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Improving pupil group work interaction and dialogue in primary classrooms: results from a year-long intervention study

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Findings are reported from a year-long evaluation of the effectiveness of the SPRinG programme relative to a control group. SPRinG aimed to address the wide gap between the potential of group interaction to promote learning and its limited use in schools. The project involved working with teachers to develop strategies for enhancing pupil group work and dialogue, and to implement a pupil relational and group skills training programme. Video observations were conducted of a sub-sample of pupil groups (31 SPRinG; 29 control groups) working on a specially designed group decision-making activity undertaken in everyday classroom settings. SPRinG groups displayed higher levels of participation, engagement, active and sustained discussion, high level inferential joint reasoning and lower levels of group disruptive blocking behaviours. We argue that group work can be successfully implemented into everyday school classrooms, and improve pupil interactions and high level discussion, provided teachers take time to train pupils in relational and group working skills.

Keywords: Group work; dialogue; pedagogy; systematic observation

Introduction

This paper reports findings from an intervention study which aimed to increase the levels and quality of pupil–pupil group work and higher order talk in everyday classroom settings. The findings reported here build on previous articles on this project by focusing on the nature of interaction and talk during filmed pupil interactions within groups in the intervention treatment in comparison to a control group (Baines, Blatchford & Chowne, 2007; Blatchford, Baines, Rubie-Davies, Bassett, & Chowne, 2006).

Research on cooperative and collaborative group work emphasises the positive effects it can have on pupil academic and social outcomes (see Slavin, Hurley, & Chamberlain, 2003; Webb & Palincsar, 1996; and chapters in O'Donnell & King, 1999). This view contrasts with naturalistic accounts of the use of groups in UK primary classrooms. Studies of classrooms show that much of the substantial amount of learning based interaction and talk that takes place occurs during whole class teaching contexts. Classroom talk consists mainly of teacher-based, relatively closed questions and offers students few opportunities for extended dialogue involving explanations, elaborations or other forms of high level talk (Cazden 2001; Smith, Hardman, Wall, & Mroz, 2004). Outside a whole class teaching context, talk and interaction between pupils are discouraged or at best tolerated by adults (Webb

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& Palincsar, 1996). Despite spending most of their time in the company of peers, pupils are given few opportunities to actively engage with them in ways that are cognitively enhancing (Baines, Blatchford & Kutnick, 2003; Bennett & Dunne, 1992; Blatchford, Kutnick, & Baines, 1999; Galton, Hargreaves, Comber, Wall, & Pell, 1999). Students often sit in groups but rarely work together as groups (Baines *et al.*, 2003; Kutnick, Blatchford, & Baines, 2002) and pupil–pupil interaction often involves off-task talk or procedural talk of limited value to learning (Galton *et al.*, 1999). It is little wonder, therefore, that talk between pupils is often perceived by adults as undermining rather than enhancing learning. When teachers do attempt to have children work together the quality of such group interaction and dialogue can be poor (Galton & Williamson, 1992). It would appear that teachers are not currently taking full advantage of pupil–pupil interaction to enhance student talk, thinking and learning in everyday classroom contexts.

Closer examination of teachers' experiences show that they appear sceptical about the benefits of allowing students to work together (Bennett & Dunne, 1992). Teachers cite loss of control, increased disruption and off task behaviour as main reasons for avoiding group interactions in the classroom (Cohen, 1994). When spread across a number of groups working simultaneously, teachers are not easily on hand to resolve conflicts or to support group task management and decision-making. There is also disbelief in the capacity of students to work together (Lewis & Cowie, 1993) particularly the less able, beliefs that group work is overly time consuming and in particular that students lack the communication skills to engage effectively in group interactions (Webb & Palincsar, 1996).

Students also have concerns about group working that may prevent them from participating or enjoying group work. A main concern relates to threats to feelings of 'psychological safety', which include self-esteem and self-confidence (Chang & Lee, 2001; Galton & Williamson, 1992). Group interaction can be a risky and emotionally stressful experience which may result in squabbles, enduring conflicts and public embarrassment (Wolters, 2003). Negative experiences undermine confidence and trust in peers and may lead to further conflict between pupils. Students may be reluctant to participate in group work for fear of losing credibility with their peers (Blatchford & Baines, *in press*) and their teacher if, for instance, they say something incorrect or controversial.

Research and theory on group work and talk

This picture of classroom life sits in direct contrast to current educational and psychological thinking about the importance of group work interactions involving opportunities for extended high level dialogue (Webb & Palincsar, 1996). Current theories of learning highlight the importance of active engagement in social interaction and cognitively challenging talk involving explanations, argumentation and joint reasoning (Piaget, 1959; Vygotsky, 1978). This style of joint argumentation or collaborative discussion is highly implicated as a main mediating process in many explanations of the effectiveness of group work on conceptual understanding (Aufschnaiter, Erduran, Osborne, & Simon 2007; Howe & Tolmie, 2003; Mercer, Wegerif, & Dawes, 1999; Wiley & Voss, 1999; Wilkinson, Parr, Fung, Hattie, & Townsend, 2002) and critical thinking (Davidson & Worsham, 1992; Wegerif, 2004).

There is now a substantial research literature indicating that cooperative and collaborative group work has positive, albeit modest, effects on pupil achievement, attitudes to school and learning and improved social interaction (Johnson & Johnson, 1985; O'Donnell & King, 1999; Slavin *et al.*, 2003; Webb & Palincsar, 1996). More recent research (see chapters in Blatchford & Kutnick, 2003; Joiner, Littleton, Faulkner, & Miell, 2000) has extended understanding of specific aspects of working in groups, for example, help seeking and giving (Webb & Mastergeorge, 2003), decision-making processes (Howe, Duchak-Tanner, & Tolmie, 2000), and the role of exploratory talk (Mercer *et al.*, 1999).

However, much of the research in this area offers only limited strategies to teachers for utilising and managing effective group work in complex classroom settings where multiple groups and learning tasks are undertaken simultaneously (Doyle, 1986). The concerns of teachers and students illustrate that placing students in groups and then expecting them to work as groups has a range of potential pitfalls. Sophisticated talk and group working skills are required during group work, for instance to resolve conflicts or to make joint decisions and these skills may be limited among students in upper primary school. Students also need confidence in their own skills and those of peers and believe group members are sensitive and will trust and respect them.

