

PPD Dialogue in Education: Inquiry report

Name:

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Title of inquiry:

Helping children of different abilities to explain their reasoning and build on ideas in mathematics

Summary:

My research focused on how to support children of different abilities to explain their reasoning and build on their own and each other's ideas. I recorded a baseline assessment which I analysed using T-Seda codes. From this I identified that very little dialogic talk was happening at all in the classroom. I then worked with the children to set ground rules for talk and to help them to develop a meta-awareness of the importance of dialogue to their own learning. I developed "talking mats" which brought together stem sentences to support the children in their dialogic interactions. A second data collection showed a substantial improvement in the amount and quality of talk between the pairs.

My context:

I am a non-class-based SENCO and I currently teach maths to a group of fourteen children year four children. They are part of a mixed year three and four class for other subjects but are split for maths to allow a year group specific curriculum to be taught. The school is a state primary in Nottinghamshire.

My motivation for the inquiry, the focus and inquiry questions:

My rationale for the study came from my own general observations of paired work with children of different abilities as I noted that the more able learner would frequently just tell the other child the answer. I also perceived that the higher ability children failed to recognise much benefit to their own learning from group or paired activities. In short, I observed little occurrence or appreciation of dialogue – talk, as defined by Alexander as being "Collective...Reciprocal...Supportive...Cumulative... [and] Purposeful" (2005 p14). As a result, I developed an initial research question as follows:

How does improving the quality of educational dialogue in maths lessons impact on the learning of children of different abilities?

However, carrying out a short observation as a forum task I realised that the quality of dialogue was significantly poorer than I had originally believed. Although this observation was informal and not recorded or coded, I noted that very little talk was happening, and any that was

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occurring was poor quality. I therefore felt that my focus should be on how to improve the dialogue itself before I would be in a position to measure the direct impact of such an improvement on learning. I therefore reframed the question as

How can I help children of different abilities to explain their reasoning and build on ideas in mathematics?

The fact that “[k]ey researchers in the field...converge on the view that the quality of educational dialogue is a key factor in academic attainment” (Mercer, Hennessey and Warwick (2019) p190) convinced me that proceeding with a project that sought to increase the use of dialogue within the class room as an end in itself would be valuable even without measuring the direct impact on learning on my specific group of children.

Mercer notes that “the talk which takes place when children are asked to work together is often uncooperative, off-task, inequitable and ultimately unproductive” in (Mercer & Sams (2006) p510). This certainly resonated with my initial observations as did the explanation for the reasons for this in the same article: “Children are rarely offered guidance or training in how to communicate effectively in groups. Even when the aim of talk is made explicit...there may be no real understanding of *how* to talk together or for what purpose.” (p510). Through this research it was proved that “providing children with guidance and practice in how to use language for reasoning would enable them to use language more effectively as a tool for working on maths problems together,” and that this in turn “would improve their individual learning and understanding of mathematics.” (p525). The findings of this research were particularly relevant to alleviating my initial concerns about whether maths – the only subject I currently teach on a regular basis - was an ideal subject for developing dialogic skills, due to the fact that there is so often a “right” answer.

I was also interested in how to support my very high ability child who struggles to articulate his reasoning - he frequently over complicates what he is talking about by trying to relate it to concepts he is interested in but does not fully grasp, such as trying to explain a column addition method using algebra - and who, as is shown below in the discussion of the baseline data, failed to show much engagement with discussions. Research on this topic suggests that “[s]tudents need to develop a metacognitive awareness of the learning functions of talk and an appreciation of its potential value as a cultural and psychological tool, because otherwise they may not treat talk-based activities as an important component of the lessons they are engaged in,” (Mercer & Howe, 2012 p18). I therefore planned in specific work on creating this meta-awareness, working with the children to support them to understand that “[d]ialogic talk...enables both learners intra and intermental skills...and through this their wider intellectual capabilities” (Knight 2013 Dialogic Talk and Whole Class Dialogue para 2). This was an element of the inquiry that I felt was particularly successful as I saw much improved engagement, particularly from the highest ability child, and so this is something I will certainly aim to incorporate within my future practice.

In my setting all classes are taught using the White Rose scheme of work. This involves following a PowerPoint of teaching slides and the children have a linked worksheet to work through each lesson. The scheme is quite prescriptive and I was concerned that by following this school-based expectation I would have fewer opportunities to plan dialogue rich activities. I developed a solution to this by specifically planning in talking times. I felt this had a positive impact on my own practice as by creating these opportunities, as well as developing the meta-awareness of the advantages in the children, I ensured that talk was made a priority rather than becoming subsumed by the aim of completing the worksheet.

