

SETTING TASKS AND SETTING CHILDREN

Jenny Houssart

Centre for Mathematics Education, Open University

Abstract: *The work described here was carried out in four primary schools which use setting for mathematics. This research forms part of a project on tasks in primary mathematics. The focus of this paper is a consideration of how tasks are influenced by setting. Transcripts of interviews with teachers are analysed for differences in how teachers of different sets talk about the tasks they give children. Findings suggest that there is likely to be a difference in the mathematical tasks children are offered according to the set they are in. Some information also emerges about systems of setting, apparent reasons for setting and how teachers perceive the pupils in their set.*

Background

Much existing research on tasks stems from the work of Doyle and his definition of an academic task (Doyle 1983). He conceptualised tasks as having three elements, namely a goal or product, a set of resources available to students while generating the product and a set of operations which can be applied to the resources to reach the goal. In further work he asserted that the tasks teachers assign determine how students come to understand a curriculum domain (Doyle 1988). The importance of tasks is also discussed by Gill (2001) who points to the importance of providing intellectually difficult tasks and opportunities for reasoning. She goes on to assert that reasoning is at the heart of mathematics.

There has been an acknowledged increase in forms of ability grouping in Britain in recent years (Sukhnandan and Lee 1998) This has included an increase in setting in primary schools, particularly for mathematics (OFSTED 1998). This document suggests official approval for setting, while documents associated with the National Numeracy Strategy take a more cautious view (DfEE 1999). There has been recent concern about setting on the grounds of equality of opportunity (Ollerton 2000) echoing concerns from an earlier era (Jackson 1964). Boaler (1997) suggests that the

growth in setting in the 1990s reflected the focus on academic success. In considering the experiences of secondary pupils in different mathematics sets, Boaler et al (2000) acknowledge work on the inequities of setting, but say there needs to also be a consideration of how setting influences subject understanding.

Another recent development has been the provision of materials by government agencies aimed at particular groups of children. This includes materials aimed at children who are deemed to be behind their peers, but likely to catch up given extra help (DfEE 2000a) and materials aimed at 'able pupils' (DfEE 2000b). Such materials and the accompanying documentation have reinforced the view that certain tasks suit certain children and it is quite possible to identify target groups for particular sets of materials.

Method

The findings reported here form part of a two year project concerning mathematical tasks at key stage two (seven to eleven year olds). The project consisted of three phases. Phase one involved individual interviews with teachers carried out at the beginning of the two year period. Phase two involved workshops with staff concerning particular aspects of mathematical tasks. Phase three involved individual interviews with teachers at the end of the two year period.

The interviews, which are described in more detail elsewhere, concerned various aspects of mathematical tasks. Phase one interviews asked teachers to talk about a 'good task' they had carried out with their class or maths set and to identify and prioritise the features that they felt made a good task (Houssart 1999). Later in the same interviews teachers were shown commercially produced mathematics tasks and asked if they would be likely to use them with their class or set (Houssart 2000a, 2001). Phase three interviews included questions about whether teachers had used certain pieces of number equipment with their class or set (Houssart 2000b). Initial

analysis suggested that there were some differences in responses according to the set taught. Teachers also sometimes made comments about the set they were teaching in addition to answering the questions on tasks. This paper draws mainly on the interview data to consider how teachers of different sets talked about mathematical tasks. It also considers additional comments teachers made about their sets. The paper also draws on background information gathered in the middle phase of the project to explain how setting evolved in these schools over the two year period and to place some of the teachers' comments in context.

Context

This paper considers four of the schools which were involved in the project. The schools were of different types, but all were large enough to make setting an option. They were a primary school for 4-11 year olds in a large village; a junior school for 7-11 year olds in an established town; a combined school for 5-12 year olds on a new estate surrounding an established town and a middle school for 7-12 year olds on a new town estate. Within each school, teachers were asked whether they would be willing to participate in the interviews and seventeen teachers were involved. Six of these taught top sets, seven middle and four bottom.

At the beginning of the project, all four schools made some use of setting for mathematics. For three of them this was their first year of setting. Two of the schools had previously made use of group work and two had relied fairly heavily on mathematics schemes. All used setting alongside a different approach involving more direct teaching to the whole set and less reliance on different resources for individuals or groups. There were some ways in which the setting was not 'total'. For example the combined school used a mixture of lessons taught in classes and lessons taught in sets. The combined school and the primary school both had maths sets containing mixed age groups. In the junior school, some children with special needs were

withdrawn from mathematics and taught by special needs staff, rather than being part of the sets.

