Slow down: how to stop spinning at KS3

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Slow Down; how to stop spinning at KS3

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Abstract
Rotational or 'carousel' models, where pupils move to new material areas and teachers once or twice a term, dominate the organisation of the Design and Technology Key Stage 3 curriculum in England. This dominance has been maintained in the face of a great deal of concern expressed about the negative effects of such models on the quality of teaching and learning and in spite of the long term availability of various alternative models.

This paper describes a small-scale study of D&T departments where models other than simple rotation through different material areas have been attempted at KS3. The aim of the study was to find out what had motivated some schools to go against the dominant trend of rotational models at KS3 and to elicit from these schools details of their experience with alternative curriculum structures.

The study indicates that schools are successfully adopting a range of non-rotational courses at KS3. Most of the schools claim that the adoption of new structures has led to improved KS3 results and success at recruitment to GCSE programs in the face of the new optional status of D&T at GCSE. Schools also claim improvements in pupils' perception of D&T as a subject as opposed to disparate material areas and a reduction in sex stereotyped views of the material areas.

The obvious objections to non-rotational courses circle around issues of teacher specialism. The schools in this study show that these objections are surmountable; D&T teachers do have the professional capability to extend their repertoire of skills and pupils benefit from their doing so.

Keywords: *KS3, curriculum organisation, curriculum models, curriculum innovation, rotational courses*

Background

> "Teaching which involves the frequent rotation of pupils among different materials areas can result in unbalanced achievement and a lack of progression.... There is little opportunity for these teachers to experience the satisfaction that comes from nurturing pupils' progress over a period of time." (DfES 2004, p61)

Rotational or 'carousel' models, where pupils move to new material areas and teachers once or twice a term (Figure 1), dominate the organisation of the Design and Technology (D&T) Key Stage 3 (KS3 - 11-14 year olds) curriculum in England.

This dominance has been maintained in the face of a great deal of concern expressed about the negative effects of such models on the quality of teaching and learning (e.g. Martin & Riggs 1999, Eggleston 2001, OfSTED 2004, DfES 2004) and in spite of the long term availability of various alternative models (e.g. Aylward 1973, Toft 1989, Breckon 1990, Eggleston 1992, Barlex 1995, DATA 1995, DfEE 1995). Claimed negative effects include the difficulty of supporting and tracking individual pupils over time, fragmentation of the experience of learning about designing, a lack of understanding of D&T as a subject as opposed to a collection of material-based experiences and a KS3 curriculum that is sometimes little more than a series of focussed practical tasks with no time for pupils to fully develop and explore their own ideas.

This paper describes a small-scale study of D&T departments where models other than simple rotation through different material areas have been attempted at KS3. The aim of this study was to find out what had motivated some schools to go against the dominant trend of rotational models at KS3 and to elicit from these schools details of their experience with alternative curriculum structures. The study has not, at this stage, attempted to measure the success of these curriculum innovations in any objective way (such as independent evaluation of the impact on KS3 or GCSE results), though it does report the schools' own views of their success, or otherwise. Nor does the study aim to compare the effectiveness of different curriculum models. The authors' aim has been to give voice to those pursuing alternative curriculum structures, allowing them to describe their motivations for moving away from the dominant model, the various alternative models they have adopted, some of the strengths and weaknesses of these models and their plans for development in this area.

Research methods
Ten English schools who have explored alternative KS3 models were identified through the Qualifications and Curriculum Authority's (QCA)

curriculum monitoring project (QCA 2004). These schools were invited to participate in this study and seven of them did so. The seven schools provided the authors with comprehensive case study material on their KS3 curriculum organisation. Following this, their KS3 co-ordinators or Heads of Department attended a day conference at which they gave structured presentations detailing their KS3 curriculum models. Each presentation was followed by group discussion during which presenters were pressed for further details and clarifications. The analysis of the qualitative data gathered by this process has two focuses: firstly, looking for common themes in the experiences of the schools taking part and, secondly, identifying aspects of individual schools' experiences that might be of particularly interest to schools thinking of adopting non-rotational courses.

