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Cambridge Primary Review Trust and the University of York,
supported by the Education Endowment Foundation

Classroom talk, social disadvantage and educational attainment: raising standards, closing the gap
(CPRT/UoY Dialogic Teaching Project)

Changing Talk, Changing Thinking: interim report from the in-house evaluation of the CPRT/UoY Dialogic Teaching Project

**Robin Alexander, Frank Hardman and Jan Hardman,
with Taha Rajab and Mark Longmore**

Introduction

The project *Classroom talk, social disadvantage and educational attainment: raising standards, closing the gap* (abbreviated to *CPRT/UoY Dialogic Teaching Project*) is a joint project of the Cambridge Primary Review Trust (CPRT) and the University of York (UoY). It is directed by Robin Alexander and Frank Hardman, funded 2014-17 by the Education Endowment Foundation, and based at the University of York.¹

The project piloted and implemented a 20-week professional development intervention that used dialogic teaching, as developed since 2001 by Robin Alexander,² to improve the quality of classroom talk and thereby increase pupils' engagement, learning and attainment. In common with other EEF projects, the intervention's efficacy was evaluated by means of an independent randomised control trial (RCT), which in this instance was undertaken by a research group at Sheffield Hallam University (SHU).

EEF summarised the trial's headline findings, published in July 2017, as follows:

Using standardised tests, the SHU evaluation found that after just 20 weeks the 2,493 Year 5 pupils (nine and 10 year olds) who received the intervention made, on average, two months' more progress in English and science than a similar group of pupils who did not receive the intervention. The intervention also boosted mathematics results by two months for pupils qualifying for free school meals (a standard poverty measure) and one month overall. Participating teachers, interviewed as part of a linked SHU process evaluation, were highly supportive of the approach while acknowledging its challenges.³

¹ Full project team and roles: Professor Robin Alexander (co-director and intervention lead), Professor Frank Hardman (co-director and research lead), Dr Jan Hardman (discourse analysis lead), Dr Taha Rajab (research fellow), David Reedy (schools liaison officer, pilot stage), Mark Longmore (schools liaison officer, trial stage).

² Alexander, R.J. (2017) *Towards Dialogic Teaching: re-thinking classroom talk*, (5th edition), York, Dialogos; Alexander, R.J. (2017) *Dialogic Teaching in Brief*, <http://www.robinalexander.org.uk/wp-content/uploads/2012/10/Dialogic-teaching-in-brief-170622.pdf> ; Alexander, R.J. (2017) *Dialogic Teaching and the Study of Classroom Talk: a developmental bibliography*, <http://www.robinalexander.org.uk/wp-content/uploads/2017/01/Alexander-dialogic-teaching-bibliography.pdf>.

³ Education Endowment Foundation media release, 7 July 2017. The SHU evaluation report is at <https://educationendowmentfoundation.org.uk/our-work/projects/dialogic-teaching>.

Alongside the RCT, but focusing on classroom talk as such rather than its measured effect on learning outcomes in the three core subjects, the York team undertook its own evaluation of the intervention's impact. Using coded video data it compared the development and character of teacher and pupil talk in intervention and control group schools as the intervention progressed. At the same time, it interviewed all participating teachers, mentors and heads in the intervention schools.

The analysis of the video data is not yet complete. This, therefore, is an interim report, published to coincide with and complement EEF's report on the trial and its outcomes.

Rationale and aims

The starting point for any evaluation should be the aims and rationale of what is to be evaluated:

[The CPRT/UoY Dialogic Teaching Project] aims to improve the quality of classroom talk as a means to increasing pupils' engagement, learning and attainment. It will develop and test a training programme which uses video, print materials and in-school mentoring. The approach, termed 'dialogic teaching', is based on the belief that the improvement of classroom talk requires attention to the speaking skills of the teacher as well as to children's developing oral capacities. It emphasises dialogue through which pupils learn to reason, discuss, argue and explain as well as merely respond, in order to develop their higher order thinking as well as their articulacy.⁴

More specifically (from the project handbook for schools),⁵ the intervention aims:

1. To develop and subject to randomised control trial a strategy for maximising the quality and educational impact of classroom talk, building on prior work on dialogic teaching and the best of international evidence.
2. To encourage a classroom culture that engages all pupils in the task in hand and retains their attention and interest.
3. To meet but also go beyond the requirements for spoken language in the national curriculum, giving particular attention to those kinds of talk through which pupils learn to reason, explain, justify, argue, speculate, evaluate and in other ways think for themselves.
4. To advance this higher-order talk across the curriculum, but devote particular attention to it in the teaching of English, mathematics and science.
5. To raise pupils' standards of attainment in literacy, numeracy and science above the levels that teaching without such an intervention is likely to achieve.
6. To incorporate insights from schools and local authorities which have invested in previous initiatives in this area, notably the Talk for Learning Project in North Yorkshire, the Barking and Dagenham Teaching Through Dialogue Initiative (TTDI), and Bolton's Tapestry of Talk project.⁶
7. To draw on a wider array of British and American research and development activity in the arena of classroom talk going back to the early 1970s, much of which has now been

⁴ <https://educationendowmentfoundation.org.uk/our-work/projects/improving-talk-for-teaching-and-learning>

⁵ Alexander, R.J. (ed) (2015) *The CPRT/IEE Dialogic Teaching Project, Trial Stage 2015-16: Handbook for Schools*. York: University of York, 6

⁶ Evaluation reports on the earlier London and Yorkshire projects can be accessed via <http://www.robinaalexander.org.uk/wp-content/uploads/2017/01/Alexander-dialogic-teaching-bibliography.pdf>

brought together in a conference and publication sponsored by the American Educational Research Association.⁷

8. To generate approaches to pedagogy and professional development which both deliver the intended outcomes and are able to be disseminated and scaled up for general use.

Piloted in 2014-15 in ten schools in Barking and Dagenham and trialled during 2015-16 in schools in Bradford, Birmingham and Leeds, the intervention entailed a structured professional development programme of eleven cycles arranged in two phases (autumn term 2015 and spring term 2016) and preceded by induction and training days. The core strategies were: mentoring; video and audio recording for self-evaluation and development; and an iterative process of target-setting, action, recording and review supported by a detailed handbook and planning/review forms for the use of mentors and teachers, with prompts for each cycle.

SHU's initial sample, before randomisation, included 76 schools, of which 38 were allocated to the intervention group and 38 to the control. Five intervention schools withdrew their agreement to participate before the programme started and a further two dropped out during the first few weeks. For reasons explained in the SHU report, all these schools were nevertheless included in their evaluation on the basis of 'intention to treat'.

The outcome evaluation undertaken by SHU was confined to aim 5 above (raising pupils' attainment in English, mathematics and science). It was not designed to assess the quality of pupil or teacher talk or levels of pupil engagement, attention and interest, even though these are stated aims of the intervention and are not only essential processes and preconditions of learning but also outcomes worthy of pursuit in their own right; and despite the fact that an oracy measure was part of the original agreement between the York team and EEF.