The SPRinG project

The SPRinG project (Social Pedagogic Research into Group Work) aimed to address the limitations of previous research, and the concerns of teachers and students by identifying strategies for improving the use of group work in classes at Key Stages 1–3 (ages 5–14). Group work was conceptualised in general terms as involving children as *co-learners* (Blatchford *et al.*, 2003), and was inclusive in that it incorporated collaborative, cooperative, and helping interactions. This paper reports results only for the KS2 component of the project (see other articles in this special issue for details of the other Key Stages covered and Kutnick, Ota, & Berdondini, 2008; Pell, Galton, Steward, Page, & Hargreaves, 2007). The project, described in detail elsewhere (Baines *et al.*, 2007; Blatchford *et al.*, 2006), was conducted over four years and involved teacher input in its development, implementation and evaluation thus enabling teachers to have 'ownership' of the approach (Galton & Williamson, 1992). The resulting programme and handbook (see Baines, Blatchford, & Kutnick *et al.*, 2008) provides teachers with a set of strategic practices, based on four key principles, for implementing and improving the quality of group work in their classrooms and a programme of activities. These activities are designed to support the development of social, communication and advanced group work skills among students, but also function to reinforce the strategic practices recommended to teachers such that group work can be integrated across the curriculum.

The four key principles for developing effective group work involve: a relational approach to developing students' group working skills emphasising sensitivity, trust, inclusion and mutual respect between group members as well as communication and advanced group work skills; classroom and grouping arrangements (e.g., class layout, group size, composition, stability) that encourage group work; tasks and lessons that warrant and develop the use of group work and talk, and adult involvement (e.g., monitoring, scaffolding) that facilitates autonomous group functioning.

Evaluation of the programme at KS2 was carried out over one year in comparison with a control group using multiple methods including systematic observations in naturalistic classroom contexts (Blatchford *et al.*, 2006), general attainment tests in science at the start and end of the year and focused assessments of learning before and after lessons on particular science topics (Baines *et al.*, 2007). Findings from these research tools indicate positive effects of the programme on academic progress and behavioural interactions in the classroom but did not provide detailed insights into the nature of interaction and talk during group work of pupils involved in SPRinG in comparison to control pupils. In order to address this shortcoming, we collected video observation data of group interactions while students worked on similar tasks in everyday classroom contexts. This design also allowed us to test the impact of task activity on group interaction and talk. Much has been made of the importance of task design for warranting high level collaborative reasoning and effective group interactions (Baines & Howe, in press; Howe *et al.*, 2000) and this factor was not controlled for in the other data collection components of the project. Without controlling for task and group conditions, findings could be explained in terms of SPRinG teachers' improved capacity to create effective tasks, instead of pupil skills training and repeated group work experiences.

The main research question addressed in this paper is whether the group work programme led to interaction and dialogue patterns supportive of learning. Effects of the group work programme were addressed in comparison to a control group. This paper reports findings from just one research tool, video observations, used to evaluate the SPRinG programme. Analysis of attainment, attitude and classroom interactional and behavioural data are reported elsewhere (Baines, Blatchford, & Kutnick, 2008; Blatchford *et al.*, 2006).

Group interaction and talk

We now detail the main areas of group behaviour addressed in this paper. Predictions are drawn from key themes and activities in the SPRinG programme and from previous research.

Engagement and participation

Effective groups co-regulate their behaviour and engagement by planning and negotiating their work and interactions together (Järvelä, Volet, & Järvenoja, 2005). Many approaches to group work seek to overcome the problem that some members do not contribute equally to the group, e.g., by 'free riding' or 'social loafing' (Latane, Williams, & Harkins, 1979). In the SPRinG project we identified strategies to help pupils involve others in the group, and also to work through difficulties caused by children dominating or being isolated or withdrawn. More fundamentally, SPRinG training aimed to enhance feelings of psychological safety by encouraging the development of trust, sensitivity and respect between students. This enabled group members to develop confidence in their own (and others') ability and willingness to participate and overcome points of conflict.

Consistent with the aims of the SPRinG programme, we expected to find that the degree of involvement of all the group would be higher than for the control group. High levels of participation among all students may also lead to high levels of task engagement.

Socio-emotional ethos

Another dimension where we expected to find differences concerned group ‘maintenance’ and group ‘blocking’. The former describes contributions that encourage a positive ethos, for example, by encouraging others to participate or by giving positive feedback. This can be contrasted with behaviour which serves to block progress, (e.g., refusing to cooperate, interrupting or ridiculing other group members). This distinction is similar to Bales’ (1950) socio-emotional positive and negative categories.

Groups with low levels of trust and respect may experience conflict and group blocking. On the other hand, efforts to promote these socio-emotional qualities can lead to increased co-regulation of participation (Järvelä *et al.*, 2005) and greater use of group maintaining actions. The SPRinG project deliberately aimed to reduce group blocking and increase group maintenance, and so we expected to find more of the latter and less of the former in SPRinG group compared to control group interactions.

Pupil–pupil dialogue

The English national curriculum indicates that between 7- and 11-years-old children should be able to have discussions with peers involving the justification of views relative to alternatives and resolution of conflict (DFEE & QCA, 2000). However, although research indicates that even young toddlers can use justifications in the context of disputes (Howe & McWilliam, 2006), the capacity of older children to participate in non-conflict based discussions and to use talk to engage in collaborative reasoning is more limited. Discussions require more than the use of justifications, and other types of reasoning talk such as explanations, counter arguments, suggestions and efforts to compromise must be developed to enable productive participation (Baines & Howe, in press; Howe & McWilliam, 2006). The discussion sequences of 9-year-olds, and to some extent younger children, can be coherent and meaningful (Anderson, Chinn, Chang, & Waggoner, 1997), but these discussions are often limited to the provision of explanations and justifications in favour of a perspective, rarely involve counter arguments and may be relatively infrequent (Anderson & Soden, 2001; Felton & Kuhn, 2001). Dorval and Gundy (1990) suggest it is not until early adolescence that discussion *characteristically* consists of more than simple assertions and comments. Furthermore, Felton and Kuhn (2001) found that adolescent discussions are limited to presentation of self supporting explanations and arguments and there are indications that even college students and adults have difficulties engaging in good quality collaborative discussions (Anderson & Soden, 2001). Clearly engaging in discussion and debate is a complex process that many adults can struggle with. If left to develop naturally, students may fail to develop skills that will help them engage in productive discussion and learning. Given these shortcomings in peer discussion skills, recommendations that children be trained in communication skills have been widespread (Gillies, 2003; Simon, Erduran, & Osborne, 2002). A number of classroom initiatives have been developed for enhancing high level talk (Clark, Anderson, Archodidou, Nguyen-Jahiel, Kuo, & Kim, 2003; Mercer *et al.*, 1999; Reznitskaya, Anderson, & Kuo, 2007) though few have combined this with training in social and other group work skills.