The schools taking part in the study had a wide rage of backgrounds as shown in Table 1.

Findings

Alternative KS3 curriculum structures

The typical rotational model for KS3 contains between three and six units of work per year covering a range of D&T material areas each taught by a specialist in that material. In each rotation there is the same number of pupil groups as there are units of work in the year. At the end of each unit every group of pupils moves to a new unit and a new teacher. Thus each teacher teaches essentially the same unit to between three and six groups each year and each group meets three to six teachers. See Figure 1 for an example of a 4 unit rotational system.

Alternatives to this rotational model generally require teachers to take responsibility for the teaching of multiple units of work – and thus for teaching in material areas that are not their initial specialism. Figure 2 shows a model where each teacher is responsible for one class for the whole year, teaching in all material areas. Note that the need to make use of specialist teaching areas means that these classes still experience the material areas in different orders.

BH	A girls' 11-18 comprehensive Technology College with 850 pupils including a sixth form run jointly with a local boys' school.
BP	A mixed 11 – 16 comprehensive school with 1700 pupils that has gained Performing Arts Specialist Status
CH	A rural mixed 11 – 18 comprehensive school with 1150 pupils that has gained Sports Specialist Status. It was a pilot school for the D&T KS3 strategy
EB	A rural mixed 11 – 18 comprehensive school with 1150 pupils that has gained Maths and Computing Specialist Status.
OG	A suburban mixed 11-18 comprehensive school in a selective borough with 1200 pupils.
TC	A mixed 11-16, secondary modern school that is applying for Business and Enterprise Specialist Status and has 840 pupils.
TA	A city mixed 11-18 comprehensive school with 2000 pupils that has gained Specialist Sports and Technology status.

Table 1: The schools

y7	10 weeks	10 weeks	10 weeks	10 weeks
Teacher A (food)	Class 1	Class 2	Class 3	Class 4
Teacher B (textiles)	Class 2	Class 3	Class 4	Class 1
Teacher C (product design)	Class 3	Class 4	Class 1	Class 2
Teacher D (ECT[1])	Class 4	Class 1	Class 2	Class 3

Figure 1: A typical rotational course structure

[1] ECT: Electronics & Communications Technology

y7	10 weeks	10 weeks	10 weeks	10 weeks
Teacher A	Class 1 (food)	Class 1 (textiles)	Class 1 (product design)	Class 1 (ECT)
Teacher B	Class 2 (textiles)	Class 2 (product design)	Class 2 (ECT)	Class 2 (food)
Teacher C	Class 3 (product design)	Class 3 (ECT)	Class 3 (food)	Class 3 (textiles)
Teacher D	Class 4 (ECT)	Class 4 (food)	Class 4 (textiles)	Class 4 (product design)

Figure 2: Non-rotational Model 1, one teacher takes all

y7	10 weeks	10 weeks	10 weeks	10 weeks
Teacher A	Class 1 (food)	Class 1 (textiles)	Class 2 (food)	Class 2 (textiles)
Teacher B	Class 2 (ECT)	Class 2 (product design)	Class 1 (ECT)	Class 1 (product design)

Figure 3: Non-rotational Model 1a, 2 teachers take all

A variation on Model 1 is to pair up teachers with complementary skills and have them share two classes between them, each teaching to their strengths, as shown in Figure 3.

Figure 4 shows a different non-rotational model in which each group's timetable contains two parallel strands of D&T teaching; typically one based in Food and Textiles technology and one based in Product Design and ECT, each taught by a different teacher. In most uses of this model each strand is based in a different room and the only room change that pupils have to make is when they move between food and textiles based units.

A third variant is shown in Figure 5, where pupils continue to rotate between teachers and material areas but a key strand of the D&T curriculum, that relating to generic design skills, is structured so that is taught in the same order for all pupils.