The SHU process evaluation examined some of these matters through telephone feedback from a small sub-sample of intervention teachers and some semi-structured classroom observation followed by interviews. But the latter did not include the intervention/control comparison that would have enabled it to identify how far the practices observed were attributable to the intervention. The in-house evaluation undertaken by the York team therefore complements that of SHU as follows:

- *Using face-to-face interviews* with all the intervention group teachers it provides more extensive feedback on the feasibility, challenges and impact of the intervention programme and its embedded strategies.
- *Using video analysis* it attempts to chart changes over the intervention period in pupil engagement and the character and quality of the classroom talk in a sub-sample of the intervention schools, comparing it with a matched sub-sample from the control schools. This treatment provides a more objective and replicable measure of the programme's impact than that based on teacher opinion alone.
- It provides a useful resource for fuller quantitative and qualitative discourse analysis at a later date.

As explained above - and as acknowledged in the current National Curriculum requirements for spoken language - oracy and pupil engagement are essential educational outcomes in

⁷ This refers to an international conference in September 2011 at the University of Pittsburgh which led to Resnick, L., Asterhan, C. and Clarke, S. (ed) (2015) *Socialising Intelligence Through Academic Talk and Dialogue*. Washington DC: AERA. Robin Alexander's contribution, 'Dialogic pedagogy at scale: oblique perspectives', is on pp 429-40.

themselves rather than mere pedagogic processes or means to other ends. We therefore prefer to call our evaluation 'in-house' rather than 'process' (the term used by SHU).

Design

The in-house evaluation by the development team has two strands:

- an interview programme undertaken in intervention schools only;
- a comparative analysis of videotaped lessons from both intervention and control schools.

Interviews

Two sets of interviews were conducted with teachers, mentors and headteachers in each of the 28 intervention schools that remained after the initial withdrawals referred to earlier. The first set took place during phase 1 (autumn term 2015), the second towards the end of phase 2 (spring term 2016). The focus in each case was on participants' adherence to and divergence from the specified programme (fidelity), challenges encountered during the programme's implementation, and its perceived impact on teaching, learning, pupil engagement and classroom talk.

The interviewers, who were all members of the York team, worked to an agreed schedule of questions. Answers were recorded on a proforma for later analysis using the NVivo software for qualitative data.

To the interview programme was added scrutiny of the cycle planning/review forms completed by the mentors for each of the teachers they were supporting to allow us deeper insights into fidelity, feasibility and utility.

Video analysis: procedure

In order to assess the pedagogic impact of the intervention it was necessary to videotape lessons in a sub-sample of both the intervention and control groups, and to do so twice so as to assess development and progress over time. Video recordings of a sample of English, mathematics and science lessons were made (i) early in phase one (week beginning 21 September 2015) to provide a baseline and (ii) towards the end of phase 2 (fortnight beginning 22 February 2016).

15 teachers from the intervention group and 11 from the control group agreed to be video-recorded. The intervention group teachers were self-selected in response to our request for volunteers at the July 2015 induction session. Self-selection was the only realistic possibility: to impose selection on top of the other demands of the project could have been counter-productive for retention. The control group teachers were selected on the basis of school-school matching.

Each teacher was recorded twice, in phase 1 and again in phase 2, yielding a theoretical total of 156 lessons (2 English, 2 mathematics and 2 science in each case). In fact, because not all of the designated teachers taught science, the total number of lessons recorded was 134 (67 in each phase). The resulting recordings were subjected to both quantitative and qualitative analysis.

For the quantitative analysis, some of the key verbal indicators of typical classroom talk, both traditional and dialogic, became the basis for a coding system that was piloted in Barking and Dagenham before being finalised and applied to the trial stage video data. Coders were

trained and checked to maximise coding consistency. The coding system for these was uploaded into the Observer XT 12.5 software (Nokludus, 2014) in order to generate quantitative data from the coded acts and exchanges. These were then statistically analysed using SPSS. The analysis was undertaken twice for the purpose of cross-validation, first internally at the University of York, then externally by Kirkdale Geometrics. The coding frameworks are provided as appendices to this report.

Analyses of the videodata up to June 2017 have covered the following:

Teacher talk

- Intervention/control differences in teacher talk moves.
- Development in teacher talk moves over time (from phase 1 to phase 2) and intervention/control comparisons.
- Teacher talk move differences between English, mathematics and science.

Pupil talk

- Intervention/control differences in the ratio of brief to extended pupil contributions.
- Change in the ratio of brief to extended pupil contributions over time (from phase 1 to phase 2) and intervention/control comparisons.
- Brief/extended ratio differences between English, mathematics and science.
- Frequency of sub-types of extended pupil contributions, derived from the project's categories of learning talk.

Pupil and teacher talk

- Change in the ratio of teacher talk to pupil talk over time, and intervention/control comparisons
- Change in the ratio of recitation to discussion/dialogue over time, and intervention/control comparisons.

For the analysis of differences in teacher talk moves and pupil responses between control and intervention groups, means and distributions of the teacher talk move variables were compared between the groups. Independent sample t-tests were applied (with a two-tailed confidence level of 95%), and where sample distributions were found to be skewed and not normally distributed, Mann-Whitney tests were used instead. Tests for unequal variances were also applied and the appropriate test statistic reported. Effect size has been estimated using Cohen's *d* values for standard t tests, and correlation *r* values for non-parametric tests.

For the analysis of within-group differences in teacher talk moves and pupil responses between intervention phases, means and distributions of the teacher talk move variables were compared between phases 1 and 2 for each group. Only lessons which formed corresponding pairs in both phases, by subject and teacher, were included. Paired sample t-tests were performed (with a two-tailed confidence level of 95%), and where sample distributions were found to be skewed and not normally distributed, Wilcoxon tests were used instead.

In both video analyses, effect sizes have been estimated using Cohen's *d* values for standard t tests, and correlation *r* values for non-parametric tests.

Next steps and cautionary note

The next stage is to dig deeper into the teacher and pupil talk moves, especially as coded at items 6-14 and 17-30 in the attached Appendix 1. For the qualitative analysis, a looser, more

ethnographic procedure has been adopted whereby the trajectory of talk over time, and the relationship between one talk move and the next, may be tracked, and examples of the various kinds of talk can be extracted.

It will be readily understood that the in-house evaluation's treatment of classroom talk is not and cannot be comprehensive, especially when set against the many elements of the various talk repertoires to whose expansion and improvement the intervention was directed. That would have required a project beyond the resources of this one, which necessarily concentrated its attention on developing and implementing the intervention. So the in-house evaluation has sampled rather than anatomised classroom interaction by focusing on some of the basic moves and functions of teacher and pupil talk during whole class teaching segments of the recorded lessons, treating these as broad indicators of impact and development which were sufficiently precise to allow intervention/control comparison. Moreover, it has confined its attention to whole class teaching and discussion, noting but not investigating either small group discussion, whether teacher-led or pupil-led, or paired teacher-pupil and pupil-pupil talk. These are no less essential to dialogic teaching's overall repertoire than whole-class teaching.

