

ON METHODOLOGY AND CLASSROOM DIALOGUE

Alf Coles

Kingsfield School, South Gloucestershire and University of Bristol

In this paper I consider methodological aspects of Gattegno's (1987) conception of a Science of Education. His emphasis on the watchfulness of the teacher, and on personal transformation is close to ideas in Dewey (1934) and Mason (2002). In all three authors this foregrounding of the personal can at times read more like a description of aesthetic rather than scientific experience; and I have found it helpful to see these as two different perspectives or lightings on the complex whole that is education. My research interests are in the transformative power of conversation and I conclude by offering a short transcript of classroom dialogue and an initial indication of an instrument for analysing utterances in terms of their logical level.

SCIENCE AND THE AESTHETIC

I am in my second year of a part-time PhD and find myself caught between the dilemma of wanting to 'find something out' that might be useful to others, and my intuitions from teaching that the only person I can hope to try and change is myself. I associate the former view of education with a 'scientific' stance - the hope that researchers may be able to build on each other's work and that, as teachers, we may be able to 'stand on the shoulders of giants' in our work in classrooms.

I first came across the notion of a science of education through the work of Caleb Gattegno. In 1987 he published 'The Science of Education', in some respects the culmination of his life work. Gattegno urged all teachers to become scientists of education through the application of 'watchfulness'. He felt that all Sciences start with an awareness (e.g., Chemistry began with the awareness that materials could be analysed according to their molecular composition). The foundation of this new science of education was to be the awareness of awareness itself. These were remarkable ideas from an era when consciousness was almost a dirty word in academic circles. Psychology was only just removing the shackles of behaviourism, and the dominant approach to education research for most of Gattegno's life was statistical and positivist (for a brief historical review see Coles, 2007).

Gattegno referred to himself as a 'technician' of education (in opposition, I imagine, to a philosopher or researcher). Whilst his ideas were in vogue in some parts of the world in the 1960's and 70's (he was featured in 'Time Magazine' in 1964, for example) his legacy in Mathematics education in the UK seems limited. His writing is notoriously hard to interpret, he developed his own vocabulary for the different aspects of the 'self', and it can be difficult to access his ideas without the support of others more experienced in working with his ideas. Gattegno gives the impression of being in such a different place, with such developed awarenesses about himself and others, that what perhaps to him seemed verifiable and scientific is, to many,

impenetrable. To engage with Gattegno's 'Science' in practice has, in my experience, entailed a personal transformation.

In this conception of science, knowledge is lived and cannot be disassociated from the knower. Dewey (1929) in similar vein called for a Science of Education which would not be seen in opposition to the view that teaching is an Art.

It is very easy for science to be regarded as a guarantee that goes with the sale of goods rather than as a light to the eyes and a lamp to the feet. (p.15)

If we retain the word "rule" at all, we must say that scientific results furnish a rule for the conduct of *observations and inquiries*, not a rule for overt action. They function not directly with respect to practice and its results, but indirectly, through the medium of an altered mental attitude. (p.30)

Even the 'accepted' findings of 'hard science' have to be re-created in the practice of each new scientist. We perhaps can be blinded to this personal dimension of science through the embodiment and embedding of ideas within a culture, meaning that practices can become accepted unthinkingly.

Mason (2002) also takes a personal view of the progress of education research. His 'discipline of noticing' explicitly foregrounds personal transformation as the key aspect of taking part in research. He coined the phrase 'researching from the inside' (Mason, 2002, p.204), which I see as consistent with Gattegno's sense that the science of education is about the development of awareness.

What is important in qualitative research in general, and in researching from the inside in particular, is not the validity or accuracy of the description, but the effect; the action that the description sets up inside others. (Mason, 2002, p.229)

The importance of something being defined by its effect inside others is a feature more usually associated with aesthetic rather than scientific experience. Again, the personal and transformative aspects of the process of research are to the fore. I cannot help feeling that an 'Aesthetics of Education' is perhaps a more telling description of the line of enquiry I have traced through Dewey, Gattegno and Mason than a 'Science of Education'. However, to use the word 'aesthetic' in this way would entail an expansion of meaning to areas outside the Arts; which Dewey (1934) in fact called for. He stated the aim of his (1934) book was:

to restore continuity between the refined and intensified forms of experience that are works of art and the everyday events, doings, and sufferings that are universally recognized to constitute experience. (p.2)

He wanted to broaden the range of what might be considered 'Art' and hence the range of activities in which we might say we are aesthetically engaged, to include:

[t]he intelligent mechanic engaged in his job, interested in doing well and finding satisfaction in his handiwork, caring for his materials and tools with genuine affection (p.4)

I take an aesthetic experience, then, to denote either of the following:

- an experience in which I am engaged in a task to the point where I lose self-consciousness; all my attention is absorbed in what I am doing.
- an experience of transformation; *e.g.*, I gain an awareness, my perception is altered.