A main prediction of the SPRinG project was that the nature of pupil–pupil talk would show more signs of collaborative discussion and explicit verbal reasoning. This would involve talk that aims to make reasoning explicit to others (e.g., through explanations, counter arguments, conditionals, etc). In other words we expected more collaborative ‘high level’ talk or argumentation from SPRinG pupils. However because SPRinG pupils had been trained in communication skills and had regularly experienced collaborative group work, we also expected their collaborative discussion to be *qualitatively* different to that of control pupils. Previous research suggests that children’s thinking skills may be affected by group work (Davidson & Worsham, 1992) and we thus distinguished between talk that was limited to the given information, which we called ‘text-based talk’, and talk that generated reasoning that was based on, but went beyond, the given information, which we called ‘inferential talk’. Lower forms of talk often observed in pupil–pupil interactions involve little effort to engage in a reasoned discussion and may take the form of simply ‘sharing information’ (e.g., ideas, opinions, suggestions), ‘procedural’ talk about doing the task (e.g., talk about how to spell a word, what to write, etc), or petty ‘disputes’ between pupils. Disputes may be an immature version of more high level discussion because pupils are reluctant to separate themselves from their own view, to take account of evidence or seek a compromise or consensus (Baines & Howe, in press). We expected less of these lower forms of talk in SPRinG groups.

It might also be predicted that there would be more talk in SPRinG groups about planning and organising the group (e.g., deciding on group roles). This would follow from the activities and principles of SPRinG. This kind of ‘meta-group’ talk is developmentally prior to on-task talk, in the sense that once groups resolve difficulties in working together they should be able to focus on the task at hand (Webb & Palincsar, 1996). On the other hand it was thought that the SPRinG pupils would spend less time organising equipment and the task than students who had not participated in the SPRinG training. This is because the planning and organising of materials tends to be more generic than the organisation of people which may be more task specific. Because SPRinG students had frequently been involved in group work it was probable that they were more familiar with organising equipment and the task than non-SPRinG students.

Sustained discussion on topic

Concerns about the nature of, and chances for, peer talk in classrooms are not just limited to increasing the cognitive level of talk. There should also be opportunities for pupils to engage in sustained talk with adults and peers (Baines *et al.*, 2003; Blatchford, Kutnick, Baines, & Galton, 2003; Galton & Williamson, 1992). The English national curriculum suggests that sustaining discussion on a topic is a central area of learning during middle childhood (DFEE & QCA, 2000). Between the ages of 7- and 11-years students are expected to be able to sustain a topic of discussion with others. Yet in everyday classroom settings, students are rarely allowed to engage in sustained interactions on a topic, rather control of conversation is held by the teacher. Under such circumstances students have few opportunities to think and develop an argument or a line of reasoning in a structured and coherent manner (Cazden, 2001; Smith *et al.*, 2004) and there are indications that primary age pupils’ ability to sustain topics of discussion is relatively poor (Dorval & Gundy, 1990).

We expected that pupils involved in SPRinG would be more likely to sustain discussions on a topic as collaborative discussion relies on students developing ideas over a period of time whereas control pupils would be more likely to change the topic.

Method

Groups of SPRinG pupils and control pupils were filmed at the end of the intervention year working on specially designed decision-making tasks within naturalistic classroom contexts.

Sample

The overall SPRinG sample involved 849 pupils from 32 classes in 17 schools. The control group consisted of 1027 pupils drawn from 40 classes in 19 schools. Filming took place in a sub-sample of Year 4 (8- to 9-years-old) and Year 5 (9- to 10-years-old) classes, 10 of which were from seven schools involved in the SPRinG intervention and a further 12 classes from seven schools in the control sample. Up to four groups of pupils could be filmed in each class at one time. A total of 39 SPRinG and 33 control groups were filmed. Due to equipment malfunction and occasions where adults dominated interactions, a number of groups were removed from the analysis. The resulting sample consisted of 31 SPRinG group work interactions and 29 control group work interactions.

The SPRinG and control classes came from schools with similar characteristics in terms of school size, % eligible for free school meals, % of pupils that had special education needs, % with a different first language than English, and the curriculum followed. All schools were approached in relation to involvement in the filming part of the research. The subsample of schools that took part in filming was representative of the overall sample and did not significantly differ on these background characteristics.

Procedure and materials

The SPRinG intervention programme involved teachers using the principles and practices they had learnt in their professional development sessions and for the first four months of the year training pupils in group working skills. The remainder of the year involved teachers using group work in their own way in the curriculum. For the purposes of filming in classrooms, parental and pupil permission was sought and where not given the particular pupil was placed in another class for the duration of filming. Filmed groups involved children that had previously and repeatedly worked together on group projects and were of mixed sex and ability (either low and middle or middle and high ability). Video data were collected for a maximum of four groups of pupils per class working under 'normal' classroom conditions. This involved using up to two digital camcorders placed at a distance away from, and focusing on, up to two groups each. Four mono omni-directional microphone-transmitters were placed at the centre of each group. A stereo receiver was connected to each camcorder enabling the camcorder to record the dialogue of the two filmed groups. To ensure that pupils did not know whether they were being filmed, identical dummy microphones were placed on the desks of non-filmed groups. All pupils were told

that they may or may not be filmed. To sustain the collection of data under 'authentic' conditions, teachers were asked to implement the group work task in their own way, but were asked to use only groups of four pupils (a key strategy recommended in the SPRinG programme). The teachers could choose one of three decision-making tasks, one concerned with which of four factory workers should get a pay rise, the second with which of four pupils should be the class representative, and the other, with which of five owners should adopt one of six dogs in a dogs' home. Teachers selected the activity they felt was most appropriate for their students. All tasks were typical of those used with this age group in personal social and moral education. The tasks were open ended because all candidates could make a claim for a rise, to be the class representative or for a certain type of dog, though there were also personal circumstances presented which could affect their case (e.g., in the context of the pay rise task, habitual lateness to work or having dependents at home). None of the tasks have a clear right or wrong answer and groups must identify criteria and reasons for selecting, or not selecting, the candidates. Teachers were given instructions and the worksheets. The tasks involved a short piece of background, a description of several contenders, and the aim for pupils was to discuss and agree on who should be chosen and why. The activity took approximately 20 minutes.

