

Exploring children's interest in seeing themselves on video: metacognition and didactics in mathematics using 'Photobooth'.

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This paper examines the process of interviewing five children aged 7 to 11 doing arithmetic, to begin to explore the benefits and limitations of using video of children in three main areas: the benefits to the researcher of making a video record of an interview; the use of visually stimulated recall; and the potential for the teacher, especially with children whose experience is one of failure in mathematics, to show the child they have made progress and thus to influence their future learning.

Keywords: visually stimulated recall; difficulties in primary arithmetic; metacognition.

Introduction

I have been carrying out clinical interviews (Ginsburg 1997) with five children aged 7 to 11, all of whom are in foster care, and all of whom have been identified by their schools as having low attainment in mathematics. Four of the children were also described as having very poor concentration and poor behaviour in lessons. The focus of each interview was an aspect of counting, addition or subtraction that had been identified as causing the child difficulties.

I have previously used a small digital camera to video children working, but decided instead to use 'Photobooth' software on a laptop, because the child can see themselves on the laptop screen (as though in a mirror) whilst the video is recording, and I thought that this might increase the child's motivation to take part in the interview.

Before the first interview, I had explained to each child that I was trying to find out more about how children learn mathematics, and I was especially interested in finding out about things they found hard to do, or they didn't understand, because this would help teachers do a better job. To help me, I would sometimes ask them to explain how they did something.

The benefits and disadvantages of recording the interviews on 'Photobooth'

The equipment is very easy to set up (just open the laptop) and this was an important consideration since the interviews were often in a small room in the child's school, and were sometimes interrupted and moved. I recorded sound on an audio recorder as back-up; this was helpful with one interview where the sound was accidentally switched off on the video, and on another where the child accidentally erased the interview when he tried to play it back. A 'test run' with each child enabled me to play back a short piece of film of themselves before their first interview.

Four of the five children commented favourably on being able to see themselves on the laptop screen; the fifth, Maisie, seemed uninterested during her first and second interviews, but before her third interview, when I was unpacking some counting equipment, she said anxiously, 'You haven't forgotten your laptop have you,

for filming me?’ All the children had watched video of other people on ‘Facebook’ and two had seen ‘Photobooth’ before. This familiarity with the medium of video on a laptop seemed helpful, and the overt nature of the filming was perhaps reassuring to some of the children: for example, Kyle commented ‘I can see what you’re watching when I’m doing stuff’.

Occasionally the videoing was a minor distraction – such as when Skye wanted to show the video her birthday badge, when Ronan showed his new shoes to the camera, or when Kyle noticed that the low resolution of the film meant his hand wobbled on screen. However, I felt that, overall, the obvious nature of the filming was an incentive for the children to concentrate for longer than usual. Being filmed seemed to make the children feel important.

A video recording of any interview does, of course, provide the researcher with the chance to view the material again, and to reconsider the child’s body language (including facial expressions) and activity, as well as their speech. In addition, there were occasions when a child did something that I did not see when I was with them, but that was caught by the camera. One notable example of this was with Millie. We had been using plastic hundreds, tens and ones equipment to do several addition and subtraction calculations. As I looked away, she quickly picked up a plastic ‘ten’ strip, and counted along the markings with her finger, checking that it was ten. Without the video, I would not have known that she was still uncertain about this.

Interviewing Millie and Kyle: contrasting experiences

Millie (aged 10) was the first child I interviewed, looking at how she carried out subtractions with numbers within 100. She gave reasonably clear explanations throughout the interview about how she had completed each calculation, demonstrated what she had done, and in some cases happily said that she could not use a particular method of calculation successfully. I did not have any plan at that point to show each child their videoed interview to discuss it, and Millie did not want to view hers. Even in retrospect, I do not think I would have gained much additional information about how she felt or the strategies she used by asking her to comment on her video, because she had said so much as she went along.

My second interview was with Kyle (aged 8), who asked if he could watch it as soon as we finished, and then spontaneously gave a commentary. Initially, Kyle’s comments were very general. We had been using small plastic fish that Kyle had to count out into two ‘ponds’ drawn on a sheet of paper, to explore number bonds within ten. His first comment on the video was to say ‘You can see me. I’m doing the fish. I’ve got a shark like, you can do it in the bath, it squirts. They’re good fish.’