I am suggesting here that the aesthetic is a personal experience or transformation, and that as awarenesses become verified or shared there can be a move to a more social 'science'. Aesthetic and scientific viewpoints offer two contrasting lightings on the complex whole that is education. The aesthetic dimension privileges the personal and transformative; the scientific privileges the social and verifiable.

AESTHETICS AND METHODOLOGY

The implications of taking an aesthetic view of research continue some of the themes of Coles (2007), in which I concluded:

I am reminded of Dick Tahta (personal communication) talking once about the 'psycho-analytic turn' in which one becomes more interested in why it is individuals take certain ideas as truth than in the actual 'truth' they are expounding. The question changes from: 'What is true?' to 'What is it in our histories or experiences that make certain ideas, methods or explanations appealing to us?'. (p. 23)

It might be easy to read this quotation as an abandonment of any possibility of progress in Mathematics Education. If we give up an interest in the 'truth' then what is the point of research? How can we build on each other's work unless we have some criteria for evaluating research – and what criteria will we use, if not linked to 'truth'? In a neuro-science laboratory, for example, the personal histories of the researchers would rarely be reported in disseminating results – why should education be different?

The questions above seem to me pertinent and important, but ones I wish to challenge. In the case, say, of a neuro-science laboratory, there are, at present, very many different research agendas tackling the issue of human consciousness and brain functioning. It seems highly unlikely that any one current research programme will provide all the answers to consciousness. Indeed I am not sure the concept of one 'truth' about consciousness and the brain even makes sense. What does seem to me the case is that different researchers develop different instruments and methods, which slice up the phenomena in certain ways that are more or less productive. Others are able to use these instruments and methods to validate findings and develop explanations and theories. What survives and spreads is what is useful.

In an education context, it seems less clear what our instruments are, at least for qualitative research. In the collecting of data there are some widely used techniques, *e.g.*, audio or video recordings, interviews, questionnaires, standard tests; and these may be seen as instruments. Gattegno, of course, envisaged the watchfulness of the teacher as the key research instrument. At the session in Manchester there seemed

agreement amongst the audience that, for example, the BSRLM community does not have any agreed and reliable instruments; but also no surprise in this, in that Mathematics Education is very broad and has always drawn widely from other fields.

I have recently had experience within the field of Conversation Analysis in which there *are* some tried and accepted methods, at least amongst users (see e.g. Rampton, 2006). Conversation analysis looks in great detail at small sections of dialogue; a key method, accepted as reliable within this field is to consider the question: ‘what else might have been done here but wasn’t?’. What I find striking is that such an instrument details a way of *using myself*; in Gattegno’s language, this is a technique for becoming watchful. It is not a method that can be followed in a mechanical way, but suggests instead a question that invites a watchful attention to detail that analysts believe reliably leads to an awareness about the text.

In contrast, I have frequently read or heard about research where theoretical frames, methodology and methods are meticulously set out, and yet still being left in the dark about what researchers actually did to arrive at their abstractions.

As I concluded in Coles (2007):

It is perhaps unsurprising that I am finding myself increasingly drawn to narrative approaches to research and feel increasingly that accounting for what in our own histories has drawn us to certain ideas, approaches or interests is crucial in being able to interpret each others’ work. (p. 23)

It seems easy to sign ourselves up to a theoretical position and gloss over issues of whether the way we act is consistent with such beliefs.

What I am articulating here is, in part, my belief in the importance of what Bruner (1990) termed 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 (p. 16).

