

INTERPRETATIONS OF A CLASSROOM VIGNETTE OR WHAT DOES READING ABOUT SOMEONE ELSE'S THEORIES-IN-ACTION DO FOR YOU?

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This paper briefly tells the story, through four critical stages, of the developing complexity of our theories-in-action (SchOn, 1991) as teacher-researchers over a period of 18 months. These theories-in-action are related to the ways in which teacher and student purposes (Brown and Coles, 1996) act as organisingfoci through which intuitive ways of knowing (Bruner 1974, Fischbein 1982, Gattegno 1987) are accessed. The parallels between our learning, as teacher-educator and teacher, and the learning of our students are marked. We share this journey to illustrate a way of working which we value for our own learning but ask the question 'what is it that the readers of such research accounts learn?'

In this paper we briefly document a series, developed over eighteen months, of interpretations of one incident which we call 'Sarah's story'. We work together as teacher-researchers in Alf's classroom, Laurinda an intermittent visitor, and have found ourselves going back to this story to be aware of how our descriptions of that event and our developing theories-in-action (Schon, 1991), are changing. We work within what Bruner (1990) called a 'culturally sensitive psychology':

'(which) is and must be based not only upon what people actually do but what they say they do and what they say caused them to do what they did. It is also concerned with what people say others did and why ... how curious that there are so few studies that (ask): how does what one does reveal what one thinks and believes.' (p16-17)

We look at the detail of our practice, what we do, using the strategy of giving 'accounts of' (Mason, 1994) significant incidents for us, often recognised through dissonance (Festinger, 1957, Brown, 1996) and reflecting on, or accounting for those incidents to probe our motivations and implicit beliefs and theories (Claxton, 1996). Mason (1996) stresses our sense of the transformative aspects of our work:

'the overt product of research is some supported assertion(s). A covert product of research is a transformation in the perspective and thinking of the researcher. Undoubtedly, one of the most significant effects of any piece of research in education is the change that takes place in the researcher.' (p58)

and here we are exploring the possibilities inherent in the assertion (Brown, S, quoted in Pimm, 1987) below:

'One incident with one child, seen in all its richness, frequently has more to convey to us than a thousand replications of an experiment conducted with hundreds of children. Our preoccupation with replicability and generalisability frequently dulls our senses to what we may see in the unique unanticipated event, that has never occurred before and may never happen again.' (p194)

At the start of our work together Laurinda's questions were concerned with ways of working with teachers in training, and those new to the profession, to develop effective practice:

Beginning teachers need to temper idealistic goals given the reality of how much skill might be required to achieve them. I found that engaging with a student on a philosophical level of debate did not seem to allow practical development or change of implicit theories or attitudes; nor did giving 'tips for teachers' at a behavioural level do much for their developing sense of who they might be becoming as a teacher. (Brown and Coles, 1997)

Working with a group of PGCE students in training to describe the details of their practice and discuss incidents which seemed to them to be in some way similar, they would develop a vocabulary of what they considered to be important such as 'sharing responses' or 'how do I know what the pupils know?'. Laurinda came to call these organising principles, purposes. Discussions at the level of purposes, seemingly somewhere between philosophy and behaviours (there are parallels with the hierarchies discussed in Nisbet and Schucksmith's (1986) 'Learning Strategies' and Rosch's categories (Lakoff, 1985) where the 'middle' level is the one most easily discussed), did seem to be effective in allowing a group of students to begin to collect together a range of strategies for use and hence their beliefs and attitudes began to adapt. The purpose for the year which Laurinda gave the students was to work on gaining a sense of the teacher they wanted to become.

Laurinda was interested in working with someone she had not trained to see if the notion of purposes was useful more widely as a developmental tool. Alf's questions were concerned with developing his own practice as a teacher and the learning of mathematics of the students in his classroom. Inevitably there were many overlaps and parallels in our concerns and developing theories. These commonalities continue to interest and motivate us.

For the last two years we have had papers accepted for presentation at the PME conference and have enjoyed being part of a critical community. Alongside the strands of our own developing research agendas, together and separately, we do find ourselves asking what the point of reading all this might be for someone else and it is with this question that we wish to engage in this session.

What follows, after a brief background to the incident, is an account of what we call 'Sarah's story'. We then give four interpretations of this story to tell another story, of our developing theories-in-action, our 'transformations in perspective' over 18 months. This is how we talk about our practice. The first interpretation gives some indication of where we were separately at the start of the journey told here. The second outlines in a distilled form a major strand to our thinking over the eighteen months. The third and fourth interpretations indicate where our current thinking is. The final comments in the paper are taken from the discussions at the BSRLM meeting where this paper was presented.