Very quickly, he began to comment on his work, sometimes commenting on activity that had not yet happened on the video: for example, he said “You wouldn’t let me use the fish. I could have done it with my fingers” *before* he said on the video, “Am I allowed to use fishes as well?” and I had said, “No, not yet.”

Kyle had not previously been able to give an answer to $0 + 7$, so I had begun to provide a pattern of questions leading to this, using seven fish distributed between the two ponds, and asking Kyle to move one fish at a time across to the other pond. When he watched the video, Kyle said comparatively little – he leant forward, concentrating on the screen. I made notes of his comments and where they were made. His comments when he watched the original interview are shown on the right-hand side of the page on the video transcripts below.

Transcript excerpt 1:

11 RG: Very good. Ok, right, now, you can actually use the fishes, put four in there and three in there.

RG demonstrates where she wants Kyle to put the fish. Kyle puts the fish in the two ponds.

RG: Then tell me as quickly as you can how many you've got altogether. Four in that pond.

12 Kyle: They can actually stand up.

13 RG: They can, they're brilliant fish.

14 Kyle: How many in that one? (*points to empty pond*)

15 RG: Three in this one.

How many all together?

Kyle's comment: There was seven.

Kyle counts each fish.

16 Kyle: One, Two, Three, Four, ... Five, Six, Seven

17 RG: Seven. Four and three makes seven.

Kyle watched the video as he successfully did $5 + 2$, then $6 + 1$:

Transcript excerpt 2:

Kyle moves one of the fish to make 6 in one pond and 1 in the other.

26 Kyle: One, two, three, one, one, two, three, four, five, six, seven.

K's comment: I counted them all.

27 RG: So we've still got seven. How many in this pond?

28 Kyle: (*turning away from the fish*) It equals seven! Don't it!

RG smiles at Kyle's reaction.

K's comment: Look at my face! I got it! 7 add 0 is 7.

I learned it!

29 RG: Yeah! So how many in this pond?

30 Kyle: One, two, three, four, five, six, and then we put that one in there and, one, two, three, four, five, six, seven.

Kyle puts the last fish into the pond on the left.

31 RG: and how many in here?

32 Kyle: None.

33 RG: So what's seven and none?

34 Kyle: Seven

K's comment: I knowed that now, I knowed it, knew it, before, you know.

Kyle's realisation in the initial interview that $7 + 0$ must be seven (line 28), *before* he had moved the last fish, was accompanied by him turning round in his chair, looking up at me and grinning. His excitement when he watched himself on the video was apparent, too, even though he attempted to moderate it by saying that he 'knew it before'. But knowing $7 + 0$ is not the same as knowing $0 + 7$:

Transcript excerpt 4:

RG moves all the fish from the pond on the left to the pond on the right.

35 RG: Suppose all these seven went over here, now we've got none and seven. How many have we got?

36 Kyle: (*Shrugs his shoulders*) Seven? I mean none?

37 RG: Look. How many have we got, we've got none there and seven there, how many altogether? (*Points to each pond*)

- 38 Kyle: Seven?
39 RG: Yeah. So what's none and seven?
40 Kyle: Seven.
41 RG: What's seven and none?
42 Kyle: Seven.

When Kyle tried the next sequence of sums, his comments showed again that he recognised he had learnt something new:

Transcript excerpt 5:

- 46 RG: Very good, and what's none and five?
47 Kyle: Five.

K's comment: I'm getting good at it now.

- 48 RG: And what's two and none?
49 Kyle: Two.
50 RG: And what's none and two?

Kyle leans back in his chair and stretches when he answers.

- 51 Kyle: Two. (grins)

K's comment: Look at me! I'm pleased, aren't I!

Kyle confirms this again after he watches himself completing several written sums involving zero:

Transcript excerpt 6:

- 60 RG: Brilliant. So now there's something you can do that you couldn't do before.
61 Kyle: I could do it, It's just I thought it was...
62 RG: It sounded silly?
63 Kyle: Yeah.
64 RG: Yeah you weren't sure about the answer were you?

Kyle shakes his head.

- RG: But do you feel sure now?