At the end of the two years, most of these compromises had been dropped in favour of a more direct system of setting. The primary school abandoned mixed age setting in favour of two sets per year group. The combined school stopped teaching some lessons in classes; they also moved from mixed age groups to single age groups in years 5 and 6, despite problems with numbers. The junior school, on the other hand adopted a more complex system, with one top set, two parallel sets and a small, mixed age bottom set. The middle school retained a straightforward system of setting, but moved to four sets rather than three in some year groups because of rising numbers.

Findings

The Top Set Teachers

There were similarities in the way the top set teachers responded to the interview questions about tasks. One example of this occurred when teachers were shown commercially produced tasks and asked if they would be likely to use them with their current class or mathematics set. Teachers of top sets showed more enthusiasm than other teachers for open and investigative tasks. These included a task based on number sequences (Bird 1986 page 47) and one about rectangles, involving comparison of area and perimeter (Blinko 1996 page 23).

I haven't done this but it looks exciting ... investigational and open ended. (Mandy, Sequences)

I'd like to give them more investigative work ... start the lesson with something like that. (Heather, Rectangles)

In another section of the interviews, teachers were asked what they thought made a good task in mathematics. Again there was some commonality in the responses of the top set teachers, with enthusiasm for creative and challenging tasks.

... encourages creativity (Mandy)

There has to be an element of challenge about it ... they want to be tested in what they're doing and not feel they're doing something babyish or below them. (Graham)

Later in the same interview teachers were asked to prioritise those factors which they felt made a good task. In doing so, John made it clear that he thought this depended on the set being taught. He had just identified 'challenge' as the most important factor in a 'good task'.

Challenge, especially with the top set ... Probably, had I had the lower set, the challenge bit would ... be far lower down, until they've got the basics in obviously. But because I've got the top set, I think it's a slightly different way of looking at it. (John)

Top set teachers differed from other teachers in that they were less likely to mention practical work in this section of the interviews. Only one top set teacher mentioned 'practical' as an aspect of a good task. They showed a similar attitude when asked about tasks using number equipment. Some felt that resources such as hundred squares and number lines did not have a place with the top set.

In addition to direct answers to questions about tasks, top set teachers talked about their sets in two main ways. These were saying how much they liked teaching this set and talking about their children's success in National Curriculum tests. Comments about teaching the top set often occurred at the beginning of interviews when they were asked what year group and set they were teaching.

I've got Year 3 top set this year – wonderfully clever maths lot, they are, they're brilliant, really! (Heather)

I've got the top maths set. They're lovely. It's great! (John)

Later in the same interview, John returned to the theme of what it was like to teach the top set.

They're like – when a supply takes them, she says it's like teaching in the – not the olden days, but, you know, it's like teaching twenty years ago, because you talk to them and they're there. They're just there, ready to take the information from you, which is brilliant. (John)

Some top set teachers talked more explicitly about the success of their set. One round of interviews was held soon after schools had received the results of National Curriculum tests taken by all 11-year-olds in English schools. Two top set teachers of 11-year-olds were included in these interviews and both mentioned test results. The focus nationally was on the number of children achieving level four or above, but the top set teachers talked of children who did better than this.

I've got 35 in my group, 30 of them got level fives in their national tests ... only five didn't. (Graham)

Did Mary (the mathematics co-ordinator) say? We got 16, 16 out of 32 of the top maths set got level fives ... that was quite good. Mary got one, a level five in hers (the middle set), so she was really pleased about that! So that was brilliant, that was really good ... so that's great, very pleased with that. (John)

The Middle Set Teachers

Middle set teachers were less enthusiastic than top set teachers about using investigative tasks, sometimes suggesting that these were more suitable for top sets.

For my group that would be a nightmare ... do it with the top set. (Luke, Sequences)

My group do need a lot of input. These low guidance tasks they do find very difficult. But ... excellent for Year 6 top group, they'd love it. (Malcolm, Rectangles)

When asked about what made a good task in mathematics, middle set teachers showed a more mixed response than top and bottom set teachers. Although aspects such as 'challenge' and 'thinking for themselves' were not as strong a theme as they

had been with top set teachers, they still got a mention by just over half of the middle set teachers. Practical activities and games were also mentioned by just over half of the middle set teachers, making this a more common theme than with top set teachers, though less common than with bottom sets.