Interim headline findings from the York team's evaluation, at July 2017

Interviews: programme impact

- Overall, participating teachers claimed direct positive gains from the programme for classroom talk, pupil engagement and pupil learning, and for their own professional understanding and skill. Specifically:
- Ground rules for pupil talk were fairly quickly established and embedded.
- Teachers learned to extend their basic talk repertoires and their skill in using them.
- Specific teaching strategies such as questioning, discussion and providing feedback became more systematic and effective.
- Oral exchanges were lengthened, sustained and deepened.
- Pupils' preparedness to listen to others improved.
- Interaction became more inclusive, with fewer pupils isolated, silent or reluctant to participate, while previously dominant pupils became less inclined or able to monopolise the talk and teachers' attention.
- With an increased emphasis on a supportive, reciprocal talk culture, pupils gained in confidence and became more patient and better attuned to each other's situations and keen to provide mutual support in both talking and learning.
- As was to be hoped, there were also subject-specific gains. Thus, in English, teachers reported improved pupil vocabulary, better discussion, and - of considerable potential importance - evidence of transfer of verbal gains from oral to written work. In mathematics, pupils became more adept at explaining the reasoning behind their solutions and thus providing teachers with a secure basis for their feedback. In science, the democratisation of questioning that is a feature of dialogic teaching fed into a more genuinely scientific stance in pupils' investigations and discussions.

Interviews: programme implementation

- Overall, checks on mentors' entries in the planning/review forms confirmed interview claims that the programme was implemented with a reasonable degree of fidelity and that it was both useful and feasible. Specifically:
- By the end of the end of the intervention, all schools had completed all eleven cycles of the programme.

- 57% of schools reported that they had followed the programme as specified in the handbook while 43% had made modifications, though still within the specified cycle framework.
- The main challenges faced were insufficient time for teachers and mentors to plan and review (33% of schools in both phases 1 and 2), national curriculum and assessment changes, staff changes (including among those immediately involved), pupil changes (pupil mobility is an issue in many project schools), and unanticipated events like staff illness, especially in phase 2.
- However, the common feature of the challenges that teachers faced was that they were intrinsic to life in primary schools rather than generated by the project. No innovation would have escaped them.
- For the critical role of mentor, which requires time for preparation and follow up as well as face-to-face meetings, time pressures were less of an issue for those mentors who held senior positions allowing administrative release.

Video data: quantitative

- Comparison of coded talk acts and exchanges in intervention and control classrooms showed significant differences emerging between the two groups over the two terms of the intervention. These differences were striking in both teacher and pupil talk. For example:
- **Closed and open teacher questions (Figure 1 and Summary Tables A & B).** In all three core subjects, the ratio of closed to open teacher questions was fairly evenly balanced in phase 1 but by phase 2 intervention teachers were making greater use of open questions than their control group peers. The argument here is that while closed or 'what?' questions require largely pre-ordained responses dependent on recall, open and ideally genuinely authentic questions launched with 'how?', 'why?' or 'what if?' encourage reasoning, speculation and more active cognitive and (through discussion) social engagement.
- **Teacher talk moves (Figures 2.1 - 2.3 and Summary Tables A & B).** Intervention teachers were trained to deploy a variety of moves to probe, extend and follow up pupil contributions on the principle that these would both increase pupils' interest and engagement and enhance their cognitive gains.⁸ Differences between the two groups in respect of these were most marked in mathematics and science, where by phase 2 the intervention teachers were making significantly greater use of wait time, revoicing, rephrasing, seeking evidence of reasoning, challenging, requesting justification and so on.
- **Balance of recitation and discussion/dialogue (Figure 4 and Summary Table C).** In English and mathematics, comparable ratios of recitation to discussion/dialogue in the intervention and control groups were transformed into significant differences by phase 2, with intervention teachers making much greater use of discussion/dialogue. In this matter, science was again somewhat different in that in phase 1 the intervention group was already making greater use of discussion/dialogue than the control group. This lead was sustained into phase 2 and increased as the intervention progressed.

⁸ Here the intervention extended Alexander's dialogic teaching framework by reference to Michaels, S. and O'Connor, C. (2012) *Talk Science Primer*. Boston MA: TERC. We are grateful to the authors for permission to use their work in this way, which UK teachers found no less useful than their US peers.

- **Balance of brief and extended pupil contributions (Figure 3 and Summary Tables A & B).** In English and mathematics, the ratio of brief to extended pupil contributions in phase 1 was the same in intervention and control classrooms. By phase 2, there were statistically significant differences between the groups in respect of an increase in extended pupil contributions and a decrease in brief contributions. In science, the intervention group started the programme with a higher ratio of extended to brief pupil contributions than the control group. (Given that this happened after the induction and training it may suggest that the programme's messages in this regard were more readily implemented in science than the other two subjects, or even that primary science teaching tends to be more instinctively dialogic). This difference was sustained into phase 2.
- **The repertoire of pupil talk (Summary Table D).** As defined and developed by Robin Alexander⁹, but in contrast with some other approaches to oracy, dialogic teaching attends as closely to the talk of the teacher as to that of the pupil, because it is through the teacher's talk that the pupil's talk is either confined within the tightly controlled boundaries of recitation or encouraged through discussion and dialogue to enlarge its discursive and semantic repertoire and hence its cognitive power. Hence the focus above on the balance of closed and open questions, recitation and dialogue, and brief and extended pupil contributions. For while dialogic teaching, again unlike some other approaches, accepts the need in certain circumstances for closed questions, recitation and brief pupil contributions, it also affirms that unless the quantity and quality of pupil talk is extended well beyond these traditional patterns of exchange into a much more extensive interactive repertoire the full communicative and cognitive potential of classroom talk will remain largely unrealised. In the end, therefore, it is the pupil's talk that matters most, and it is to the teacher's agency in securing the enhancement of pupil talk that dialogic teaching is directed. Hence 'dialogic teaching.'

To judge pupil talk merely by the length of utterances, as in the brief/extended analysis referred to above, is useful only as a preliminary or general indicator of quality. What matters is the form of pupil talk that opportunities for its temporal extension allow, for extended talk may be - in terms of the most demanding of Alexander's five criteria of successful dialogic teaching - cumulative, or it may be merely circular, and this is a particular risk in classroom discussion.¹⁰ Here, Alexander's 11 categories of 'learning talk' (narrate, explain, analyse, speculate, imagine, explore, evaluate, discuss, argue, justify, question)¹¹ provide the necessary analytical indicators.

These indicators were modified for coding purposes as 12 sub-types of extended pupil contributions which also include pupil responses to some of the key teacher talk moves. The modified coding categories for pupil learning talk were: expand/add, connect, explain/analyse, rephrase, narrate, evaluate, argue, justify, speculate, challenge, imagine, shift position. These were applied as indicated on page 3 to video transcript samples from both the intervention and the control groups at the mid-point of phase 2.

As the appended tables show, the differences by that stage of the intervention were striking. Intervention group pupils were markedly more expansive in their contributions and exhibited much higher levels of explanation, analysis, argumentation, challenge and justification. Their talk, then, was clearly much more dialogic than that of their control

⁹ Alexander, R.J. (2017) *Towards Dialogic Teaching: rethinking classroom talk* (5th edition). York: Dialogos.

¹⁰ The five basic criteria of dialogic teaching are: *collective, reciprocal, cumulative, supportive and purposeful* (*Towards Dialogic Teaching*, pp 37-8).

¹¹ *Ibid*, p 44.

group peers. Though there were between-subject differences, the overall pattern of intervention/control contrast obtained across all three subjects tested in the SHU evaluation.