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My success criteria were that I would be able to observe children explaining their reasoning, building on their own and each other's ideas and challenging one another when working in mixed ability pairs.

My inquiry plan and activities

I carried out an initial baseline assessment by filming pairs of children and then transcribing extracts from the talking times within the lesson, which were between two and four minutes in duration. These were coded using a version of the T-Seda forms 2B and 2C. I looked for examples of reasoning, building on ideas, invitations to explain reasoning and challenge.

Following the baseline analysis, I delivered a lesson to the children in which I explained the importance of effective dialogue and explicitly talked them through the advantages of developing these skills. We then worked as a group to create ground rules, a copy of which is included (appendix 1). In the following lesson I discussed the use of sentence stems. I used two different resources I had accessed online as a starting point. Throughout the lesson I gave the children many opportunities to use the sheets to prompt discussion. I also modelled the use of these, as well as guiding the children to use them to shape whole class talk. I observed that the children appeared quite uncomfortable with challenging each other and saying they disagreed or even asking another child to prove something – they laughed nervously and showed a reluctance to speak. However, when I asked those children who had been challenged how it felt, they could reassure their classmates that it had not been a negative experience and we established that this was because it was done in a respectful manner. Because this feedback came directly from their peers, children seemed to accept it and I was able to witness them gradually become more comfortable with using the sentence stems over several lessons. Following this introduction session, we discussed which we all felt were most useful and I used this feedback to create the resource included in appendix 2.

The children then had this resource available to them in all maths lessons over a period of two weeks and I encouraged them to use it, both in paired work and in feeding back to the class. At the beginning of each session I went over the ground rules to reinforce these.

I then recorded a second session, again filming the talking times, which were of similar duration to that discussed above. I transcribed and coded this, using the same forms.

Ethical considerations and relationships with others:

For this inquiry I wished to video the children in order to code from a transcript so needed written consent from parents. One issue that arose was the difficulty in ensuring full anonymity. As I teach such a limited number of children, I was concerned that they would be identifiable, particularly as I am discussing them in terms of ability. Initially I had used the initial of each child's first name. However, I decided to label them using generic letters to make identification more difficult. As the ability of the children was central to my analysis of the data I decided to make their relative ability clear in the identifiers, settling on HAB-A and HAB-B for the higher ability child of each pair and LAB-A and LAB-B for the lower ability

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students.

I identified a possible issue when the children returned to school following a two-week isolation period. As is discussed below, some of the children had completed the maths units virtually but others had not done any work. I was therefore advised by the headteacher to repeat the units but to plan in extra challenges for the higher ability learners. As this would have disrupted my plans for the children to spend a lot of time engaging in dialogue about the relevant work in mixed ability pairs, I felt that I would be unable to do this. However, I was concerned about whether this would be ethical as I would essentially be expecting children to repeat work they had already completed in order for me to carry out my research project. I was worried that the children could be bored and disengaged and parents may also be concerned. The research that I had already carried out about the impact that dialogic activities can have on improving learning convinced me that to proceed with my planned project would be in the best interests of the children. This was supported by the low quality of dialogue observed in my baseline data, as well as the fact that I had previously identified significant issues with the highest ability child's (who had produced the most work during the isolation period) difficulty with articulating his reasoning.

My findings:

I carried out an initial baseline assessment focussing on two pairs of children and the data is summarised in form 2C below. The rating for overall participation is based on 1 for low participation and 3 for high:

Student	R	CH	B	IRE	Rating of overall participation
HAB-A	√				1
LAB-A					1
HAB-B	√√√√				3
LAB-B		√			1

If the first extract (Appendix 3) is examined it can be seen that only one example of dialogue is evident throughout. HAB-A was extremely focussed on completing his worksheet. Although he appeared happy to help his partner, this took the form of telling him the answer – “rub that out and put 1200” - and there was very little talk at all. It was also interesting to note that LAB-A expressed a desire to get on with the worksheet. This was out of character for him, and appeared from his tone of voice, to be something he said to please HAB-A and build a shared sense of frustration.

