysis entails a transaction between researcher and data, just exactly what the researcher brings to this is not at all easy to specify, again, other than in very general terms. Nevertheless, the analysis generally gets done in the end. The facility, here, is weakly institutionalised and DS^-, a private kind of skill; I'll call it a 'trick.

Finally, any innovation to a discourse must, prior to its incorporation into the discourse, stand as a weakly institutionalised form of DS^+ practice; this I will refer to as 'idiolect'—elements of Brown and Dowling (1998), perhaps. I now have the basis for another strategic space that is shown in Figure 8.

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[6] There is rather greater diversity in the responses of referees appointed to review papers submitted to academic educational research journals and bids for research funding; rather more politics and vested interests here, perhaps.

	Institutionalisation	
	Formal (I^+)	Informal (I^-)
DS^+	*discourse*	*idiolect*
DS^-	*skill*	*trick*

Figure 8
Practical Strategic Space

I have introduced this space by reference to what might be regarded as a single activity—research education. However, I am proposing that, in general, these four strategies will be deployed in all activities and, in particular, in all curricular technologies. The spaces in Figures 4 and 7 were introduced in a way that might suggest that we can find pure forms in terms of grammatical mode (Figure 4) or authority strategy (Figure 7). However, this is an artefact of my own pedagogic theory. In the development and deployment of these and other strategic spaces the intention is to produce a strategic map that enables the description of opposing strategies: how/where is a discourse/skill or a liberal/bureaucratic differentiation marked out; where does a curricular technology articulate a metaphoric apparatus with a method; and so forth. These, contrary perhaps to appearances, are de-essentialising technologies. A number of other strategies are introduced in Dowling (in press) together with a lexicon of nearly two hundred specialised terms. This apparatus in deployed in a range of contexts including art, film, literature, the internet, mathematics, science, classrooms and teaching, academic work and, elsewhere (Dowling & Brown, 2000), edutainment. Here, I have added 'the curriculum'.

Principles of Curriculum (as) Theory

On the basis of the discussion above, I offer the following principles for thinking about the curriculum (and more would emerge from a more complete presentation of my organisational language). I should offer a caveat: the term 'public' is being used in two different ways in the earlier discussion and in these principles.

1. Curriculum, theory, technology can be understood as equivalent kinds of entity, though one of these terms (or another equivalent) may be more appropriate in any particular context. Curriculum/theory/technology (C/T/T) comprises an esoteric domain of practice that is/can be deployed on texts and contexts in the production of commentaries that recontextualise these texts and contexts and that may also inform C/T/T development.
2. That which enables a C/T/T to look beyond itself is an exteriority generated within the practice constituting a hybrid C/T/T consisting of an internal and an external C/T/T. This exteriority may be established by pedagogic theory or by methodology, which are also C/T/Ts. In casting a gaze beyond itself, C/T/T

constitutes a public domain of commentary on texts and contexts generated by other C/T/Ts. In the absence of an external component a C/T/T can see only itself.

3. This schema can be applied at any level of analysis thus enabling the exploration of complex C/T/Ts, for example:
    a. the recontextualising of curriculum content by pedagogic theory;
    b. the construction of a public domain and the movement between esoteric and public domains (or the movement within the more developed domain space described elsewhere (for example, Dowling 1998, c. 8) in pedagogic or research practices.
4. Authority claimed by or on behalf of a C/T/T may be located (or, rather, strategic attempts may be made to locate it) in the author of an action or in a publicly institutionalised practice or both or neither. This gives rise to four modes of authority strategy—charismatic, traditional, bureaucratic, liberal. Any given C/T/T is likely to entail the deployment of more than one and possibly all four modes of authority strategy, but this schema enables the description of trends and shifts in authority and the establishing of public and private discourses associated with a C/T/T.
5. All evaluative action, formal or informal, entails the elimination of the subjectivity of the object of evaluation, thus evaluative authority is always bureaucratic or liberal.
6. The acquisition of C/T/T entails apprenticeship into its esoteric domain; principles 1-3 may be deployed in determining that domain. This establishes traditional authority as the legitimate mode in the elaboration of C/T/T. This mode articulates a specific practice and a specific author as subject of that practice. It is being proposed, here, that bureaucratising strategies, in separating the practice from the practitioner, will always constitute a transformative recontextualisation.
7. Where C/T/T is a hybrid comprising a content (internal language) and a pedagogic theory or methodology (external language) then the elaboration or transmission of the content is a relay rather than an apprenticeship, though apprenticeship into the complex C/T/T itself is still possible (for example, in teacher education).
8. The internal and external languages of a hybrid C/T/T may vary in terms of the level of discursive saturation, giving rise to four modes of hybridity—metonymic apparatus, metaphoric apparatus, fiction, and method. Any given instance is likely to combine more than one and possibly all four modes.
9. The C/T/T varies internally in terms of strength of institutionalisation and discursive saturation, which schema also enables analysis of any given C/T/T in terms of the four modes: discourse, skill, trick, idiolect.