Conclusion

The findings from the videodata analysis reported above and in the appendices clearly demonstrate that the intervention impacted positively on teacher questioning, teacher talk moves for probing pupil responses, the balance of recitation and discussion/dialogue, the length of pupil contributions and - critically for the quality of pupil thinking, understanding and learning - the pupils' repertoire of what Alexander defines as 'learning talk'. At the same time, the interviews confirm that the intervention was of a kind that, in the main, teachers could accommodate and that they valued and believed made a difference.

Particularly significant, we suggest, is the triangulation of our headline findings with those of the independent SHU evaluation. Thus:

- The York team's interviews with teachers in the intervention schools show that they have responded positively to the intervention and have implemented it with a high level of fidelity, subject to the variability that is inevitable in practice as complex and idiosyncratic as classroom interaction.
- The York team's comparative analysis of videodata from the intervention and control schools shows changes in the character and quality of both teacher and pupil talk in the intervention schools that are both significant in their own right and directly in line with the intervention's intentions.
- The SHU evaluation team finds that pupils in the intervention classes have achieved, on average, two months' progress over their control group peers.

The SHU report has attested that the evaluation team's methodology and analysis are sufficiently secure to allow them to conclude that the pupil attainment gains can be attributed directly to the intervention, so we can reasonably deduce that specific talk transformations such as those noted are what has made the difference, and that the efficacy of dialogic teaching as defined and developed in this project has now been demonstrated. Although this report remains interim in status because it requires material from the qualitative discourse analysis to exemplify the patterns and trends we have summarised, it provides evidence of impact which, on all fronts, is overwhelmingly positive.

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APPENDIX 1: CODING FRAME FOR ANALYSIS OF VIDEO DATA

Codes	Teacher question talk moves	Descriptions
1.TCQ	T closed question	Teacher asks a closed question - allows one possible response
2.TOQ	T open question	Teacher asks an open/genuine question – allows various responses
Codes	Teacher feedback/evaluation talk moves	Descriptions
3. TACK/REJ	T acknowledge/reject	Teacher simply accepts or rejects a pupil's contribution - e.g. <i>repeat exactly the given answer, 'yes', 'ok', 'thank you', 'not quite the answer', 'incorrect'</i>
4. TPR	T praise	Teacher praises a pupil's contribution - e.g. <i>'well done', 'good', 'brilliant'</i>
5. TCOM	T comment	Teacher remarks, summarises, reformulates, builds on and/or transforms a pupil's contribution

Codes	Teacher follow up (dialogic) talk moves	Descriptions
6. TADDQ	T add on question	Teacher asks pupils to add on to another pupil's contribution - e.g. <i>'Can anyone add on to ...?', 'Can anyone follow on from...?', 'Any comments on that?', 'What else can we ...?'</i>
7. TAGREE/DISQ	T agree/disagree question	Teacher asks if a pupil or pupils agree or disagree with another pupil's contribution - e.g. <i>'Do you agree/disagree (and why?)', 'Does anyone want to respond to that?'</i>
8. TEXPQ	T expand question	Teacher stays with the same pupil and asks to say more - e.g. <i>'What do you mean by that?', 'Can you give an example?', 'Okay, tell me more about that', 'how could that be...?'</i>
9. TRPQ	T rephrase question	Teacher asks a pupil to repeat or reformulate own or another pupil's contribution - e.g. <i>'Can you say that again?', 'Who can repeat what X just said in their own words?', 'What did your partner say?'</i>
10. TRVQ	T revoice question	Teacher verifies own understanding of a pupil's contribution, which requires a student response - e.g. <i>'So, are you saying...?', 'Then I guess you think...?'</i>
11. TWQ	T why question	Teacher stays with the same pupil (or asks another pupil) and asks for evidence or reasoning - e.g. <i>'Why do you think that?', 'What is your evidence?'</i>
12. TCHQ	T challenge question	Teacher provides a challenge or a counter-example - e.g. <i>'Does it always work that way?', 'What if...?', 'Is that always true?'</i>

Codes	Pupil question talk moves	Descriptions
13. PCQ	P closed question	Pupil asks a closed question - allows one possible response
14. POQ	P open question	Pupil asks an open/genuine question – allows various responses

Codes	Pupil contribution talk moves	Descriptions
15. PBRC	P brief contribution	Pupil provides pre-specified, brief information without any development - in a word, phrase or simple sentence
16. PEXTC	P extended contribution	Pupil provides non-specified information and thinking. The contribution is developed to some extent through explanation, expansion, evaluation, justification, argumentation, speculation and so on

Codes	Sub-types of pupil extended contributions (PEXTC)	Descriptions
17. PEX/ADD	P expand/add	Pupil says more by building on, adding to or extending own or another pupil's contribution <i>-e.g., 'You could also ...', 'I would like to add on to that'</i>
18. PCO	P connect	Pupil makes an intertextual reference to something else, e.g. a previous discussion, another text, event, experience or resources
19. PEXN	P explain/analyse	Pupil explains something in some detail or examines own or another pupil's contribution <i>No reason is given, that is not to convince or persuade</i>

20. PRPH	P rephrase	Pupil repeats, reformulates or summarises own or another pupil's contribution -e.g. 'I said', 'He said that...', 'I mean ...'
21. PNAR	P narrate	Pupil recounts events of a story or an experience -e.g., 'My brother said, long time ago, ...'
22. PEVA	P evaluate	Pupil makes a judgement -e.g. 'I think it's true/false', 'That's correct/wrong', 'I think it's good/bad'
23. PARG	P argue	Pupil states a position/opinion/argument -e.g. 'I think that...', 'In my view...', 'I agree with ...', 'should'
24. PJUS	P justify	Pupil justifies own opinion or argument -e.g. 'because', 'reason', 'so', 'if', 'think', 'why', 'how', 'maybe/might'
25. PSPEC	P speculate	Pupil predicts or hypothesizes an idea
26. PCH	P challenge	Pupil provides a challenge or a counter-example -e.g. 'Yeah, but...?', 'What if...?'
27. PIM	P imagine	Pupil creates an analogy, a mental image or a scenario -e.g. 'imagine if...'
28. PSOP	P shift position	Pupil indicates a change of mind or perspective - e.g. 'I've changed my idea'

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APPENDIX 2: FIGURES AND TABLES FROM THE VIDEODATA ANALYSIS SO FAR

Figure 1: OPEN AND CLOSED TEACHER QUESTIONS

Control/intervention group comparison of teachers' open and closed questions in the three core subjects in phases 1 and 2 of the intervention programme