In the second baseline transcript (appendix 4), a lot more talk was evident; a possible reason for this is the personality of HAB-B. He is by nature very keen to please adults, and is also a lover of drama and theatre. At times I felt that he was performing for the camera and wanting to create a positive impression, for example by asking LAB-B “would you like to read this question?” In several instances HAB-B did explain his reasoning.

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However, he did so almost as a commentary of what he was doing rather than creating a genuine dialogue with the other child. For example, for three turns in succession he simply stated the answers as he wrote them with no interaction with LAB-B:

“6000m equals 6km. 6100m equals... 6km and 100 metres... 6200m equals 6 km and 200 m...6450m equals 6 km and 450 metres”

LAB-B gave the appearance of lacking confidence throughout the activity. When HAB-B had explained something, she would show agreement and write an answer down, but I felt that there were times she needed to seek further discussion and clarification as she had clearly not understood. At one point, LAB-B did attempt a challenge – “I’m not sure that’s right...”. However, she did not enlarge on this.

Following my interventions, I repeated the data collection and an improvement in the amount and quality of dialogue was evident, particularly between child HAB-A and LAB-A:

Student	R	CH	B	IRE	Rating of overall participation
HAB-A	√√√√√		√√	√	3
LAB-A	√		√√	√	2
HAB-B	√√√√√√√	√	√	√√	3
LAB-B	√√	√√√	√	√	2

In the baseline data, no incidents of building on ideas or inviting reasoning were recorded at all, whereas in the final assessment all children used these strategies at least once. Both lower ability children participated substantially more and both explained their reasoning on more than one occasion. For LAB-B in particular, the fact that she was explicitly asked to do so appears to have been effective in encouraging her participation; for example on one occasion she scanned the resource, before asking “I’m going to ask this question...how did you notice that?” The process of building ideas together appeared to have a positive effect on the confidence of the lower ability children. Following LAB-B’s explanation to HAB-B of how to create division facts from a multiplication question (appendix 6), she volunteered to feedback to the class, unusually for her, and did so in a much louder and more confident voice that I have previously heard from her. As can be seen in the transcript in appendix 5, LAB-A, a boy who can be quite disengaged and has on occasion shown behavioural difficulties, was very eager to show me how many questions he had produced to prove his rule. I decided to take a photocopy of the whiteboard he was working on in order to preserve the work and when I told him this, he was extremely excited and told the children around him what I was doing.

The only area where little improvement was seen was challenge. Although LAB-B did attempt this several times, these were around small arithmetic errors rather than questioning elements of reasoning. HAB-A and LAB-A did not challenge each other at all. It is probable that this is partly as a result of the mixed ability nature of the pairings. Although all children improved in terms of the amount and quality of their dialogue and in some

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cases they built on ideas together, it is clear that their relative ability does affect their input into the dialogic interactions. HAB-A and HAB-B automatically took on a leadership role within each pair. They explained their reasoning to their partner, but in most cases their goal, and indeed the end result, was to help the other participant in developing their understanding. Similarly, the lower ability child was more likely to ask for clarification about how the other child worked it out. Even when HAB-A and HAB-B asked for proof or evidence, it appeared to be a supportive question, rather than because they genuinely needed to know. I would hypothesize that challenge would be more frequent and necessary in dialogue between children of similar ability, which may be an area of research to explore in the future. Another element that may explain the lack of improvement in this area is the nature of the subject matter. As discussed earlier, maths is a subject in which most answers can be clearly marked right or wrong; once a “right” answer or an effective rule has been established, the need for challenge becomes largely obsolete. Had we been discussing PSHE related issues for example, there is likely to have been much more scope for children to disagree with each other without the need to reach a factually correct conclusion.

HAB-A in particular showed a substantial improvement in articulating his ideas and making these clearer for his audience, including by creating his own examples: “So say I’m sharing 200 chocolate bars and I’m the only person who’s there...so there’s 1 person there...so I’m the only person who can have them...I’d have them all to myself wouldn’t I?” He moved from one incident of explaining his reasoning in the baseline assessment to five in the final session, and the rate of his participation improved from a 1 to a 3. For him the explicit understanding that the talk was necessary to improve his own long-term learning appeared to be key in helping him to improve this, as he began to apply the same effort and dedication into this element of the lessons as he had previously applied only to completing the worksheets. Were I to repeat this I would ask the children to complete a self-assessment at the beginning and end of the project to gather their views on the importance and relevance of dialogue.