Video coding

On playback, every 20 seconds of group interaction was coded using the following categories.

Group participation and task engagement

For this mutually exclusive category set the observer coded the prominent form of interaction within the 20-second sequence.

- *All actively involved and on task.* When all group members contribute and actively listen (e.g., nodding, back channel responses) to others. All are equally engaged in the work and interaction is on task.
- *All involved and on task, some passive.* As above but one or some are actively listening though not contributing.
- *All involved and on task, split.* When the group splits into subgroups. Both groups are on task and actively involved.
- *Some uninvolved and appear off task passive.* Some are involved in the group interaction but one or more children are passively disengaged and plainly not attending.
- *Some uninvolved and actively off task.* Some are involved in the group interaction but one, two or three children are actively engaged in something else not related to the task.
- *All off task.* None of the pupils are on task and all are clearly off task

Socio-emotional ethos

The observer could code either or both categories if they occurred once or more during the 20-second sequence.

- *Group maintenance.* Speech or gestures that sustain the interaction and function of the group, that draw others in, for example, by saying, 'that's a good suggestion'; 'do you agree?'
- *Group blocking.* A child in the group makes an explicit attempt to block progress by refusal to participate or cooperate, saying, for example, 'I'm not doing this', or by ridiculing another pupil.

Type of pupil–pupil dialogue

Categories were mutually exclusive and ordered by talk quality. When talk was on task, an occurrence of 'on task inferential collaborative discussion' superseded all other categories, followed by 'text based collaborative talk', 'meta-group talk', 'sharing information' and so on.

- *Off-task talk.* When the talk is not related to the task or topic of discussion.
- *Collaborative discussion.* Dialogue where group members engage in talk that aims to make reasoning explicit to others and involves giving explanations, counter arguments, justifications, conditionals and result statements. This was divided into two types: *high level inferential talk* was reasoning talk that went beyond the information provided for the task (involving inference or synthesis). For example, a pupil would seek to justify someone getting a pay rise in terms of reasoning about their home circumstances. This involved thinking beyond the text. It superseded *high level text-based talk* which was more limited because it was reasoning based on the text in front of pupils, for example the justification for the pay rise came from information on the worksheet.
- *Meta-group talk.* Organising and planning within the group; talk about the group rather than about the task in hand (e.g., children may discuss group roles, how the group should proceed, etc).
- *Sharing information.* Sharing their ideas, opinions, suggestions and different knowledge, but with little effort to explore the ideas further or to investigate the evidence. Reasons for opinions or decisions are not given.
- *Disputational talk.* Speakers are concerned to defend their own idea/opinion at the expense of any attempt at reasoning, reaching a solution or compromise. These can become emotionally charged situations and may end in frustration, aggression and/or tears.
- *Reading out task.* Involves reading out the task scenario before beginning the discussion.
- *Procedural talk.* Involves spelling out words for others, reading what had been written by the group and anything to do with preparation of materials.
- *Other/no talk.* Occurs when no one in the group speaks during the 20-second interval or the talk does not fit any other category.

Discourse topic

For this mutually exclusive category set the observer coded on the basis of the topical focus of the discourse over the 20-second sequence.

- *Sustained topic focus.* Throughout the 20-second span the talk is on task and is about one particular topic and the topic is sustained. For example, the topic

may be a particular character in the task, or how an agreement can be reached and so on.

- *Changeable topic focus.* Occurs when throughout the 20-second span the talk is on task and about more than one topic as outlined above.
- *Other/no talk.* Occurs when there is no talk over the period, a topic cannot be identified or when the talk is off task.

Reliability

Video observations were coded by an experienced education researcher trained in the use of the categorisation scheme. At the point of coding this researcher was unaware which groups were in the SPRinG or control condition. A second observer also coded 15% of the group interactions. Agreement was high reaching 89% overall and for each mutually exclusive set was: 83% for group participation and engagement, 86% for socio-emotional maintenance, and 67% for socio-emotional blocking, 88% for discourse topic, and 87% for type of pupil–pupil dialogue.

Results

The data presented in the following tables (Tables 1–4) are percentages of total observations. Data were analysed using one-way ANOVAs and Cohen's *d* effect sizes are reported.

Participation and engagement

The video observations revealed that all members of SPRinG groups were actively involved in the group discussions more frequently than were control pupils (see Table 1) ($F(1,58)=23.32$, $p<.001$, $d=1.25$). On the other hand, a portion of members of the control groups were more often actively off-task than were pupils in SPRinG groups ($F(1,58)=10.71$, $p<.01$, $d=.85$). Furthermore, although it was uncommon that groups split up and worked apart from their peers in both treatment conditions, it was more common for control than it was for SPRinG groups ($F(1,58)=4.88$, $p<.05$, $d=.68$). Control groups were also more frequently off-task than were SPRinG groups, although this analysis did not reach statistical significance.

Table 1. Mean percentage of group participation and engagement for SPRinG and Control groups.

Participation and task engagement	SPRinG N=31		Control N=29	
	Mean	SD	Mean	SD
All actively involved	65.20**	24.83	35.85	22.04
All involved, some passive	5.26	8.42	8.31	11.45
All involved split	0.12	0.47	1.15*	2.56
Some uninvolved – off-task passive	9.03	8.82	9.90	10.76
Some uninvolved – off-task active	15.62	16.20	30.89**	19.86
All off-task	4.37	7.21	9.25	12.91

* $p < 0.05$; ** $p < 0.01$.

Table 2. Mean percentage of group maintenance and group blocking for SPRinG and Control groups.

Socio-emotional ethos	SPRinG N=31		Control N=29	
	Mean	SD	Mean	SD
Group maintenance	10.94	6.76	12.13	9.71
Group blocking	3.53	6.13	13.35**	14.78

* $p < 0.05$; ** $p < 0.01$.