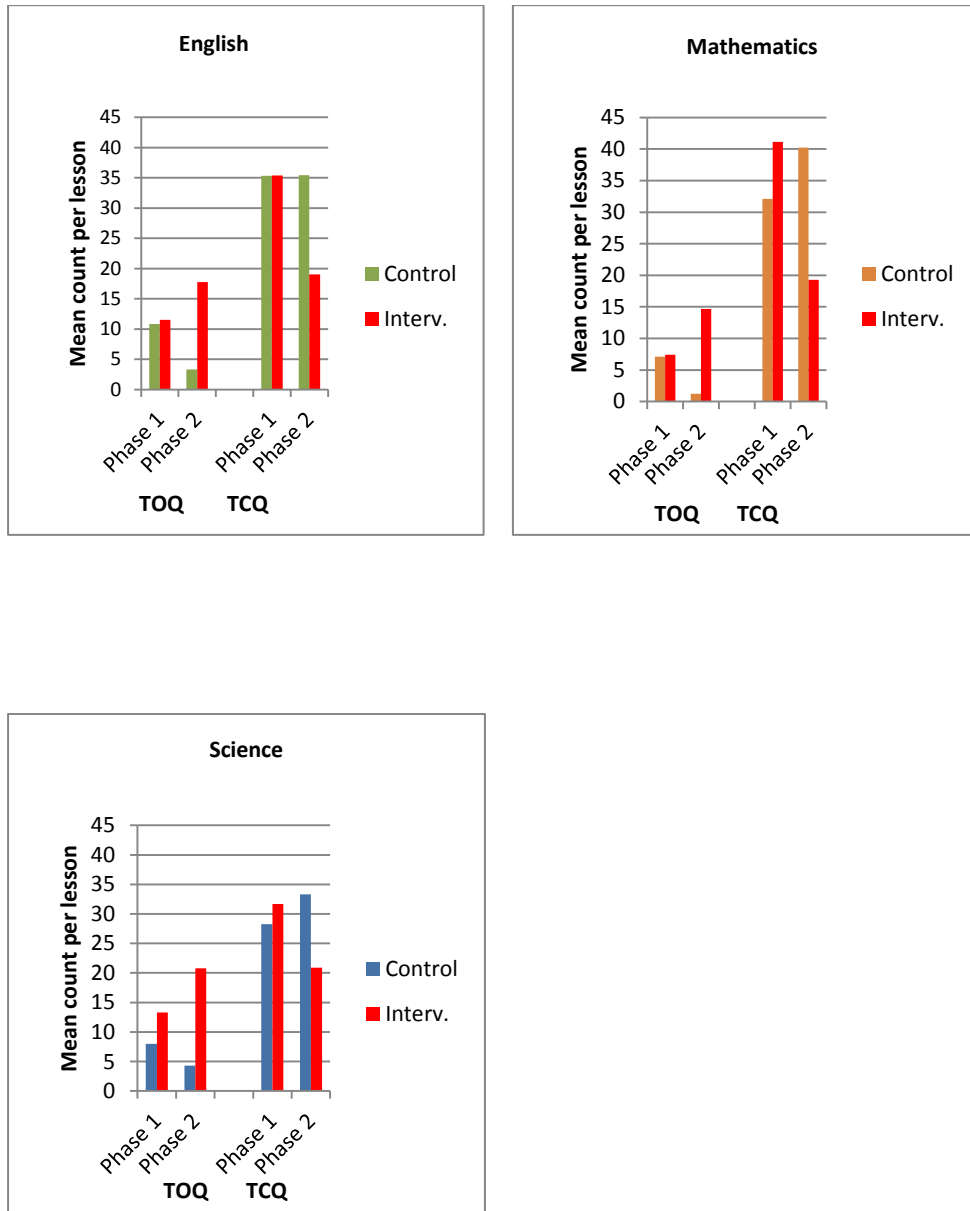


Figure 2.1: TEACHERS' USE OF FOLLOW-UP (DIALOGIC) TALK MOVES - ENGLISH

Control/intervention group comparison of teachers' use of follow-up (dialogic) talk moves in phases 1 and 2 of the intervention programme - English.

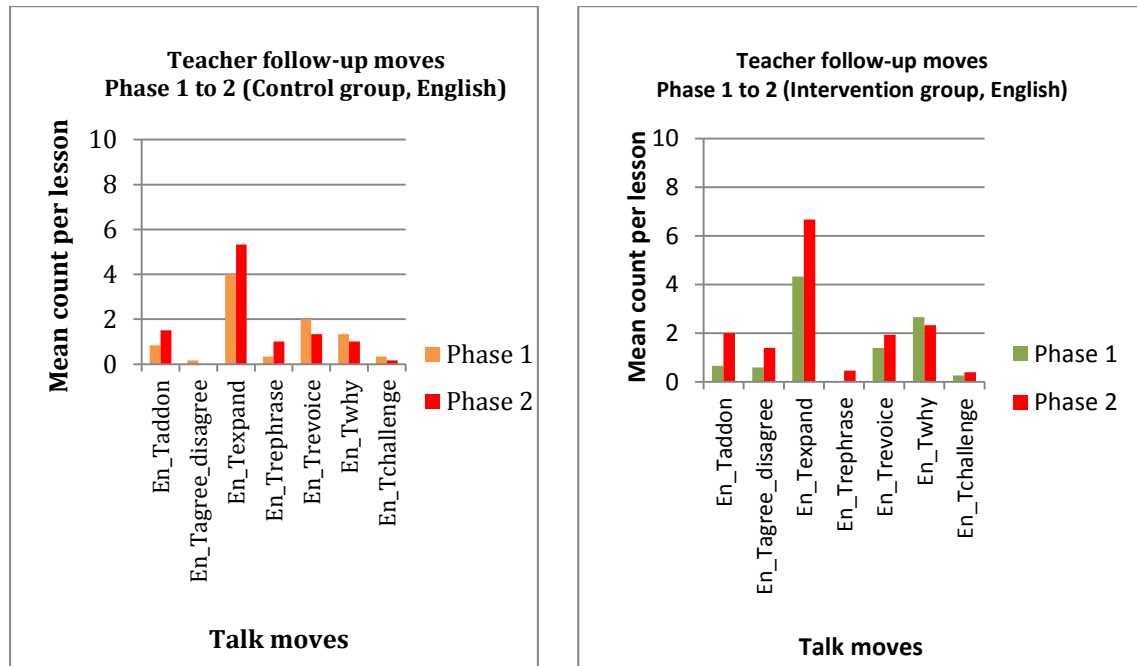


Figure 2.2: TEACHERS' USE OF FOLLOW-UP (DIALOGIC) TALK MOVES - MATHEMATICS

Control/intervention group comparison of teachers' use of follow-up (dialogic) talk moves in phases 1 and 2 of the intervention programme - mathematics.