The child for whom the least progress was seen was HAB-B. As has been noted the camera did appear to affect his behaviour. Also, although he is currently assessed at working at Greater Depth for maths he has had periods where he has struggled to maintain this level and he does not have the intuitive reasoning skills of HAB-A. He was able to use his dialogic skills to support LAB-B. However, I feel that being paired with a child closer in ability to himself might have supported the development of his own reasoning skills more effectively.

The resource you created:

I produced a “talking mat” of sentence stems for the children to use to guide their discussions. I limited this to nine stems as I felt that when children tried using the pre-made resources I had sourced from the Internet, they became overwhelmed with the number. I organised the sentences so that on the left-hand side were the sentences that would allow a child to ask for help, those in the middle supported explanation of reasoning and the ones on the right helped with challenging or reaching a consensus. Although I didn’t label these specifically on the chart, I felt that this enabled me as a teacher to support children more effectively by pointing to which area of the chart they could focus at particular points of a discussion, without guiding them too explicitly. I noted throughout the inquiry that lower ability children appeared to feel more empowered to ask for help or clarification if they were using the sentence stems.

In the final lesson, HAB-B said to me “Miss, I know how to get [LAB-B] to talk, I just use of one of these” and pointed to the resource. This suggests that he had been frustrated at how one sided the discussions had been previously and appreciated having the tools to encourage greater participation.

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My reflective evaluation of the process and Changes to Practice

Explicitly explaining to the children why dialogue is important was a key element to the success of improving the dialogue, particularly for the child of highest ability. The children were able to see a reason for participating fully and this led to better quality dialogue. Giving the children the sentence stems gave them a structure which supported their talking. As well as giving them the actual vocabulary to start them off, it appeared that the lower ability children felt that it gave them explicit permission to ask for help and to request specific explanations with this in front of them. The ground rules, and the time we spent discussing these also gave children a greater understanding of what was expected. By spending so much time on creating the conditions for effective dialogue, they began to see it as an important element of the lesson and the learning in its own right not just a precursor to the worksheet.

Following collecting my initial baseline data, my maths group had to isolate for two weeks due to a positive Coronavirus case within their mixed class. This left me only the two weeks at the end of term to carry out my inquiry. A further challenge was created by the fact that the children had access to the mathematics scheme to work virtually from home using the White Rose videos; this was organised by their class teacher so I had no involvement in the delivery of the maths for this period. It became clear that around half of the children had completed this but half had done very little. In order to address this challenge, I specifically planned to do an intense focus on the use of dialogue and how this can improve learning in maths. I explicitly talked about the impact of effective dialogue and how research has shown that this improves learning. I explained that over the following two weeks we would be focussing on this, so although some the maths might seem easy, or something they had seen before, this was actually less important than developing their skills in explaining their reasoning. With hindsight, I believe this made the intervention more successful. By explaining the purpose so clearly and making this the main focus, I felt that the higher ability children in particular began to see the advantages in working with a partner and as result, their focus moved away from wanting to complete the worksheet towards wanting to provide clear explanations.

For me as a practitioner, I had to make a similar leap away from feeling as though the children needed to complete their worksheets each lesson. By specifically planning in time to talk, I began to afford this its proper value. I also began to see more opportunities for children to engage in dialogue and construct learning for themselves by asking them to explore and generate rules that might be generally applicable, which led to a greater understanding and internalising of knowledge. I also feel that making the reasons behind what we were doing very clear to the children was highly effective and something I will be striving to continue with in my future practice.

A potential issue related to the challenge of carrying out action research within my own setting was the fact that myself as teacher and my TA appeared to intervene more with the children within the final data collection session. This was not conscious or deliberate but simply a result of following the particular daily lesson of the scheme we use. It is possible that this had some impact on the increase in dialogic interactions.

Next steps:

My next steps will be to measure the impact of improved dialogue on learning as this was my original inquiry question, prior to the decision that more initial focused work would be required. Each unit is assessed with a formal topic specific assessment at the end; I will therefore be able to

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compare the scores on this with those recorded earlier in the year before I carried out my inquiry.

I also intend to measure the impact of this intervention when children are paired with others of similar ability and to see how the results compare.

I will be leading a whole school staff meeting in the spring term to share the results of my inquiry with a wider audience and to highlight the importance and potential benefits of creating dialogic classrooms. I will also share the resource I created and make this available to staff who would like to incorporate the use of this into their own practice.

References:

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