Thus, in the example in Figure 5, the first unit of work for every pupil, regardless of the material area, will include a focus on design briefs that will be built on in later units. Each time a particular material focussed unit is taught in the year it will have the same material area objectives but the generic skills focus will change.

y7, class 1	10 weeks	10 weeks	10 weeks	10 weeks
Teacher A	A range of units based in product design and ECT			
Teacher B	textiles		food	

Figure 4: Non-rotational Model 2, stranded

y7	10 weeks	10 weeks	10 weeks	10 weeks
Generic skills	Design Briefs	Research Product Analysis	Specifications Evaluation	Step by step plans
Teacher A (food)	Class 1	Class 2	Class 3	Class 4
Teacher B (textiles)	Class 2	Class 3	Class 4	Class 1
Teacher C (product design)	Class 3	Class 4	Class 1	Class 2
Teacher D (ECT)	Class 4	Class 1	Class 2	Class 3

Figure 5: Non-rotational Model 3, fixing generic skills

There are, clearly, other ways of combining these organisational themes. These curriculum models have been highlighted as they are those adopted by the schools in this study, as shown in Table 2.

Model	Schools
Non-rotational Model 1	OG
Non-rotational Model 1a	TA
Non-rotational Model 2	BH, BP, EB, TC
Non-rotational Model 3	CH

Table 2: KS3 models used

The final variant from a standard rotational course found in two of the sample schools [BP, CH] was the use of some degree of opting into specific materials areas in Year 9 in preparation for GCSE courses, but the implications of this are not explored here.

Choosing a curriculum structure

The school adopting Model 1 has operated it for eight years. It was keen to ensure that D&T is taught and perceived as a single subject and wanted to provide continuity of teaching and progression in learning, especially in the area of designing.

The school adopting Model 1a wanted to reduce the number of teachers involved with each group of pupils. Giving teachers longer with a group would allow for better planning, progression and monitoring. The structure is in its second year and the aim of the school was to move to a Model 1 structure as staffing allowed.

Four schools had adopted some variant of the stranded model (2) and had been running it for between 5 and 14 years. The decision to move away from a rotational model centred round some combination of three main issues; the first related to the number of teachers that a pupil might meet in a year and the impact that was having on progression, assessment, pupil tracking and differentiation. The second was the advantage gained in allowing unit lengths to be variable; both to allow the development of units of varying length in the curriculum and to provide flexibility around the endpoints of units to allow for groups and individuals working at different paces. The third reason focused on a desire to reduce sex stereotyped views of the various material areas. Some schools saw the adoption of Model 2 as a stepping stone towards adopting a Model 1 structure, others as a sensible endpoint that effectively balanced their curriculum concerns against the best use of teacher expertise.

The school adopting Model 3, with a non-rotational focus on generic skills, had as a core aim to increase the transfer of design skills between material areas. As well as the unified generic skills curriculum they focus on the manufacture of hybrid products and wanted to alter the perception of pupils so that they saw D&T as one subject. Their curriculum design emphasis has been on amelioration of the unwanted effects of the rotation.

Managing teachers working across a range of materials

Whatever the details of the model adopted, schools using a non-rotational course have had to develop strategies to support teachers working outside their main subject specialism. Common strategies include:

- The use of a common design process and language in all material areas.
- The use of material specialists to develop units of work, introduce them to the team and support non-specialists in their implementation of these through such things as internal training sessions, lesson observation, the development of appropriate support materials and grading sheets for each unit specifying what pupils must achieve to reach a certain level.
- Frequent meetings, for example for moderation and sampling to the ensure maintenance of standards.
- The use of Performance Management targets to trigger external INSET related to the development of D&T subject knowledge.
- Health and Safety training for all materials areas.
- The use of technicians to support non-specialists with technical knowledge like using drills, threading up sewing machines etc.