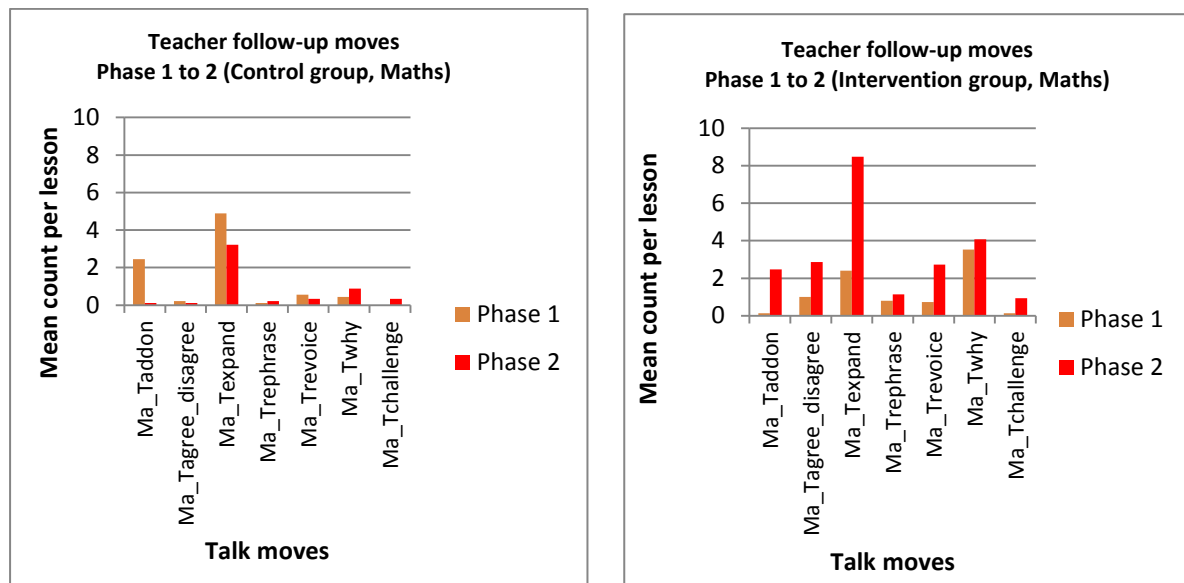


Figure 2.3. TEACHERS' USE OF FOLLOW-UP (DIALOGIC) TALK MOVES - SCIENCE
Control/intervention group comparison of teachers' use of follow-up (dialogic) talk moves in phases 1 and 2 of the intervention programme - science.

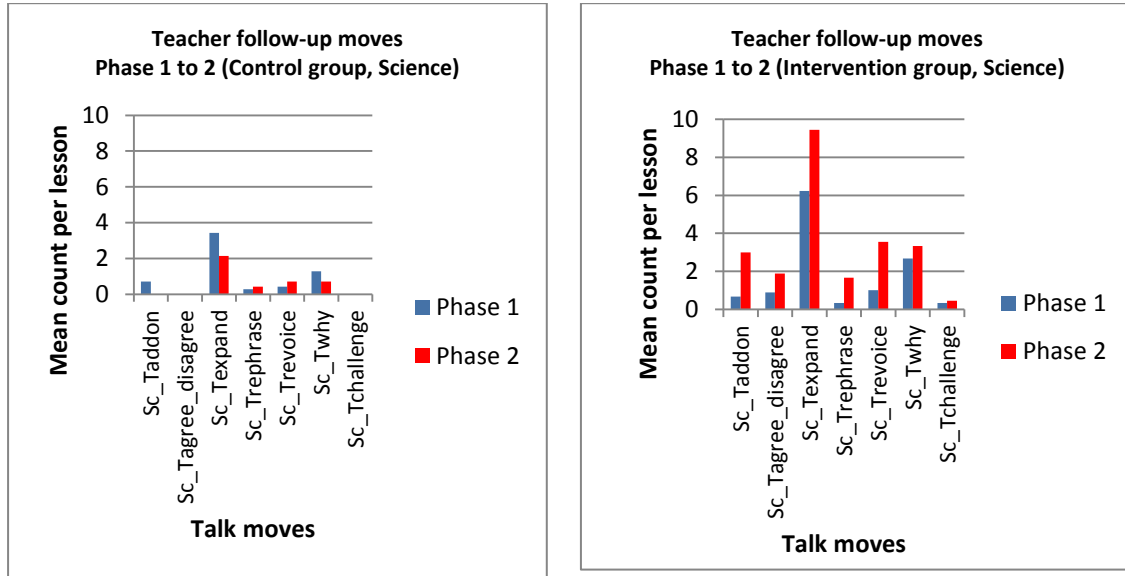


Figure 3: PUPIL CONTRIBUTIONS
Control/intervention group comparison of pupil brief extended contributions in phases 1 and 2 of the intervention programme - English, mathematics and science.

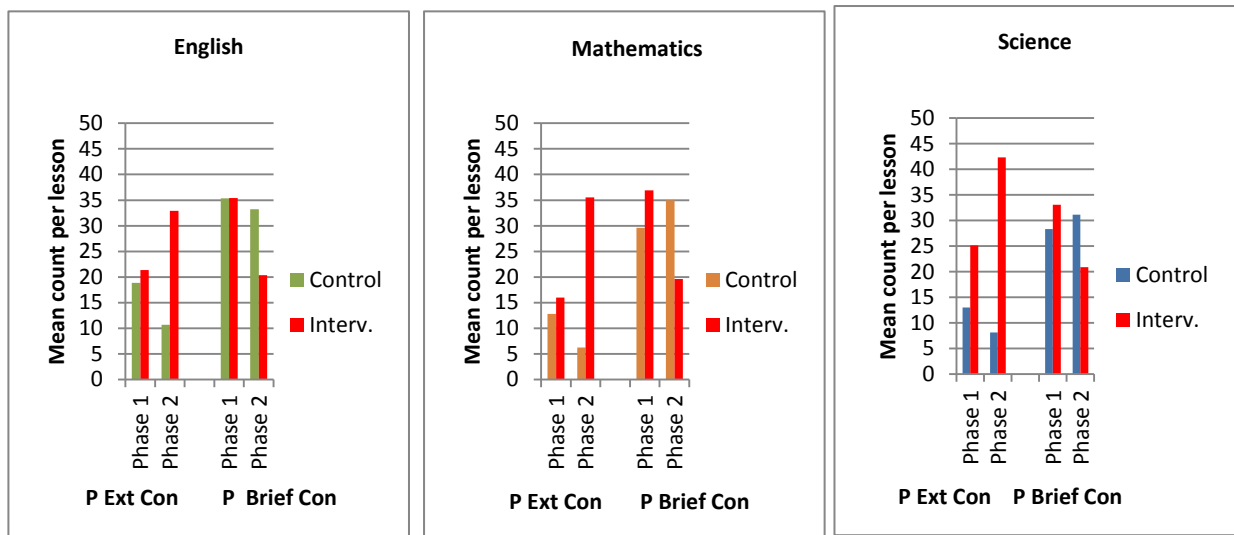
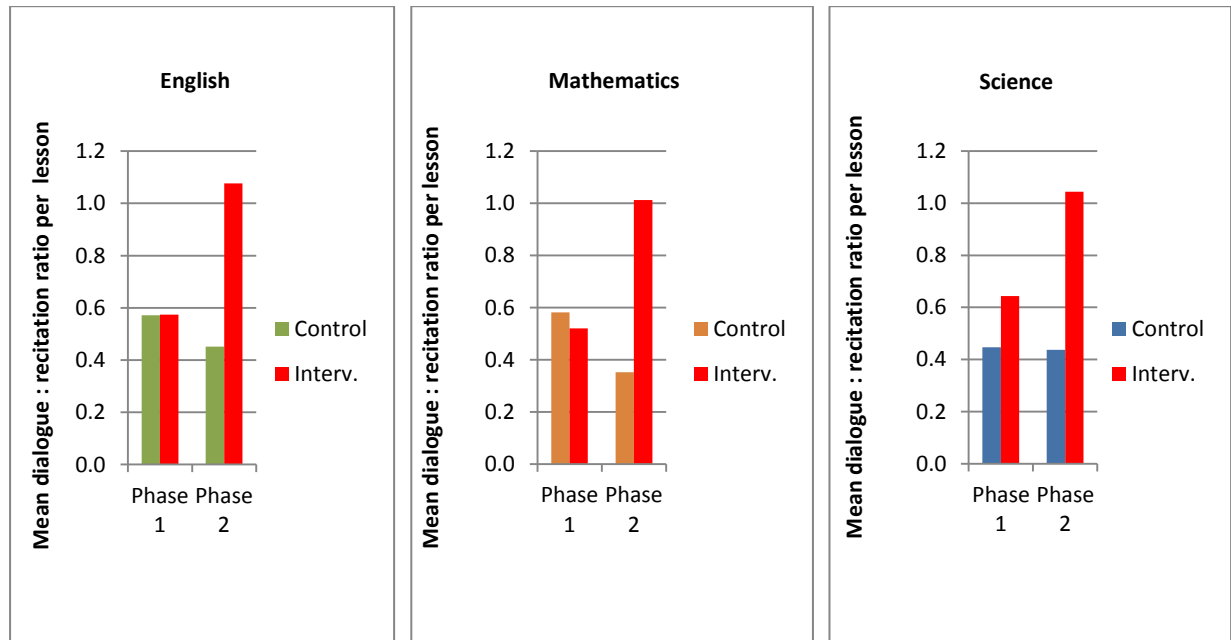