Socio-emotional ethos

Group blocking was more frequent in control group interactions than those of SPRinG groups ($F(1,58)=11.58$, $p=.001$, $d=.94$). There was no statistically significant difference, however, between SPRinG and control groups in the amount of group maintenance that members provided for each other during group discussions (see Table 2).

The nature of group blocking was varied in the interactions and ranged from acts of aggression and ridicule against other members to mild behaviour designed to disrupt the task and prevent group progress. The last of these was the most common form of blocking and is illustrated in Extract 1 where repeated efforts to get the work under way are met by Student 4's efforts to block group progress.

In this example from a control classroom, a multiethnic group of Year 5 students (two boys and two girls) are working on the 'class representative' task.

Extract 1

14. St4: Hey, this is my one [refers to task information sheet].
15. St1: We're using all of them 'cos we all need to read.
16. St4: Wait, wait [said as he tries to take a sheet off another child].
17. St3: I'm keeping this one.
18. St1: We need to work on this sheet.
19. St4: No, I need it.
20. St3: You're reading yours.
21. St4: No, I need it as well. [Begins to take all the sheets off other children.]
22. St2: ... [inaudible] ...
23. St1: We all need the sheets 'cos we gotta write on here.
24. St4: We need to write here.
25. St4: Yeah, write then. [Throws all the sheets on the floor.]
26. St2: Hey!! Who should be, um ...
27. St4: Aaron [Candidate 1], that's it! That's what St1 wants.
28. St2: Who should not be the class rep?
29. St3: Yeah, why do you want all the sheets?
30. St4: I want it.
31. St3: Why? What are you doing [as St4 tries to grab his sheet]?
32. St4: I want to show you something.
33. St3: Here, have this one. [Gives him one of the other sheets in front of St1.]
34. St4: [Throws it.] No, she won't let me 'cos she's too greedy.
35. St1: I am ... that can be your sheet, I don't need this sheet. [Gives one to St4 and puts another on a pile on the desk.]
36. St3: Aaron.
37. St2: So, you don't want Aaron to be the class rep?
38. St3: I do want him. I don't want Javid [Candidate 2].

39. [Throughout this St4 keeps taking sheets from one person and throwing them at another. They try to ignore him]
 40. St4: See what she's doing. She's taking it away.
 41. St1: I don't want it.
 42. St4: [Throws the sheets at St1]

In this example Student 4 makes repeated attempts to block progress on the task. The interaction continues in this vein and moves to a full argument where Student 3 and the other group members try a range of strategies to encourage Student 4 to cooperate including reasoning with him, frightening him by indicating that everything he has said is being recorded, by using a vote to achieve the task quickly and a 'no speaking' contest to get him and Student 3 to stop arguing. In the end Students 1 and 2 try to do as much of the task alone while ignoring the other two pupils but fail to finish. A main difficulty is that Students 1 and 2 allow themselves to get drawn back into the ongoing dispute. This interaction was a relatively common experience among the control groups. Throughout the sequence there is constant evidence (verbal and non-verbal) of frustration, anger and annoyance from all group members.

Many instances of group blocking such as in the example above were met with efforts to ignore the person doing the blocking. On other occasions students try to bring the member blocking group functioning back into to the collaborative activity through contributions that function to maintain the group.

Group maintenance is evident in line 22 of Extract 2 from a control group (multiethnic, one boy and three girls) of Year 5 students working on the 'dogs' home' activity. One child repeatedly insists that the dog, Gnasher, should be linked to a candidate.

Extract 2

21. St3: Gnasher, Man.
 22. St2: You can't just say it for yourself. We've all got to choose it.
 23. St3: I want Gnasher, Man.
 24. St2: So, there's not only you.

Explicit attempts at group maintenance were also evident in the discussions of SPRinG groups but these were frequently isolated instances rather than being in response to blocking. Each of the following excerpts comes from the interactions of different SPRinG groups (see Extract 3).

Extract 3

- St2: Hey, the cool thing is, none of us are actually arguing.
 St1: ... He doesn't really, like bother. So I think he'd be good. What do you think?
 St2: Well we're all going for, well, it's like, you're going for Helen [Candidate 4], yeah?
 St3: I'm going to go for Amir [Candidate 3].
 St2: I'll still go for Helen but [fades].
 St1: Now we've got to persuade each other.
 St3: We can.
 St3: Let's hear what everyone else says.

Pupil–pupil dialogue

While there were no differences in the amount of text-based talk and meta-group talk used by SPRinG and control groups (see Table 3), SPRinG pupils engaged in far more high level inferential talk than did the control groups ($F(1,58)=21.92, p<.001$,

Table 3. Mean percentage of type of dialogue engaged in by SPRinG and Control groups.

Type of dialogue	SPRinG N=31		Control N=29	
	Mean	SD	Mean	SD
High level – inferential	25.19**	16.42	9.20	8.57
High level – text based	12.00	7.11	12.62	8.85
Meta-group talk	11.24	8.50	11.31	10.01
Sharing information	17.4	9.11	25.26*	14.58
Disputational talk	0.16	0.88	1.06*	1.89
Reading out task	11.38**	6.64	1.94	3.52
Procedural talk	7.66	5.42	12.74**	8.51
Off-task talk	5.60	9.00	17.40**	16.21
Other/No talk	8.85*	8.74	4.05	4.50

* $p < 0.05$; ** $p < 0.01$.

$d=1.28$). On the other hand the control groups more often used lower level talk involving sharing information than did SPRinG pupils ($F(1,58)=6.36$, $p < .05$, $d=.66$). SPRinG pupils read out the task more often than did control groups ($F(1,58)=46.39$, $p < .001$, $d=1.86$), while control pupils used more procedural talk than did SPRinG pupils ($F(1,58)=7.71$, $p < .01$, $d=.73$). Disputational talk was uncommon in both groups but occurred more frequently in control than in SPRinG groups ($F(1,58)=5.79$, $p < .05$, $d=.65$). Similarly control pupils engaged in off-task talk far more often than did SPRinG students ($F(1,58)=12.37$, $p = .001$, $d=.94$).

Extract 4 comes from a discussion by a Year 5 SPRinG group working on the ‘pay rise’ task. The group of four students was multiethnic and consisted of two boys and two girls. This discussion was typical among SPRinG students. Having already discussed the characters once, the group decide to re-read the character outlines again to help resolve their disagreement.