A Brief Commentary

In developing the basis for these principles, I have, collaterally, produced some commentary on ‘the curriculum’ in a number of contexts. I will here list some of these.

1. Pedagogic theory relating to school mathematics produces a range of application and illustration of the esoteric domain of mathematics as its public domain. The mathematising of non-mathematical texts and contexts is a key aspect of the recontextualising device of school mathematics. The theory also constitutes different categories of student. The potentially competent student, for example, may be presented with public domain settings in order to be drawn in to the esoteric domain. By contrast, there is another category of student that is incompetent even within regions of their everyday lives.[7] This incompetence is due to a lack of mathematical skill, which mathematics education purports to provide. This skill, however, is generally encoded by recontextualised public domain settings. Since these settings are always transformed practices, the incompetent student has, through mathematics education, no access either to the esoteric domain of school mathematics or to the remediation of their own lives. Elsewhere (Dowling, 1998) I have demonstrated that, in respect of one mathematics scheme at least, the basis of this distribution device is aligned with social class.
2. Another aspect of the recontextualising device of pedagogic theory designs practical activities as metaphors for mathematical discourse. Insofar as these activities are to facilitate entry into esoteric mathematics, the student is constituted as the empiricist subject.
3. Pedagogic theory also recontextualises the esoteric domain of mathematics, not least via the chunking, sequencing and pacing of mathematical content, which inevitably has implications for how mathematics can be presented at any given point in both transmission (recontextualising and distribution devices) and in the evaluation device.
4. The distribution device constitutes a shift in emphasis within the recontextualising device of school mathematics such that empiricism tends to be phased out in favour of a succession of content chunks with the progression of student age for those students 'capable' of mathematical development.
5. The distribution of pedagogic theory described in 3 and 4 are consistent with the recontextualisation of set theory from an organising mother structure, in the bourbakiist philosophy of mathematics to a resource for the construction of practical metaphors, in the elementary school, to the introduction of simply another chunk in the secondary school.
6. The bureaucratising strategies of evaluation apparent in, for example, the TIMSS studies effectively privatise the subjective and contribute to the constitution of mathematicoscience as the ideal for legitimate public discourse. Elsewhere (Dowling, 2007a, in press) I have argued that the technology of democracy (also presented on the TIMSS site) is an additional plank in this public discourse.
7. Higher Education is currently undergoing a transformation that entails the dramatic weakening of traditional authority in favour of bureaucratic and liberal forms. This trend is possibly identifiable in many, if not all, public institutions, including, for example, legal and healthcare apparatuses. One pedagogic

[7] Though, collectively, students may possess a reservoir of practical tactics that, if shared, has the potential to remediate all members of the group.

outcome of the effective deployment of traditional authority is the establishing of hysteresis in the relation between transmission action and liberal evaluation; essentially, the traditionally authorised professor has the initial, at least, presumption of expertise. With the demise of this form, only charismatic strategies remain, but, of course, these of necessity challenge, in one way or another, orthodox practice.

8. Research education/activity is a complex activity that exhibits variation in terms of the level of discursive saturation and the level of institutionalisation of practice. Whilst research methods textbooks may be constituted as public discourse, the production of academic writing is more appropriately understood as a skill. The process of qualitative analysis is substantially private and may best be described as consisting of tricks, whilst theoretical and methodological developments must be initialised as idiolect.

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