PUPILS' PARTICIPATION IN THE CLASSROOM EXAMINED IN RELATION TO 'INTERACTIVE WHOLE CLASS TEACHING'

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Longitudinal case study data are informing the different ways that pupils engage and manage their participation within the lesson. Drawing on observations of two children in the "mental and oral" starter of the Numeracy Lesson we develop the argument that, within the whole class sessions, pupils appear engaged with the mathematics in the way the teacher expects them to be while in fact they are engaged in other ways and for reasons other than interest in the mathematics.

INTRODUCTION

The Leverhulme Numeracy Research Programme (LNRP, e.g. Brown et al, 2000) is a longitudinal study of the teaching and learning of numeracy *investigating factors leading to low attainment in primary numeracy in English schools, and testing out ways of raising attainment*. It sets out to shed light on several aspects of mathematics in the primary school, including:

- knowledge of how classroom practices, including teaching methods, teaching organisation and curriculum influence standards of attainment;
- understanding how schooling and social factors interact in the development of numerate pupils.

Our research has included collection of both quantitative and qualitative data. This present paper focuses on "critical incidents" , that is classroom episodes in which there is an opportunity for learning to take place or when such an opportunity is missed. Our concern with children's mathematical learning includes their attitudes, working practices and interest in numeracy. A key factor in the development of children's mathematical thinking is their **engagement.**

The Mental and Oral Starter

Our study began in September 1997 and the National Numeracy Strategy (NNS) was implemented in schools in September 1999. Since that time the teaching of mathematics in English primary schools has been affected profoundly: Few schools at the time of writing do not follow the form and content set out in the NNS document 'Framework for Teaching Mathematics".

A central tenet of the NNS is the need for increased emphasis on ‘interactive whole class teaching’. All mathematics lessons are expected to begin with a ten minute ‘oral and mental’ starter, where the whole class joins in activities that usually require everyone to show answers (through, for example, use of digit cards or individual white boards) or require that individuals respond to questions posed. The end of each

lesson is also expected to have a whole class ‘plenary’ which may also involve question and answer interactions about the lesson.

Our observation of some 150 lessons over the past year show that the main part of lessons, between ‘starter’ and ‘plenary’, also frequently includes a substantial element of ‘public’ answering of questions. The use of questioning is promoted as a major teaching tactic: there is also strong encouragement for lessons to have ‘pace’ and much of the whole class work that we have observed places emphasis on speed as well as correctness.

Thus a strong ‘performative’ element of being able to produce correct answers to closed questions and appropriate explanations is entering into English primary mathematics lessons. The characteristic behaviours that children develop in order to be seen to participate in such sessions are likely to affect learning outcomes and is the focus of this paper.

THEORETICAL BACKGROUND

Our theoretical starting point for examining the sort of learning that might arise through such whole class sessions is analysis of pupils 'participation in sociocultural activities' (Rogoff, 1994). Working together in the whole class ‘mental and oral starter’ provides a microcosm ‘community of practice’ (Rogoff, 1994). Coffield (1999), discussing post 16 education and arguing for a social theory of learning sees learning as

> located in social participation and dialogue as well as the heads of individuals; and it shifts the focus from a concentration on individual cognitive processes to the social relationships and arrangements which shape, for instance, positive and negative 'learner identities... (p. 493)

To explore more deeply our notions of participation we draw on data for two case study children now aged seven years: Meg and Oscar.

Through this case study data we seek to elaborate the notion of participation and, in particular, to ask:

how do pupils present themselves during whole class sessions?

what motivates pupils’ to take part?

is it fruitful in terms of mathematical learning?

MEG

Episode 1.

As part of a whole class session, the teacher is working on halving numbers. Each child has an individual white board and marker pen with which to display answers.

Teacher: Half of 36?

Meg starts to lift her board up to show the teacher. She has written ‘15’, but before she shows it she notices that others around her have ‘18’. She quickly changes it; the teacher does not notice and says, ‘Well done, Meg.’

Teacher: Half of 72

Meg puts on an act. She takes the top off her pen, pushes it back again and looks puzzled. She appears to be counting - her lips are moving but it is not clear what she is saying. She turns round and sees what George has written then turns back again and wrinkles her face (as if to say, ‘I'm concentrating hard’). Then she looks around at several boards and see what answer others have got. Next she closes her eyes and screws up her face. After a time her face lights up as if she’s just made a big discovery and she writes down ‘36’.

Episode 2.

The teacher is using a counting stick (metre length rod, with ten divisions but no number marked) to count on from zero in 10s, 5s, 2s going up to 100, 50 or 20 respectively. The children each have a number fan to show their answers. From the way that Meg looks at the rod and nods her head, it seems that she relies a lot with the higher multiples on counting from zero (as opposed to, say, knowing that when counting in 5s the other end is 50, so the ninth mark must designate 45). She is often still searching for the two digits on her fan with which to show her answer when the teacher has moved on to the next question.

After two counting on in 10s questions (where Meg was not quick enough to show her answer) the teacher changes to counting in 2s. She points to the 8th division and asks for its value.

Meg, again, repeats her nodding and looking at the divisions from zero, notices that the boy sitting next to her has set his fan to show 16. She stops counting on and puts out 16.

The teacher then points to the 9th division. Meg nodding and counting from zero, puts out 18 on her fan, the teacher asks her how she got the answer.