Extract 4

32. St2: I still think Helen, I still think Helen [Candidate 4] because she’s a teenager as well, init?
33. St1: I think Helen more now because...
34. St4: I think Helen is too young to do...
35. St2: To come to work? But she hasn’t dedicated herself yet.
36. St1: Her work is poor because she’s probably thinking about her ill mother and her son.
37. St3: And her salary isn’t really high yet and the other two are high so they don’t really need a pay rise. There it’s just between those two now.
38. St1: I thought you agreed about her? Yeah?
39. St3: Well it was his [Candidate 3] idea for the new sock-flavoured crisps.
40. St2: But he made a bad impression on management. He made a bad impression.
41. St4: Critical comments.
42. St3: Like he’s the one who’s saying sock-flavoured crisps are...
43. St1: Sock flavour?
44. St2: It’s off but...
45. St4: His salary is already high. It means we’ve got these two left.
46. St2: I don’t think this one here [points to description of Amir, Candidate 3] because once you make a bad impression in working you’re not going to get nothing.
47. St4: So it’s these two.

48. St3: And she has a child to look after.
 49. St1: And if he gets the pay rise probably he thinks, oh it doesn't matter if I do bad things in the company. He'd still be getting the pay rise and all that.
 50. St3: They [the employers] could have like a conversation where Helen gets the pay rise if she buys her mother medicine and then works harder.
 51. St4: Yeah, I think if she works the hardest then she should get it.
 52. St2: I wouldn't be surprised if Helen has a poor attendance.
 53. St1: Me neither.
 54. St2: Because look she's got one child, she's nineteen years old.
 55. St3: And she's got an ill mother.
 56. St2: She's got one child, yeah, so like she has to pay for like toys and stuff for him and she's got an ill mother so that's like...
 57. St3: Look after her.
 58. St2: So that's like a load of money.
 59. St4: You know when you just start a job, you never get very much money, do you? And as you get into the job more then you get more money so I think that we shouldn't do Paul [Candidate 1]. He's not brilliant but he's not bad either. His work is average. He doesn't need much money. So, yes, you're right. Helen should get the pay rise.
 60. St1: So do we all agree then?
 61. St2: Helen should get it?
 62. St3: Yeah.

Extract 4 contains many examples of students using explanations, counter arguments, conditionals and other utterance types involved in reasoning talk. The group talk is focused on, and functions to sustain, the topic and there are very few utterances that divert the focus of discussion. All students are involved in the activity, actively seek to involve each other, and are focused on reaching a joint decision. Much of their reasoning talk is clearly presented and highly elaborated, frequently involving text-based reasoning, for example, lines 39 and 40 of the transcription. However their explanations and reasoning go beyond the text for the task and are thus inferential, as is evident, for example, in lines 36–37, 46, 49–50, 56–59. Lines 60–62 aim to ensure explicit joint agreement within the group.

The talk produced by members of control groups is different from that of students in the SPRinG condition. Data from groups of control pupils working on these activities show less elaborated reasoning talk and draw primarily on the information presented in the text. Extract 5 comes from a mixed sex (two boys and two girls), multiethnic Year 5 group working on the 'class representative' task.

Extract 5

58. St1: Well, I don't think Raksha [Candidate 4] should be one.
 59. St2: Yeah.
 60. St4: Yeah because she doesn't listen to people...
 61. St3: And she don't, like it says that she don't share ideas either.
 62. St4: Yeah.
 63. St2: She'd be useless.
 64. St4: Yeah, and she doesn't like...
 65. St1: I'm not sure about Javid or Maria [Candidates 1 and 3].
 66. St4: Did you say you don't want Maria to be one?
 67. St1: I didn't say. I'm not sure.
 68. St3: Probably depends on...
 69. St2: I think Maria is, might be a good class representative.
 70. St3: Yes she might be.
 71. St4: Yeah.
 72. St3: Cause she can persuade people.
 73. St2: Yeah.

74. St3: If you read the, the only bad thing about Maria is that she is quiet.
 75. St2: Yeah, and she doesn't want to be a class representative but her friends do.
 76. St1: If she's quiet, like if she speaks quietly everyone's gonna talk over her and then it's not going to be actually very...
 77. St3: But if everyone listens then they might hear her.
 78. St4: Hmm.
 79. St1: Yeah, but do you think, other people will be sharing their ideas as well so you have to be loud to try and make somebody listen to you.
 80. St3: Yeah, but if you're in a meeting then each person has their say.
 81. St2: Yeah, what about Jayv, Javid?
 82. St1: He's a popular boy...
 83. St3: But he just wants to do it so he can miss lessons.
 84. St4: Cause he, yeah, so he can miss lessons.
 85. St1: Yeah, but he's not going to listen to other people talking as well.
 86. St2: Yeah, that's right.

This group discussion was one of the more cooperative involving more reasoning talk than average for the control groups. In the extract, the reasons presented in lines 60, 61, 72, 74, 75, 82, 83 and 85 draw directly on evidence from the task text and in these groups students make fewer efforts than SPRinG groups to discuss inferences and implications that go beyond the text, though they are still in evidence for example utterances 76–77 and 79–80. There is also evidence of what we refer to as sharing information, for example 58, 65, 66 and 69. There was also more disputational talk in the dialogues of control groups (as indicated in Extract 1). Control groups also spent much more time discussing procedural issues such as how to spell particular words, whose turn it was and so on. By contrast SPRinG groups often read and re-read the candidate profiles to ensure they had a thorough understanding and awareness of the key issues. This more thorough understanding of the details may have enabled participation in the inferential high level reasoning talk.

Meta-group talk, that is talk that focuses on explicit organisation of group discussion and agreement processes, was also in evidence within the discussions of both control and SPRinG groups but usually involved rather short sequences of talk. Extract 6 comes from a SPRinG group of Year 4 pupils (two girls and two boys) undertaking the 'pay rise' activity. The first parts of lines 78 and 79 are examples of meta-group talk.

Extract 6

78. St4: Well, come on, we need to work this out. Who doesn't need the money?
 79. St1: Maybe we should think about who shouldn't be given the pay rise. Who should not be given the pay rise?

Sustained discussion on topic

Statistically significant differences were found between SPRinG and control groups in the extent to which discourse topics were sustained and changed (see Table 4). SPRinG pupils were more frequently observed to sustain the topic than control groups ($F(1,58)=6.90$, $p<.05$, $d=.68$), whereas control pupils changed the focus of discussion more often than did SPRinG children ($F(1,58)=10.01$, $p<.01$, $d=.84$).