Background

The mixed ability class of 11 and 12 year olds were in the middle of an investigation related to perimeter and area. They had all started with the problem of finding the rectangle with the largest area, given a perimeter of 12cm. Having solved this starter problem students were encouraged to try other perimeters, begin looking for patterns and start generating and working on their own questions. At the beginning of one lesson we shared what they had found out so far:

- The largest area for any different perimeter is a square.
- To draw a rectangle with a perimeter of an odd number you must use halves.
- Odd sides means an odd area.
- Even sides implies an even area.
- Divide the perimeter by 4, then times by itself, what you get is biggest area.

These statements were written on the board as they came and no explanations were asked for or given. When the list was completed, I added that I had been thinking about the first question and wondered whether it was possible to find the perimeter of a square when the area was 50cm^2 . There was an invitation to stay with what they were working on or incorporate any of these ideas into their investigations. The class continued to work individually or in small groups.

Sarah's story

After some time Sarah, who had been working on the 50cm^2 problem, came up to me stating that the perimeter must be 4cm. I drew a square with area 1cm^2 on the board with 1s marked around the perimeter and waited for some response. When none came I asked her how she had worked the 4cm out. Sarah talked about 'reversing the rule *divide the perimeter by 4 then times by itself* to get the biggest area'. I started writing the flow diagram for this as she spoke and Sarah reversed 'times by itself' to 'divide into itself' and 'divide by 4' to 'times by 4'. This gave $50 / 50 \times 4 = 4$.

I said, 'OK, times by itself' and wrote: 4-

She quickly replied '16' having had experience of writing functions in this way, and I wrote 16 next to the arrow, followed by: 6 -

The answer '36' again came quickly. I offered: -- 49

She responded with 7 immediately. We agreed that this had not been 'divide into itself' but what was it? She went away to work on this.

Interpretation 1

Alf: One of the reasons I continued to think about this incident was the energy with which Sarah 'went away to work', her attention on what she was going to do. I was aware at the time of my interactions with students often not leaving them with anything new to work at or even without a sense of what to work on at all. In analysing the actions of the teacher I noticed three points where I thought I would have acted differently.

The first is the offer of the image of the square. My initial reaction would almost certainly have been a verbal question 'How did you get that?'. The second is the teacher's willingness to drop the image after it drew no response. If I had offered the square I would have worked with Sarah to get her to see why this contradicted her statement, despite the fact that it did not at first connect with her. The final sense of difference is at the point where the misconception is revealed. Rather than offering the

mechanism of the function game, my sense would have been to work, again verbally, with Sarah pointing out that this was where her error lay.

Laurinda: Why did this incident stand out for me? One reading would be that on other occasions the initial offer seemed to be sufficient whereas in this case it was not. This allowed both of us to reflect on the event because the discomfort which I experienced meant that I noticed it and could start to respond to Alf's questions about what I had done. My reflections were related to seeing 'It's not the answer that's wrong' as a purpose which guided my awarenesses. Of course '4' was wrong. But what I was more concerned with was offering her something to work on so that she could sort that out. Apparently I was not concerned with understanding how she had worked on the problem. If I had been I would have immediately asked 'How did you get that?' . The evidence of what happened is that I shared my image which arose in response to the uncomfortableness I experienced in relation to area 50cm^2 , perimeter 4cms. Since this did not elicit any attention or energy I asked the question so that I could be given some more information from which to make a decision about what to offer.

What was useful for me about this analysis and reflection was that I became aware of what seemed to be an habitual and effective behaviour, developed over time. This allows me in future to consider alternative strategies. The theory-in-action which seemed to be operational was that in her world, Sarah was convinced for a reason. It was not my primary task to discover this reason but to offer things from my world, which we call mechanisms, to which she would need to adapt hers.

Interpretation 2

Sarah's response of '7' was immediate as was the teacher's offers of both mechanisms. We came to call actions which were this quick 'instinctual'. Another detail which caught our attention was the conviction in Sarah's decision to leave, knowing what she was going to work on.

We have an image of a nested set of six concentric circles which illustrates the complex set of purposes (sub-purposes and overarching purposes!) within which Sarah is operating. The most immediate is "How did I get 7?" which is part of the wider problem 'What's the inverse of multiply by itself?' , both questions created by her. These build in scope to the overarching purpose of working with ideas of perimeter and area. We are not including here her motivations to learn mathematics or other socio-cultural issues. We are concerned with the learning of mathematics and its mediation through the teacher. Teacher purposes and students' purposes are sometimes the same, sometimes different, sometimes shared, sometimes not shared but interconnecting.

Sarah was working energetically within a complex space of mathematics with many of her own purposes. In this extract she brought to our minds Gattegno's definition (1987)

of intuition as a way of knowing 'needed when encountering complexity, and one wants to respect it, to maintain it (p73) ... Once we become aware that we can function as an intuitive person we find that all (other ways of knowing) are renewed and capable of serving us as they never have before (p79).' We also found Bruner's (1974) and Fischbein's (1982) ideas on intuition helpful.