Some of the middle set teachers made additional comments about what it was like to teach their set and about the results of National Curriculum tests. Some such comments came when teachers were asked which set they taught.

... Year 3, middle set ... I like that ... because obviously you're aiming for the middle and it's easier in many respects. (Angela)

The middle maths set's not a very good one to take ... I would like to take the top set. (Luke)

It was felt that I would be the most use with the middle set. (Mary)

Mary's statement initially seemed puzzling, but was explained by other comments, later in the same interview and in subsequent interviews. Mary was a mathematics specialist and was mathematics co-ordinator. When she had joined the school there was concern that not enough 11-year-olds were reaching the expected level in the National Curriculum tests. When they started setting, she was asked to teach the middle set of 11-year-olds in order to 'bring them up'. This was successful, with most middle set children achieving level 4 while she taught this set. The focus then shifted to whether children in the bottom set could be helped to achieve level 4.

Another middle set teacher who was faced with the task of raising the number of level 4s was Luke. He was interviewed in the Spring term of 1999, when the idea of booster classes had just been introduced, offering additional support for those children not quite achieving level 4. Like many of the teachers, Luke referred to the National Curriculum tests as SATs (standard assessment tasks).

We're doing numeracy booster and my set have gone in there. I said, "I don't think this lot are going to get through without some help." She (the year group leader) said, "No,

you're right, all this lot are level three." So that's the middle set, mostly on level three and we've got the SATs coming up in about five weeks. (Luke)

Despite Luke's concern, most of his set did achieve level 4, following the booster classes. This caused delight at the time, but by the following year discussion started about whether the bottom set could achieve level 4 and whether a reorganisation of sets would improve results.

The Bottom Set Teachers

When shown commercial mathematics tasks and asked if they would use them with their set, some bottom set teachers were even more emphatic than middle set teachers in rejecting the tasks 'Sequences' and 'Rectangles'.

... not for my group ... for brighter children. (Freda, Sequences)

I like the activity, I do like that activity. But for my group ... (Carol, Rectangles)

When describing a 'good task' they had carried out with their set, many of the bottom set teachers talked in a way that provided a stark contrast to the challenge and creativity referred to by top set teachers.

They like colouring in. (Freda)

I always start with the concrete and what they know first. (Paul)

They sat down happily with that, making block graphs ... we also did some little games ... games are ... successful ... until they can't take turns which also happens and they have a paddy because they don't like someone else winning the game! But those are the best sorts of activities. (Linda)

When asked to be more explicit about what makes a good task, many bottom set teachers continued in this vein with mentions of games and colouring in. In fact all the bottom set teachers made some reference to practical work or the use of games or equipment. However there were bottom set teachers who also mentioned aspects such as investigations and challenge.

It's always a task that uses practical equipment. The abstract ones they find fairly difficult. Although they do enjoy simple sort of investigative things. I mean they do have to be very simple. (Linda)

It was quite practical to begin with they actually do something with their hands. There was a certain amount of challenge built into it and extension. In this group their confidence has increased by 100%. I haven't ever taught in this way before and I was, kind of quite apprehensive about it, but for that little group ... I believe that achievement is linked to confidence and the way you feel about yourself and their confidence has increased so much ... They want to get finished ... they are keen to get on with it. (Carol)

Only one bottom set teacher mentioned test results. This was a teacher of nine and ten year olds, who was actually talking about the 'optional tests' used by all year groups in his school.

One or two of the parents have come back and said that they weren't happy with the SATs ... but I think we need to address as a whole society what we are using maths for ... some of the bits they're not going to use. (Paul)

Discussion

These findings suggest different mathematical experiences are likely to be offered to children in different sets. In particular children in bottom sets and to a lesser extent middle sets, are less likely to be offered open and investigative tasks and tasks which teachers perceive as challenging. On the other hand, children in bottom sets are more likely to be offered practical activities and games. This difference in selection of tasks is likely, as Doyle (1988) suggests, to give children in different sets a different understanding of mathematics as a curriculum domain. It is possible that children in bottom sets have fewer opportunities for reasoning, which has been described as at the heart of the discipline (Gill 2001). The use of number equipment on the other hand was felt to be more suitable for children in lower sets. This fits in with the tendency observed by Seeger (1998) for representations and manipulatives to be seen

as particularly beneficial to 'weaker' students. However he questions this view and goes on to suggest that such 'aids' may in fact create additional problems.