Reading the quotation in reflexive spirit, I take this as a comment about the central plank of the research process, *i.e.*, the need to account for how our beliefs inform what we do. However Bruner goes on to state the need to reverse this direction of accounting, and muses:

... how curious that there are so few studies that (ask): how does what one does reveal what one thinks and believes (p. 17)

An aesthetic take on the reporting of qualitative research, might include an account of how what we do (and have done) informs us about what we think and believe. Paradoxically, I think a more aesthetic approach to research reporting, with an account of lived experience and personal transformations, would help me validate findings and results, as I could attempt to use myself in similar ways.

INTO THE CLASSROOM

The tension between the aesthetic and scientific resurfaces again, for me, when it comes to studying classroom interaction. As a teacher, I have long been convinced of the importance of classroom discussion; in terms of generating engagement and commitment to activities, in terms of shaping classroom culture and in terms of driving individual learning. One of my research interests is in trying to say something about how and when classroom discussion ‘takes off’ – is it possible to capture in a transcript when individuals make connections, or ideas get sparked? Do these discussions have the influence I think they do? In my Masters’ dissertation, I analysed the listening of the teacher and developed from Davis (1996) the notion of ‘transformative listening’ (Coles, 2001). This notion was an attempt to say something about the state of mind of the teacher when utterances from students are not evaluated or even interpreted; but instead given space so that they may be heard by others, may alter the direction of a lesson, may alter the teacher’s ideas.

The aesthetic dimension is present in these interests, in that I am interested in moments of personal transformation. However, in analysing classroom data I want to find a (scientific) tool or instrument that others will be able to validate. I have been struck by some apparent similarities in teacher discussions and classroom dialogue to do with patterns around points where either discussion become transformative.

Laurinda Brown and I have written before about ‘metacommenting’ in classrooms (e.g. Coles and Brown, 1999), and the effect of this level of dialogue in giving students a purpose to their work. I have been experimenting with analysing utterances into their ‘logical’ level and have developed the following classification.

At level 0 utterances are descriptions or direct responses, or questions. If utterances at this level can be verified or not, this will generally be done by observation.

At level 1 utterances may be generalisations from level 0 observations, e.g. the description of a pattern in level 0 observations. Responses at this level are *about* rather than *to* what has just been said.

At level 2 utterances are generalisations from level 1, e.g. the description of a pattern in level 1 observations.

In the session in Manchester I shared briefly with participants sections dialogue in which I had applied this classification, one of which is, in part, below. See Note 1 for an explanation of how the table is constructed.

A year 7 class had been working on a problem in which a disagreement had arisen about whether to leave in a zero on the left of an answer half way through a process. In the context of the problem leaving the zero in or not led to different final answers.

T/S	L	Utterance
T	1	What are we going to do about this, because this feels like it might be something we are going to have to sort out. So Natasha's going, ‘if we

		always put a zero in then we'll always get 1089'. Georgie [Teacher gestures to student]
S7	1	When you actually do the sum first and you come up with 099, I reckon you should actually leave the oh on because that's the answer you come up with. It's like doing 4 take away 2 and saying 'Oh, I'm not going to use 2, I'm going to use 3'. It's changing the sum.
T	0	Okay, any thoughts on that? Johnny
S8	1	No, because even if you done something to the zero it's still the same number, ninety nine, and in the sum you're only using ninety nine and not nine hundred and ninety as well as 099 [Teacher gestures to another student]
S9	0	I was going to say the same thing as Johnny
T	2	So, I think what you need to be clear about as somebody working on mathematics as a mathematician; you need to decide what you're going to do and be consistently about that. Amy, you're feeling strongly you need to leave the zero in; you might not feel strongly you need to keep the zero in. Natasha's conjecture might not apply to your rules. So when we're making conjectures we need to be clear about the rules we're using, I suppose; so you might want to add on to your conjecture; Natasha's, 'this is when you leave the zero's' or something like that. Could anybody adapt this conjecture if they didn't want to leave the zero in?

What I find striking is that the level 2 utterance is preceded by a succession of level 1 comments by the students. I have observed exactly this pattern in discussions between teachers and also other sections of classroom dialogue. It is as though dialogue cannot make a double jump in levels of abstraction. There have to be the level 1 comments around to allow a level 2 generalisation to be made. My conjecture is that these level 2 utterances are important factors in sustaining the mathematical orientation of a classroom community. I will report further on these ideas in the future.

NOTES

1. T/S indicates whether a teacher or student is speaking. Square brackets are used to indicate gestures. The L column indicates my analysis of the highest logical level of each utterance.

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