Figure 4: DISCUSSION AND DIALOGUE¹

Control/intervention group comparison of ratio of discussion/dialogue to recitation in phases 1 and 2 of the intervention programme in the three core subjects



¹ Definitions of these terms as used in this project:

RECITATION: short and tightly structured IRE (initiation-response-evaluation) or Q & A exchanges designed to test or stimulate recall of what has been previously encountered or to cue pupils to provide the expected answer.

DISCUSSION: the open exchange of ideas with a view to sharing information, exploring issues or solving problems.

DIALOGUE: collective, reciprocal, supportive and cumulative talk which guides, prompts, probes and extends pupil contributions in order to scaffold their understanding and expedite handover of concepts and principles.

Summary tables A: QUESTIONS, FOLLOW-UP AND PUPIL CONTRIBUTIONS BY SUBJECT AND INTERVENTION PHASE

Talk Moves (English)	PHASE 1	N	Mean	Std. Deviation	Std. Error Mean
Teacher open questions	Control	6	10.833	8.010	3.270
	Intervention	15	11.533	5.330	1.376
Teacher closed questions	Control	6	35.333	13.125	5.358
	Intervention	15	35.400	16.690	4.309
Teacher follow-up	Control	6	9.000	6.603	2.696
	Intervention	15	9.933	6.442	1.663
Pupil extended contributions	Control	6	18.833	11.754	4.799
	Intervention	15	21.333	8.226	2.124
Pupil brief contributions	Control	6	35.333	13.125	5.358
	Intervention	15	35.400	16.690	4.309

Talk Moves (English)	PHASE 2	N	Mean	Std. Deviation	Std. Error Mean
Teacher open questions	Control	9	3.333	3.905	1.302
	Intervention	15	17.733	5.824	1.504
Teacher closed questions	Control	9	35.444	12.001	4.000
	Intervention	15	19.000	5.516	1.424
Teacher follow-up	Control	9	9.000	9.631	3.210
	Intervention	15	15.200	9.756	2.519
Pupil extended contributions	Control	9	10.667	9.014	3.005
	Intervention	15	32.933	12.098	3.124
Pupil brief contributions	Control	9	33.222	8.105	2.702
	Intervention	15	20.333	7.743	1.999

Talk Moves (Maths)	PHASE 1	N	Mean	Std. Deviation	Std. Error Mean
Teacher open questions	Control	10	7.100	4.909	1.552
	Intervention	15	7.400	7.298	1.884
Teacher closed questions	Control	10	32.100	12.957	4.097
	Intervention	15	41.133	20.546	5.305
Teacher follow-up	Control	10	8.000	8.994	2.844
	Intervention	15	8.733	6.595	1.703
Pupil extended contributions	Control	10	12.800	8.766	2.772
	Intervention	15	16.000	9.979	2.576
Pupil brief contributions	Control	10	29.600	7.291	2.306
	Intervention	15	36.933	16.127	4.164

Talk Moves (Maths)	PHASE 2	N	Mean	Std. Deviation	Std. Error Mean
Teacher open question	Control	9	1.222	1.641	0.547
	Intervention	15	14.667	5.740	1.482
Teacher closed questions	Control	9	40.222	15.450	5.150
	Intervention	15	19.267	6.995	1.806
Teacher follow-up	Control	9	5.222	3.930	1.310
	Intervention	15	22.667	17.020	4.394
Pupil extended contributions	Control	9	6.222	3.993	1.331
	Intervention	15	35.533	17.691	4.568
Pupil brief contributions	Control	9	35.000	10.642	3.547
	Intervention	15	19.600	6.791	1.753

Talk Moves (Science)	PHASE 1	N	Mean	Std. Deviation	Std. Error Mean
Teacher open question	Control	7	8.000	5.033	1.902
	Intervention	10	13.300	6.929	2.191
Teacher closed questions	Control	7	28.286	8.139	3.076
	Intervention	10	31.700	10.874	3.439
Teacher follow-up	Control	7	6.143	5.843	2.209
	Intervention	10	12.200	4.341	1.373
Pupil extended contributions	Control	7	13.000	8.583	3.244
	Intervention	10	25.100	4.508	1.426
Pupil brief contributions	Control	7	28.286	8.139	3.076
	Intervention	10	33.100	8.925	2.822

Talk Moves (Science)	PHASE 2	N	Mean	Std. Deviation	Std. Error Mean
Teacher open question	Control	7	4.286	3.094	1.169
	Intervention	10	20.800	7.495	2.370
Teacher closed questions	Control	7	33.286	11.572	4.374
	Intervention	10	20.900	6.855	2.168
Teacher follow-up	Control	7	4.000	2.828	1.069
	Intervention	10	21.500	12.826	4.056
Pupil extended contributions	Control	7	8.143	5.336	2.017
	Intervention	10	42.300	17.994	5.690
Pupil brief contributions	Control	7	31.143	10.205	3.857
	Intervention	10	20.900	6.855	2.168

Summary tables B: QUESTIONS, FOLLOW-UP AND PUPIL CONTRIBUTIONS BY SUBJECT AND INTERVENTION PHASE

Talk Moves (Control Group, English)	Mean	N	Std. Deviation	Std. Error Mean
Teacher Open Questions Phase 1	10.833	6	8.010	3.270
Teacher Open Questions Phase 2	2.000	6	3.098	1.265
Teacher Closed Questions Phase 1	35.333	6	13.125	5.358
Teacher Closed Questions Phase 2	41.000	6	10.807	4.412
Teacher Follow-up Phase 1	9.000	6	6.603	2.696
Teacher Follow-up Phase 2	10.333	6	10.386	4.240
Pupil Extended Contributions Phase 1	18.833	6	11.754	4.799
Pupil Extended Contributions Phase 2	10.000	6	7.642	3.120
Pupil brief contributions Phase 1	35.333	6	13.125	5.358
Pupil brief contributions Phase 2	37.667	6	5.610	2.290