There was quite a marked difference in the extent to which group dialogues consistently sustained a topic or changed the topic continuously. Extract 7 comes from a discussion by a Year 5 SPRinG group (multiethnic, two girls and two boys)

Table 4. Mean percentage for sustained and changeable topic focus for SPRinG and Control groups.

Discourse topic	SPRinG N=31		Control N=29	
	Mean	SD	Mean	SD
Sustained topic focus	22.91**	13.10	14.33	12.11
Changeable topic	30.58	12.59	44.70**	21.18
Other/No talk	44.94	18.34	36.05	17.97

* $p < 0.05$; ** $p < 0.01$.

working on the ‘pay rise’ task. The sequence on the topic of whether Helen should get the pay rise continued for just over two minutes and is shortened here for the sake of space.

Extract 7

209. St4: Helen [Candidate 4] should not be given the pay rise because she...
 210. St3: Her work and attendance are poor.
 211. St1: If she improves her work and attendance then she should be given it. Her work and attendance is poor.
 212. St4: She should not come to work late.
 [...]
 218. St3: She’s too young to work.
 [...]
 227. St4: Yeah, I know so she shouldn’t really mix with her work and her family. So if she goes to work it’s her fault she’s thinking about her family.
 [...]
 240. St3: How do you know that she’s that poor? She could be really rich there but her mum ‘cause could still be like ill but could die ill.
 [...]
 243. St1: She needs to get more focused on her work.
 244. St4: She shouldn’t get it... She should get more focused.

By contrast the discussions of control groups showed a more changeable pattern of talk on topics over the 20-second periods. Extract 8, from a control group of Year 5 students (multiethnic, one boy and three girls) working on the ‘dogs’ home’ task, illustrates changing topics and group members talking about different topics (note that text in brackets identifies the referent when this is unclear). In the example, Student 1 frequently refers to the topic of timing (lines 109, 113, 118), the topic of turn taking arises at 114–117 and the rest of the talk is about linking different dogs to different owners (lines 110–112 and 119–124) totalling 6 topic changes in the space of a 20 second observation.

Extract 8

109. St 1: And then we’re going to our class
 110. St 2: She [Miss Gibson, Candidate 3] can, she can take the dog [Scooter]...
 111. St 4: Take the dog, she can take the dog...
 112. St 2: With her, with her.
 113. St 1: Five minutes is when the big hand goes to the eight; we need to be dashing. I mean, to the line.
 114. St 2: OK, I need to do that one and that one.
 115. St 1: No, me, man.
 116. St 2: OK.
 117. St 3: I’m supposed to do that one.

- 118. St 1: Let's go, let's go, let's go.
- 119. St 4: Fifi [the dog] should be with a woman.
- 120. St 1: Yeah.
- 121. St 2: No.
- 122. St 4: Yeah, the 75-year-old, the 75-year-old [Mrs Orbasli].
- 123. St 2: No, no.
- 124. St 3: That one St1? Fifi would...

Discussion

This study examined whether pupil groups in classrooms where the SPRinG group work programme took place changed their behavioural interactions in predicted ways, in comparison with a control group. Interactions were coded systematically from video observations of groups of SPRinG and control pupils engaged in the same group work tasks. Several differences were found between SPRinG and control groups. SPRinG pupils more often than control groups involved all members in discussions, sustained the topic of discussions over extended periods, engaged in high level inferential discussions that developed and extended their reasoning, and organised themselves by reading out the task. Conversely control pupils, more frequently than SPRinG pupils, were actively off-task, were engaged in group blocking, changed the focus of their discussion, engaged in lower level talk where they shared information but did not develop their reasoning, spent time discussing procedural matters and engaged in off-task talk.

Involvement and engagement

We found, in line with predictions, that involvement in SPRinG increased the amount of time pupils spent working together as a whole group. By contrast control groups were more likely to split into subgroups, while remaining on task, and also more likely to have a portion of the group not involved in the group work activity and thus free-riding on the back of other group members' efforts to do the task. However these students were not just passively free-riding, rather they were actively engaged in non-task related activity which in many circumstances may function to disrupt group on task activity and also create bad feeling within the group. Free rider behaviour is an oft-cited problem (Slavin *et al.*, 2003) and a main reason teachers give for not undertaking group work. The SPRinG training programme sought to encourage pupils to develop strategies to deal with free riders in the group. These results indicate that the SPRinG project was successful in encouraging group interactions that involved all pupils, less free-riding behaviour and productive work related interactions. Such findings are important in the context of the generally inactive learning role that pupils tend to have in primary schools in England (Galton *et al.*, 1999).

Socio-emotional ethos

Findings on group 'maintenance' and 'blocking' partially supported predictions. Group blocking was more prevalent in control groups. This suggests that SPRinG was successful in reducing the amount of everyday negative behaviours between group members but also encouraged group members to display more self-control. Group blocking behaviours are a main source of concern for teachers, since they can

necessitate adult intervention and control in order to resolve the problem and prevent further escalation. When groups do not have strategies for dealing with group blocking and members are reluctant to assert self control or participate, group work experiences can be very tense and frustrating for all involved. It is hardly surprising that in everyday classroom contexts, students have major doubts about group work (Galton & Williamson, 1992).

Findings showed, however, little difference in the amount of explicit group maintenance (for example encouraging others to participate), which was unexpected. This suggests that SPRinG had little impact on encouraging positive thoughts and feelings within groups. However, it was the observers' perception that, as a result of the SPRinG training and practice with group work, participation and facilitation of others was so built into the fabric of interactions (for example by addressing each other's comments and explanations) that there was little need to make encouraging verbal gestures to others. This view is reinforced by the earlier finding that SPRinG groups tended to have all members involved, thus making explicit efforts to involve others was unnecessary. It may be that because these groups have spent much time working together over the year, there is little need for explicit efforts to include members that participate less since on the whole members participate equally. This suggests that the development of effective group functioning may initially involve efforts to include others but once a feeling of safety and trust exists between group members, self-regulation of involvement becomes the norm. This implies that a programme like SPRinG can encourage more connectedness between students as seen in the higher levels of joint involvement and reduced group blocking. By contrast group maintenance was most often produced by members of control groups in response to group blocking behaviours.