We began to look for other examples of students using 'intuition' or 'instinct' and to plan to allow for this; to allow space for students' encountering complexity'. In this type of space the teacher is also faced with complexity. No student had ever asked the teacher in the extract, Laurinda, the question before and yet she responded immediately. The teacher must also be operating intuitively. This work led to the statement of a theory-in-action (Schon, 1991) that purposes support the decision-making of intuitive practitioners in the classroom allowing them to work with and in the complexity through adaption to and from experience. This work forms the basis for a chapter in a proposed book on 'The Intuitive Practitioner' .

Interpretation 3

In trying to describe the state of the teacher who adapts to what is offered by the students the words 'free-floating attention' (a term of Freud's) seemed the closest. We started reading in the psychoanalytic literature and were struck by parallels between some analysts' states of mind during consultations and those of the intuitive teacher with which we were working. Bion even uses the word 'intuited' (Symington, 1996) in this context.

Adam Phillips (1993) suggests the term 'attentive boredom (p82)' for the state a psychoanalyst can be in when working with a patient. Boredom here refers to 'a state of waiting, without the conscious representation of an object, to find desire again (p76)' . Attentive boredom is possibly the state of waiting for the arising of something that will be recognised and yet, in Bion's terms 'without memory or desire' (Symington, 1996) of that object. Bion also used a term coined by Keats, negative capability, to suggest an analyst 'capable of being in uncertainties, mysteries, doubts, without any irritable reaching after fact and reason' (ibid, 1996, p169). This analysis allowed us to talk about the non-attachment to the offered image of the square of perimeter four.

We certainly recognised 'Bion's recommendation that the analyst strive after negative capability' as being 'not an immediate mental discipline to be engaged in just prior to the session, but rather a way of life (Symington, 1996, p169)'. However, 'without memory or desire' does not imply no preparation and no reflection! Rather, the more preparation and reflection, the more it is possible to make connections in the moment both for the students and the teacher.

We are currently finding wider reading and working with the psychoanalytic literature useful.

Interpretation 4

Alf: I am currently doing an MEd and have returned to look again in detail at my one to one interactions with students, still aware of times when my offers to students are verbal explanations or series of instructions that do not seem to take a student further in their work. I have begun to read in the area of semiotics and have attended the semiotics working group at BSRLM. From a semiotic perspective, in a lesson, the students and I are engaging in a project of shared meaning-making.

So, at the point at which Sarah is unable to do anything with the offered image of a square, the visual image does not connect with her current thoughts. She is working with area in an algebraic sense, as something that she puts into her initial flow-diagram; she seems unable, in that moment, to connect with the spatial sense of area. Laurinda attempts to work with Sarah's ideas and offer something to allow her to restructure her own meaning. The lack of connection with the visual was not addressed but I now recognise this as something I would come back to, either with Sarah or the whole class. Meaning is created over time, I do not have to force connections on students at the moment they occur to me. There are again parallels between the students' making meaning within the mathematics and my planning, arising out of the meaning I am making about my students' learning about mathematics.

Conclusion

This work has been useful to us in lots of ways, not least the teaching of our students at the University and in the school. We tell stories, the stories of our practices, the story of the mathematics, the stories of events in the classroom, the stories of our lives ... We are integrating ideas from many literatures but always related to and embedded in our practice as teachers. The question which we keep coming back to however is 'is there a point for anyone else?' During the telling of these interpretations participants in the session were invited to record what questions arose for them:

- Where would you start with the interpretation of a new incident? What language would you use? Given the journey it would be harder now for others to penetrate what you're seeing.

- How is it possible to access what has become 'hard-wired' in one's own practice?

- Why do you call this practitioner research? It feels broader. You are making sense of meaning-making within that situation.

- Thinking about connections between implicit and explicit: implicit/philosophies and explicit/'tips for teachers'. Somewhere in the middle allows movement from implicit to explicit - a rich vein for initial teacher trainees.

- My questions initially mirrored those I'd ask my teaching students: where do you start? what's enough? whose agenda? but as the session went on the questions moved and have something to do with energy transfer.
- Where's Sarah gone to? This isn't Sarah's story. It's Laurinda's story. Uncomfortableness with the concentric circles; Sarah's purpose would describe a wiggly path; her attention may be elsewhere.
- Did Sarah get lost? What has Sarah got access to in her world that will help me to communicate with her?
- We could waste a lot of effort trying to diagnose Sarah's world when she doesn't have to herself. What's going on is the 'along side-ness'; Sarah having to find something in her own world to offer. This feels like 'Fundamental Practitioner Research' (Vandenberg, 1974).
- This is the intersection of Laurinda's story and Sarah's story; their communication and how it comes about. The story is about joint meaning.

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