Talk Moves (Intervention Group, English)	Mean	N	Std. Deviation	Std. Error Mean
Teacher Open Questions Phase 1	11.533	15	5.330	1.376
Teacher Open Questions Phase 2	17.733	15	5.824	1.504
Teacher Closed Questions Phase 1	35.400	15	16.690	4.309
Teacher Closed Questions Phase 2	19.000	15	5.516	1.424
Teacher Follow-up Phase 1	9.933	15	6.442	1.663
Teacher Follow-up Phase 2	15.200	15	9.756	2.519
Pupil Extended Contributions Phase 1	21.333	15	8.226	2.124
Pupil Extended Contributions Phase 2	32.933	15	12.098	3.124
Pupil brief contributions Phase 1	35.400	15	16.690	4.309
Pupil brief contributions Phase 2	20.333	15	7.743	1.999

Talk Moves (Control Group, Maths)	Mean	N	Std. Deviation	Std. Error Mean
Teacher Open Questions Phase 1	7.556	9	4.978	1.659
Teacher Open Questions Phase 2	1.222	9	1.641	0.547
Teacher Closed Questions Phase 1	31.889	9	13.724	4.575
Teacher Closed Questions Phase 2	40.222	9	15.450	5.150
Teacher Follow-up Phase 1	8.667	9	9.274	3.091
Teacher Follow-up Phase 2	5.222	9	3.930	1.310
Pupil Extended Contributions Phase 1	13.667	9	8.832	2.944
Pupil Extended Contributions Phase 2	6.222	9	3.993	1.331
Pupil brief contributions Phase 1	29.111	9	7.557	2.519
Pupil brief contributions Phase 2	35.000	9	10.642	3.547

Talk Moves (Intervention Group, Maths)	Mean	N	Std. Deviation	Std. Error Mean
Teacher Open Questions Phase 1	7.400	15	7.298	1.884
Teacher Open Questions Phase 2	14.667	15	5.740	1.482
Teacher Closed Questions Phase 1	41.133	15	20.546	5.305
Teacher Closed Questions Phase 2	19.267	15	6.995	1.806
Teacher Follow-up Phase 1	8.733	15	6.595	1.703
Teacher Follow-up Phase 2	22.667	15	17.020	4.394
Pupil Extended Contributions Phase 1	16.000	15	9.979	2.576
Pupil Extended Contributions Phase 2	35.533	15	17.691	4.568
Pupil brief contributions Phase 1	36.933	15	16.127	4.164
Pupil brief contributions Phase 2	19.600	15	6.791	1.753

Talk Moves (Control Group, Science)	Mean	N	Std. Deviation	Std. Error Mean
Teacher Open Questions Phase 1	8.000	7	5.033	1.902
Teacher Open Questions Phase 2	4.286	7	3.094	1.169
Teacher Closed Questions Phase 1	28.286	7	8.139	3.076
Teacher Closed Questions Phase 2	33.286	7	11.572	4.374
Teacher Follow-up Phase 1	6.143	7	5.843	2.209
Teacher Follow-up Phase 2	4.000	7	2.828	1.069
Pupil Extended Contributions Phase 1	13.000	7	8.583	3.244
Pupil Extended Contributions Phase 2	8.143	7	5.336	2.017
Pupil brief contributions Phase 1	28.286	7	8.139	3.076
Pupil brief contributions Phase 2	31.143	7	10.205	3.857

Talk Moves (Intervention Group, Science)	Mean	N	Std. Deviation	Std. Error Mean
Teacher Open Questions Phase 1	13.556	9	7.299	2.433
Teacher Open Questions Phase 2	21.667	9	7.399	2.466
Teacher Closed Questions Phase 1	32.000	9	11.489	3.830
Teacher Closed Questions Phase 2	21.444	9	7.038	2.346
Teacher Follow-up Phase 1	12.111	9	4.595	1.532
Teacher Follow-up Phase 2	23.333	9	12.135	4.045
Pupil Extended Contributions Phase 1	25.444	9	4.640	1.547
Pupil Extended Contributions Phase 2	45.000	9	16.800	5.600
Pupil brief contributions Phase 1	33.556	9	9.342	3.114
Pupil brief contributions Phase 2	21.444	9	7.038	2.346

Summary tables C: RATIOS OF DISCUSSION/DIALOGUE TO RECITATION, BY SUBJECT AND INTERVENTION PHASE

Talk move ratios (English)	PHASE 1	N	Mean	Std. Deviation	Std. Error Mean
Teacher discussion and dialogue to recitation ratio	Control	6	0.572	0.257	0.105
	Intervention	15	0.574	0.145	0.037

Talk move ratios (English)	PHASE 2	N	Mean	Std. Deviation	Std. Error Mean
Teacher discussion and dialogue to recitation ratio	Control	9	0.452	0.174	0.058
	Intervention	15	1.076	0.257	0.066

Talk move ratios (Maths)	PHASE 1	N	Mean	Std. Deviation	Std. Error Mean
Teacher discussion and dialogue to recitation ratio	Control	10	0.582	0.283	0.089
	Intervention	15	0.521	0.210	0.054

Talk move ratios (Maths)	PHASE 2	N	Mean	Std. Deviation	Std. Error Mean
Teacher discussion and dialogue to recitation ratio	Control	9	0.353	0.119	0.040
	Intervention	15	1.012	0.321	0.083

Talk move ratios (Science)	PHASE 1	N	Mean	Std. Deviation	Std. Error Mean
Pupil to teacher talk ratio	Control	7	0.489	0.142	0.054
	Intervention	10	0.459	0.049	0.016
Teacher discussion and dialogue to recitation ratio	Control	7	0.447	0.161	0.061
	Intervention	10	0.643	0.119	0.038

Talk move ratios (Science)	PHASE 2	N	Mean	Std. Deviation	Std. Error Mean
Pupil to teacher talk ratio	Control	7	0.507	0.114	0.043
	Intervention	10	0.584	0.066	0.021
Teacher discussion and dialogue to recitation ratio	Control	7	0.437	0.092	0.035
	Intervention	10	1.044	0.282	0.089

Summary tables D: FREQUENCY OF SUB-TYPES OF EXTENDED PUPIL CONTRIBUTIONS

Sub-types of pupil extended contributions	Intervention group (30 lesson episodes)	Control group (24 lesson episodes)
Pupil expand/add	25	7
Pupil connect	4	-
Pupil explain/analyse	124	76
Pupil rephrase	8	7
Pupil narrate	3	3
Pupil evaluate	6	1
Pupil argue	92	10
Pupil justify	96	8
Pupil speculate	6	5
Pupil challenge	17	-
Pupil imagine	4	13
Pupil shift position	4	-
Total	389	130
Mean frequency	12.96	5.41

Sub-types of pupil extended contributions	ENGLISH		MATHS		SCIENCE	
	Intervention (10)	Control (8)	Intervention (10)	Control (8)	Intervention (10)	Control (8)
Pupil expand/add	13	4	5	-	7	3
Pupil connect	-	-	1	-	3	-
Pupil explain/analyse	44	24	28	17	52	35
Pupil rephrase	2	4	5	1	1	2
Pupil narrate	2	1	-	-	1	2
Pupil evaluate	5	1	-	-	1	-
Pupil argue	34	4	39	2	19	4
Pupil justify	20	4	35	-	41	4
Pupil speculate	6	3	-	-	-	2
Pupil challenge	3	-	8	-	6	-
Pupil imagine	2	12	2	-	-	1
Pupil shift position	-	-	3	-	1	-
Total	131	57	126	20	132	53
Mean frequency	13.1	7.12	12.6	2.5	13.2	6.62