Some other information about teachers' perceptions of their sets emerged, though this must be treated with caution as it was not an issue raised in the interview questions or discussed by all teachers. A tentative finding is that teachers tended to link setting with National curriculum assessment. Thus certain sets were associated with certain levels of attainment, with some surprise expressed at exceptions. Another link is that reorganisation of setting was seen as a way of improving test results. This was only hinted at in the interviews, but was discussed more explicitly in the middle phase of the project during workshops and staff meetings. The combined school stated that they were moving away from mixed age sets to small single age sets for the final two year groups in the school so they could 'concentrate on the SATs'. The junior school and the middle school both discussed ways of reorganising to help more children reach the expected level. This linking of setting with test results supports Boaler's suggestion (1997) that setting is related to a focus on academic success.

Conclusion

In the schools considered here, setting had influenced the way teachers viewed the children they taught and in particular the tasks they saw as suitable for them. Teachers were trying hard to meet what they perceived as the particular needs of their sets, but in doing so were unwittingly reducing access to central mathematical ideas for children in the lower sets.

References

- Bird, M.: 1986, *Mathematics with Nine and Ten Year Olds*. Leicester: Mathematical Association.
- Blinko, J in collaboration with Buckinghamshire County Council: 1996, *Teaching and Learning Number*. Buckinghamshire: Buckinghamshire County Council.

- Boaler, J.: 1997, 'Setting, Social Class and Survival of the Quickest.' *British Educational Research Journal*, 23(5), 575-595.
- Boaler, J., Wiliam, D. and Brown, M.: 2000, 'Students' Experiences of Ability Grouping – disaffection, polarisation and the construction of failure'. *British Educational Research Journal*, 26(5), 631-648.
- Department for Education and Employment: 1999, *The National Numeracy Strategy, Framework for teaching mathematics from Reception to Year 6*. Sudbury: DfEE Publications.
- Department for Education and Employment: 2000a, *The National Numeracy Strategy, Springboard 5, Catch-up programme for children in Year 5*. Sudbury: DfEE Publications
- Department for Education and Employment: 2000b, *The National Numeracy Strategy, Mathematical challenges for able pupils in Key Stages 1 and 2*. Sudbury: DfEE Publications
- Doyle, W.: 1983, 'Academic Work'. *Review of Educational Research*, 53, 159-199.
- Doyle, W.: 1988, 'Work in Mathematics Classes: The Context of Students' Thinking During Instruction.' *Educational Psychologist*, 23(2), 167-180.
- Gill, A.: 2001, 'The Importance of Mathematical Content.' In National Research Council, *Knowing and Learning Mathematics for Teaching* (pp. 119-121). Washington: National Academy Press.
- Houssart, J.: 1999, 'Teachers' Perceptions of Good Tasks in Primary Mathematics.' *British Society for Research into Learning Mathematics, Proceedings of the Day Conference held at the Open University, Saturday 27th February 1999*.
- Houssart, J.: 2000a, 'Perceptions of Pattern amongst Primary Teachers.' *Educational Studies*, 26(4), 489-502.
- Houssart, J.: 2000b, 'The role of Number Resources in the Daily Mathematics Lesson.' *British Society for Research into Learning Mathematics, Proceedings of the Day Conference held at Roehampton Institute, Saturday 18th November 2000*
- Houssart, J.: 2001, 'Choosing Resources for Primary Mathematics.' *Mathematics in School*, 30(3), 10-11.
- Jackson, B.:1964, *Streaming: an education system in miniature*. London: Routledge and Kegan Paul.
- Office for Standards in Education: 1998, *Setting in Primary Schools*. London: OFSTED Publications
- Ollerton, M: 2000, 'Inclusion and entitlement, equality of opportunity and quality of curriculum provision.' *Support for Learning*, 16(1), 35-40.
- Seeger, F.: 1998, 'Representations in the Mathematics Classroom: Reflections and Constructions.' In F. Seeger, J. Voigt and U. Waschescio (eds.), *The Culture of the Mathematics Classroom* (pp. 308-343). Cambridge: Cambridge University Press.
- Sukhnandan, L. and Lee, B.:1998, *Streaming, setting and grouping by ability, a review of the literature*. Slough: National Foundation for Educational Research.