K's comment: Yeah, I'm sure now.

- 65 Kyle: Yep.

Visually stimulated recall

Kyle made very little comment on his work during the original interview, but watching the interview gave him the opportunity to both explain how he worked things out, and to identify what he had learnt. In contrast, Millie 'talked out loud' in her interview, and after each calculation she discussed the decisions she had made and her level of success with them.

Lyle (2003) describes stimulated recall (SR) as

an introspection procedure in which (normally) videotaped passages of behaviour are replayed to individuals to stimulate recall of their concurrent cognitive activity. (p 861)

He notes that SR has been used extensively in teaching, counselling, nursing and medical research, language teaching and sports coaching (i.e. largely with adults). He contrasts the method with 'think aloud' techniques, where the subject is asked to comment on their cognitive processes whilst engaged in the target activity, and points out that this is difficult to do in many real-life problem-solving situations. He suggests that to increase the validity of SR, 'best practice' would include making the

retrospection as immediate as possible, and allowing the subject to make a relatively unstructured response.

Kyle's activity during his interview depended on him being able to notice a pattern in the sums he was doing, to convince him that $0 + 7$ would be seven. SR was (albeit by serendipity!) a better method to use to explore his understanding, as asking him to 'think aloud' would have diverted his attention to talk about how he did each sum, and he may have missed the main point altogether. Millie was engaged in several separate calculations, and also seemed more practised at being asked to explain her methods, so 'think aloud' worked well for her.

Whitebread et al. (2009), in their discussion of metacognition and self-regulated learning in young children, point to the difficulty that 'think alouds' may pose for those whose verbal understanding and fluency are less developed. This may also be problematic for children engaged in SR. Skye (aged 8) watched her videoed interview without making any new comments; she laughed a great deal, and often repeated what she had said on film, but did not add any further commentary about her understanding of what she had done. However, she listened very attentively when I explained why I thought she had done well in her interview, giving her specific examples of the things I had seen her do.

Tanner, Jones and Lewis (2011) comment that pupils aged 5 to 7 in their study, where children videoed each other working, were able to recognise physical signs of thinking and concentration in others. Interpreting facial expression and body language can be difficult; it was interesting to note that one teacher felt Kyle was 'rude' in class because he sometimes leant back on his chair and stretched his arms, but in his commentary on his video interview, Kyle explained this behaviour as showing "I'm pleased, aren't I!" (line 51 in excerpt 3 above).

Potential for teaching

All five of the children I interviewed had said that they found 'numeracy' difficult, and Dylan, Kyle, Ronan and Skye had variously described themselves as 'rubbish', 'dumb' or 'no good'. In the terms of Kilpatrick et al. (2001) the children's 'productive disposition' was very poor – they did not have a "habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy" (p 5). The remedial help each child was getting was universally based on practising skills, commonly with a teaching assistant armed with worksheets, and four of the five children were apparently making very little progress (Millie being the exception).

Shifting this resignation to failure can be a difficult task. Developing their skills at recognising when and how they have learnt something new seems to be one aspect of the children's learning where reviewing video of themselves engaged in activity could be very helpful. Kyle could see this for himself. Skye was keen for me to show her a particular place on the video where she had begun to count a pile of two-pence and penny coins successfully, and listened carefully to my explanation of why I thought it was very good. Ronan (aged 8) had not wanted to watch his first videoed interview at the time, but after his second interview he asked if he could watch the first interview, so that he could see if he had got any better. They were keen to see for themselves the proof that a video recording provides, that you can be successful.

Dylan's second videoed interview seemed unlikely to provide that proof, as he struggled with trying to answer $20 - 13$. When he watched the video, at one point he

asked “Can we wipe it out now? Delete it?”. The focus of my discussion with him needed to be about his perseverance – he had kept trying – and then to give him a new strategy to try. He checked that the correct answer was 7 on a calculator, then had a break, and finally thought about how he could link 7, 13 and 20, using an idea he had had before: “I could take away 10, take away 3”. It was obviously important not to leave the experience as one he saw as a failure.

Visually stimulated recall as a research method was useful with two of these five children, in providing additional data. Using the video interview as a teaching and learning tool seemed to have potential with all five, and this will be a focus of further work in the future.

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