

# MATHEMATICS TEACHING AND THE RESEARCH PROCESS: AN ETHICAL CONVERSATION

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*Alf Coles is at the start of his PhD studies at the University of Bristol, Graduate School of Education (GSoE). He is also head of mathematics in a nearby school for students from 11-18 years old. Before moving to the University of Ottawa, in Canada, Richard Barwell worked at the GSoE, where he had the role of ethics co-ordinator. The GSoE uses 'ethical conversations' to support researchers in considering ethical issues in their research. Any researcher (including doctoral students) putting together a research project is encouraged to meet with the ethics co-ordinator or another colleague to discuss the ethical issues that may arise. Laurinda Brown invited Alf and Richard to have a public version of an ethical conversation in relation to Alf's ideas for his doctoral study, wondering what implications might arise for the teaching and learning of mathematics.*

*Richard:* The idea of an ethical conversation is to support you in thinking about ethical aspects of the research you are planning. Such thinking could be done by a researcher following a checklist or a set of guidelines. While such things can be useful, they can also be rather solitary. A conversation involves dialogue: it is a way of interacting with a community of researchers. Conversations invite the researcher to articulate their thinking and therefore to clarify the details of what they want to do and, importantly, why they want to do it. Articulating and clarifying such principles can be seen as part of an ethical approach to research. One basic purpose, then, is to identify ethical issues that may arise in your project and to discuss possible strategies with which to address them. For me, however, a deeper aim is for both of us to develop a greater ethical awareness in how we think about and conduct our research on a day-to-day basis. A good place for us to begin would be for you to describe your research.

*Alf:* I want to study the listening in mathematics classrooms. I am interested in relationships between the listening of the teacher, any teaching strategies used, the listening and participation of the students and the learning of the students. I will be focusing only on periods of whole-class discussion in lessons. We have an established practice in my department of watching videotapes of each other teach and discussing what teaching strategies we observed. I also want to study the listening during these departmental meetings.

*Richard:* Could you say a bit about what you mean by listening, and why you are interested in it? It's helpful for me to understand what you're working on, since that's what the participants will be getting involved with.

*Alf:* As a teacher it has always seemed to me that the most powerful learning experiences with a class are the times when whole-class discussions move to being directly between students. One person will pick up on what another one says or question it or challenge it; a difference becomes apparent and there are energised contributions as students try to resolve things. I see these discussions as transformational. In my master's dissertation, I analysed sections of classroom dialogue when the teacher-student-teacher pattern broke down. What was going on during episodes of student-student interaction? What was the role of the teacher? There seemed to be a distinction between teachers listening to students in an evaluative manner, where contributions were responded to with a judgment (generally right/wrong), and teachers listening in a manner where contributions were received more openly. It was striking that I never found a section of student-student dialogue following the teacher listening in an evaluative manner; *i.e.*, all student-student interactions followed some 'non-evaluative' intervention from the teacher.

*Richard:* So, to investigate listening, what data will you collect?

*Alf:* I plan, over one academic year, to take videotapes of up to six teachers teaching six lessons each, mainly to the year 7 (11- to 12-year-old) students. I also intend to audio-record six meetings of the whole mathematics department where we will discuss excerpts from these lesson videotapes.

*Richard:* I make that thirty-six lessons altogether. That's quite a lot.

*Alf:* Yes, perhaps unfeasibly many - I'd actually be happy to cut down the number of teachers, but it would be important for me to get snapshots of lessons throughout the year to track how the classroom culture develops, so six lessons for each teacher would be needed.

*Richard:* From the way you write, I suspect you find your research extremely interesting. What do your colleagues or your students make of what you're doing? You mentioned that you've talked to them about it to some extent - what do they think?

*Alf:* A good question. I audio-taped three or four meetings last year - telling people not much more than that it was for my PhD. They indulge me I think, with no real idea of what the tapes might be used for. Most members of staff are happy to be videotaped, though not all. They can choose to be part of this or not. Students seem to ignore the video camera after

the first or second time. There is always a bit of waving at the camera, but other than that I haven't detected any particular change in behaviour. My research has helped me develop the way I work with staff and students.