Pupil-pupil dialogue

A main expectation was that SPRinG pupils' group work would involve more signs of explicit reasoning discussions and this was confirmed by the video analysis. SPRinG groups produced more high level inferential talk involving speculative reasoning that went beyond the information provided for the task. There was, however, little sign of a difference between SPRinG and control groups in levels of high level text based reasoning. Control groups were more likely to engage in talk that involved the sharing of information with less effort to reason or explore ideas or evidence further. These results indicate that overall involvement in SPRinG training encouraged students to engage in higher order talk and reasoning in groups.

As the term indicates, higher order inferential talk is more than using available evidence as part of an argument but involves participants using available information to speculate and explore alternate possibilities and to co-construct inferences that go beyond the boundaries of the task to examine implications and arrive at more considered conclusions. Because of the open ended nature of the group tasks, text based higher order reasoning will only allow the discussion to go so far in the decision making process. In order to make a final (and logical) decision in such tasks, group members must go beyond the evidence available. Higher order inferential talk therefore reflects the use of important critical thinking skills.

In contrast to our predictions, there were few differences in the levels of 'meta group' talk. Such talk usually involves planning and organising the group and the

task. Observers felt that groups were less inclined to engage in extended reflections on group planning; rather they preferred to get on with the task. Since the task was relatively short and straightforward in definition there was little need for extended meta-group talk to plan for the task. With the exception of identifying who should note down the various decisions and ensuring joint agreement there was little need for group organisation and thus meta-group talk. Such talk may be more evident during complex group activities carried out over a longer period of time (e.g., group projects/investigations, etc).

Findings in relation to levels of procedural talk were in line with predictions with SPRinG pupils producing less than control pupils, though levels were low in both groups. SPRinG groups seemed to regulate procedural matters (e.g., the taking of turns in reading, completing the written aspect of the task) relatively efficiently in the background and thus these involved little talk time, probably because SPRinG groups were more experienced at working as groups. A similar finding was found in relation to disputes between peers. We anticipated that the amount of unsubstantiated disputational talk would be lower among SPRinG group members especially as training specifically encouraged the use of reasoned debate. Overall disputational talk was very low but was in greater evidence in control group members' interactions. The lack of disputes in pupil interactions generally is of little surprise, since such interactions can be stressful and upsetting and become unproductive. However SPRinG training has allowed pupils to engage in productive debate and to question others in the context of a more positive group climate and thus SPRinG seems able to help fulfil the potential of group work to increase active and productive discussion on task.

Sustained discussion on topic

We also found that SPRinG pupils were more likely to sustain topics under discussion. Control groups, by contrast, were more likely to change topics and thus not maintain them over time. This suggests that involvement in SPRinG has helped pupil–pupil dialogue in an educationally beneficial way. Sustained and elaborated dialogue are components of good quality group work enabling participants to express views and extend explanations and reasoning (Slavin *et al.*, 2003; Webb & Palincsar, 1996). Sustained talk on topics of conversation presupposes a joint focus of attention and sustained intersubjectivity. But sustained talk on topics in the SPRinG groups also reflected a more systematic approach to joint engagement in resolving the problem and making a decision. By sustaining talk on a topic, group members considered at length the arguments both for and against making a particular decision and may imply a more systematic approach to reasoning.

General discussion

There are a number of possible questions that arise in relation to the validity of the research design of the current study. We address these issues elsewhere including the improbability of a 'Hawthorne effect' acting on the findings (Baines *et al.*, 2007). A common concern about studies that involve video recordings of collaborative group work is that they may lack ecological validity. One of the strengths of this study is that in the course of data collection for the research reported here, we endeavoured

to ensure that the group task was undertaken in an authentic classroom context. The task was introduced by teachers and conducted under normal classroom conditions and recording apparatus was arranged so as to minimise obtrusiveness. Nevertheless, the presence of recording equipment and the undertaking of a task slightly different from the norm, especially for members of the control group, may have affected group interactions. However other findings from the project involving naturalistic systematic observations in classrooms suggest that the patterns observed in the SPRinG groups were not specific to the structured group work tasks but have transferred to everyday classroom activities (Blatchford *et al.*, 2006).

A main rationale for filming SPRinG and control group work interactions, in addition to providing detailed insights into the nature of group work interactions and talk, was to identify whether the effects on classroom behaviour and attainment reported elsewhere (Blatchford *et al.*, 2006) could be explained by improvements in SPRinG teachers' capability to set up the conditions and tasks for group work. Because students worked in small groups of four on the similar tasks, findings can be more closely connected to experiences of group work and relational skills training. Overall, findings suggest that SPRinG training and regular experiences of group work explained differences between SPRinG and control groups in engagement, participation and talk during group interactions.

Evidence that control groups also participated in reasoning talk suggests that creating tasks that warrant group working may go some way to enhancing group discussions but are not sufficient for helping students overcome many of the concerns and problems they experience when undertaking group work. The relational approach and skills training provided students with strategies and opportunities to develop advanced group working skills necessary for effective group functioning. As evidenced in the interactions of members in control groups and consistent with teachers' views, group work may cause conflicts to surface between peers. However, involvement in the relational and group work skills training programme enables children to resolve and move beyond these conflicts and had a positive effect on group behaviour over the course of the evaluation year.

Consistent with previous research findings (Järvelä *et al.*, 2005), it is our view that the relational approach promotes an underlying form of interpersonal orientation that enhances co-regulation of the interaction by all group members. This is unlikely to be facilitated by an approach that emphasises group rewards and individual accountability, such as that advanced by Slavin *et al.* (2003), or that involves communication skills training alone. The relational approach combines social, communication and advanced group working skills and strategic classroom practices into a package that can directly influence inclusion, cooperation and social cohesion. The work and emotional effort required of teachers and pupils to adopt this approach should not be misjudged but teachers often found relational training paid off in the longer term. Despite their initial concerns that embarking on a programme of group work might result in a decline in behaviour, participation and learning, we have found these have improved. This study has identified a number of ways in which the SPRinG programme seemed to have positive effects on interactive and dialogue processes connected to successful group work and these processes have been highly implicated in many explanations of the effectiveness of group work on learning (Webb & Palincsar, 1996; Howe & Tolmie, 2003). Teachers could therefore

benefit by allowing a much more central role for group work in their teaching and pupils' learning within classrooms.

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