Advantages of alternative structures

Largely the advantages claimed by schools reflect the aims they set themselves in adopting the new structure. Non-rotational courses make available more time to develop good teaching relationships with pupils. The larger blocks of teaching provide flexibility to 'play' with unit size and structure, they also generally eliminate the problem of pupils not finishing by the time of the changeover point and provide more flexibility in allowing able pupils to pursue work to greater depth. There is better planning and progression in the development of key generic designing skills and knowledge as well as improved transfer of both design and material-related knowledge between material areas. In addition there is improved recognition by pupils of D&T as a single subject as opposed to a series of discrete disciplines and this is linked to reduced sex

stereotyping in pupils' views of the material areas. Most schools claimed much improved formative assessment, monitoring, differentiation and moderating of pupils' work and noted general gains in terms of teachers developing their skills and repertoire. The effect of these improvements in teaching are claimed to be reduced pupil disaffection and an increased pace of work; for departments facing GCSE D&T as an optional subject these improvements in the operation of the D&T curriculum are seen as critical in maintaining pupil numbers Post-14.

Schools also generally felt that the structures they had developed had left them in a strong position to smoothly adopt the nascent KS3 strategy.

Issues raised by the adoption of alternative structures
The schools in the study argued that high quality management of the D&T team is essential to success in this kind of curriculum development. Allied to this was the importance of the whole D&T team being supportive of the venture.

Recruitment of suitable teachers, in particular food, textiles and ECT specialists has been a problem for most of the schools; these are difficult specialisms to fill under any circumstances, but some schools have anecdotal evidence that their requirement for teachers to teach across materials areas is deterring some applicants. A strength of non-rotational arrangements is the increased flexibility offered by teachers who are able to cope with a range of specialisms, but specialists are still required and these schools increasingly want to recruit teachers who already have a good range of specialist abilities.

Maintaining high standards of health and safety across all subject areas is clearly important and is an added cost of non-rotational models as all D&T teachers need health & safety training for all areas.

Some schools noted that teachers may find teaching outside their specialism stressful. In particular they worry about giving pupils inaccurate information; many schools suggested that this fear has some justification, there being some evidence of low level misinformation. At the same time specialists may feel under pressure to provide all the answers and the units of work they provide have to be very detailed. Because of this it can be harder to change units of work as each represents a large investment in time.

Finally, many non-rotational models require teachers to move between specialist rooms. This can be both organisationally and mentally demanding; it makes it harder to set up practical lessons in advance and unfamiliarity can make finding necessary equipment and materials difficult. It also the case that teachers generally prefer to have their own teaching base which they can make their own. Good technician support can ameliorate some of these problems.

Conclusions
The schools at the centre of this study are successfully adopting a range of non-rotational courses at KS3. They have developed a range of different organisational structures that are dependent partly on the particulars of their situations and partly on the perceived difficulties with prior curricula that the schools felt they were attempting to solve. Most of the schools in the study see themselves as being on a journey of curriculum development towards less rotation in their KS3 curriculum.

Most claim that the adoption of new structures has led to improved KS3 results and success at recruitment to GCSE programs in the face of the new optional status of D&T at GCSE. They also claim improvements in pupils' perception of D&T as a subject as opposed to disparate material areas and a reduction in sex stereotyped views of the material areas.

The obvious objections to non-rotational courses circle around issues of teacher specialism; the wastefulness and attendant risks of teachers not playing to their strengths in their teaching and the potential health and safety dangers. The schools in this study show that these objections are surmountable; D&T teachers do have the professional capability to extend their repertoire of skills and pupils benefit from their doing so.

It would be interesting to extend this study to scrutinise actual practice and pupil results in schools with non-rotational courses. This would allow us to elicit the extent to which teachers' claims for improvements brought about by non-rotational courses can be substantiated and to examine the strengths and weaknesses of particular non-rotational models.

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