Meg: You count in ones to nine and then go backwards and then its like double again.

Teacher: Meg is using what we did last week, like doubling and halving.

While it is possible that Meg was multiplying by 2 her actions suggested otherwise. Once she had counted along to the number she went straight to showing it on her fan, that is that she arrived at the answer by counting on in twos. There was little suggestion that she was carrying out any operation on a number such as counting along to nine and doubling it. If she had realised that she could get an answer quicker by doubling it is not clear why she talked about "counting in ones to 9" or "going back".

It seems that Meg is not trying to explain her method but only striving to take part in the ‘game’ of providing an explanation. Time and again, we have observed Meg produce post hoc explanations which do not match what she did but are sometimes not even mathematically correct (add on 9 by adding on 10 and taking off 6). She can do it with great conviction, and even present it in a way that covers up the nonsense.

It is not that she is not capable of invoking a learning orientation. On those occasions where she has been encouraged to slow down and think about the mathematics rather than investing her energy to convince others that she knows it all her delight at succeeding is palpable. She often resists admitting that she might need help on. In another incident when she was attempting to shade one quarter of various rectilinear shapes drawn in her book she protested that questions from the researcher were making her terribly confused, rather than saying that she wasn't sure about the work. But when asked if she would welcome some help she looked both pleased and interested, listened carefully and seemed to take on board intelligently the suggestions offered.

What motivates Meg when she is relating to the teacher, here and in other examples, is her status. Throughout the four years that we have been observing Meg, her teachers say she is able, hardworking and reliable. Meg strives to continue to appear like this to the teacher. In relation to other children, Meg behaves differently, enjoying having power and some control over them. In one incident, having been entrusted with a set of cards for a fraction game for her group, she insisted they all sit still and quiet while she, playing ‘teacher’, took her time choosing who she would allow to set them out.

OSCAR

Episode 2

Oscar’s contributions to the whole class guess the number game.

Oscar: Is it lower than 100?

George: Is it a three digit number?

Yes

Teacher to Oscar: So is it lower than a hundred?

Oscar says no and shakes his head.

Oscar: Is it above 400?

Oscar: Is it below 450?

The teacher, after the number has been found, picks up on this and says that the questions were good until they knew that the number was between 400 and 450, and asks what might have further asked.

Oscar: Is it above 410?

Teacher: Or is it between 410 and 430?

> As children leave the carpeted area to go to text book tasks, Oscar tell me he is in blue group and that he and George are best at maths in that group and ahead even of Harry.

Oscar seems to like being fairly unobtrusive in the classroom and keeps a low profile, offering 'safe' answers and, unlike Meg, sticking with 'Don't know' rather than risking an incorrect response when asked to describe his strategy. Initially he was identified by his teacher as 'average' in mathematical attainment. He used to work quite slowly, taking his time, capable and proficient. Now he works in the same group as George, identified as higher attaining throughout. George and Oscar spend time together as a pair both inside and outside the classroom. The friendship with George is very important to Oscar and this maybe the reason for the culture of speed and competitiveness which is creeping into his work and which prompts him to fall back on getting the answers from George. His desire to maintain his position in the class as George's friend seems to compete with his inclinations to work slowly and steadily.

DISCUSSION

In the examples quoted above these three children, like many more we have observed in visits to classrooms are participating collectively in the mental and oral starter. Yet, although the teachers set up activities to involve everyone and monitor participation, the ways in which particular pupils manage their involvement and what motivates them to engage with the activities will vary from individual to individual. As Claxton (1999) points out, the ability to learn in a flexible way in our current age of uncertainty needs to emphasise the importance of engagement rather than 'ability'. But, as the examples demonstrate, the reasons that children engage with activities may be far removed from enthusiasm to engage with the mathematics.

Pollard and Triggs, et al. (2000) provide an example of this in their case study of four to seven year olds found that:

> children had only a vague idea of teachers' instructional objectives. Rather than engaging in some synergetic process between teacher and pupil to extend existing understanding, most children were simply concerned to do what they needed to do to avoid being embarrassed or told off or having to do the work again. We found that children felt pressured by classroom constraints to develop task engagement. (p. 302-303)

Pollard also finds that it is ‘necessary to facilitate emotional engagement as well as intellectual challenge’ (Pollard with Filer, 1996), an issue explored in detail by Goleman (1998). Part of the emotional engagement will rest upon maintaining a successful ‘presentation of self’ (Goffman 1959) and may well be a ‘necessary precondition of stable engagement with learning’ (Pollard with Filer, ibid. p310.)

These examples support the idea that when children participate in whole class interactive teaching in mathematics they may not be participating in the mathematical thinking which is intended. This arises from other motivations than the desire to learn.

The emphasis on whole class interactive teaching does seem to be connected with the notion that all children should participate in shared discussions of mathematical ideas. A major concern is that the strong "performative" element referred to above prompts children to adopt classroom behaviours which mitigate against them developing good habits as learners. In order to examine in more detail what value children derive form their mathematics lessons we are seeking to distinguish between **participation** and **engagement**. Our examples show that Meg, Oscar and George are all **participating** in the activities of the classroom but not necessarily **engaging** with the mathematical thinking which the teacher intended when she planned the lesson. The model of engagement that we are developing extends earlier work (Askew et al 1999) and draws on Earle et al's (2000) model of improving performance.

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