*Richard:* I suspect many researchers would be a little surprised at your response and want to talk about the idea of *informed consent*. From what you say, your colleagues and students (*i.e.*, the participants in the research) are not 'fully' informed about what you are doing in the research, or what you do with the recordings that you make. On the other hand, I take it that, in your last comment, you mean that your research has had a positive, beneficial effect on your work and, consequently, on the learning and teaching of mathematics in your department. I wonder, then, what you think of the following extract from the *Revised ethical guidelines for educational research* (2004) adopted by the British Educational Research Association:

Researchers must take the steps necessary to ensure that all participants in the research understand the process in which they are to be engaged, including why their participation is necessary, how it will be used and how and to whom it will be reported (p. 5)

*Alf:* I am confident, as you picked up, that my research role has had and will continue to have a beneficial impact on my students and colleagues – and therefore also on my colleagues' students. The fact that I audio- or video-record lessons and meetings means I am able to operate with full attention on my role as teacher or chair. The recordings allow me to interrogate and reflect after the event. My problem is that I don't know how I can 'ensure' anyone understands anything. I am not sure what my 11-year-old students have made of being told that some transcripts, of which they are a part, form the data for papers that may be given to mathematics educators at conferences around the world. If I wanted students to connect with what this means I would get some images of conference venues, programmes, research reports – perhaps show them some small clips of their own video recordings.

*Richard:* That sounds like an interesting way to 'inform' students although in effect you would be educating them about the world of educational research. Furthermore, it seems to me that any participants' understanding of research is going to develop over time. Your idea seems more oriented to starting a conversation with the students which could be returned to in future; not so much informing as talking. Your focus, however, is on the practicalities of the conferences and publications. Couldn't you also offer your students and colleagues a conversation about what you're working on?

*Alf:* You may be right about talking with participants about what my focus is, which I have done to some extent with the teachers. But this is where I come up against a problem: I do not want to provoke any awareness that might get in the way of students engaging in the mathematics, or teachers engaging in discussion of the videotapes. That feels un-ethical. So, for example, if I told students that I am particularly interested in what happens during times in the lesson when they start responding to each other, I fear that might get in the way, for some, of them actually engaging

in the discussion itself. Likewise, I wonder what it would do to departmental discussions if I said I was recording in order to study what the issues are around a conversation becoming transformational. The last thing I would want is for the teachers or students to feel like they have to get into a certain type of discussion. I feel a bit as though I am researching the unsayable anyway when it comes to issues to do with how discussions become transformative. I really wouldn't want to draw students' or teachers' attention to my behaviour. I have told students I am studying myself and investigating the process of teaching and learning mathematics. I have hesitated to give much more detail.

*Richard:* What, then, does doing research ethically mean for you?

*Alf:* I know that in a classroom the thing I most strongly object to with observers is if, say, they start asking questions like: "Did you come up with that question or was that given to you?" or "Do you know what National Curriculum level you are working at?" or any question that seems to be coming from a different place to this classroom and what we observe here, *i.e.*, where it is clear the questioner is not engaged with the task of the lesson. And this comes back to my concerns in my last comment about not wanting to provoke, through research, an unhelpful level of awareness about the process students are going through (and whether it is, for example, unusual).

I also find it unethical when I read research that is basically pretty damning of what has been observed. Researchers have to make distinctions about what they interpret but these do not have to be judgemental, like daggers in the back. In a small book that has influenced my thinking in many ways, Varela (1999) talks about ethical "know-how":

praxis is what ethical learning is all about [ ] if we do not practice transformation, we will never attain the highest degree of ethical expertise (p. 63)

Being open to transformation and change myself places me out of a judgmental and evaluative stance towards the object of my research.

*Richard:* What you describe seems close to the idea of "ethical mindfulness", which a colleague at the GSoE, Tim Bond, talks about. This idea is more about a "way of being" that takes account of others' concerns, rather than checking a set of guidelines and discussing things with the participants at some point. Doing research in schools is much too complex for the latter approach to account for every conceivable occurrence. Let me give an example. A few years ago I was sitting in a year 5 (students aged 9-10 years) mathematics lesson and the teacher was introducing some work on dimensions. She rehearsed a few bits of vocabulary with the aid of a set of plastic shapes, including words like length, width and thickness. She also asked the students to think about the difference between 2-D and 3-D shapes. At some point, a student asked her a question she couldn't answer – I think it was something like, *What's a 1-D shape?* She looked at me and asked if I knew. How would you respond? There are many possible responses. One would be about being a researcher, an observer, not a participant, and to avoid answering. Another would be to give a quick explanation to

the teacher. A third would be to say that the concept is not in the year 5 curriculum and therefore not relevant. What happened was that I got into a short public discussion with the student that went on to consider 0-D shapes as well. It was one of those moments where everyone in the room was thinking together. What does this have to do with ethics? Well, for me, the choice of action I have presented has an ethical dimension. I guess the underlying reason for what I did is a concern with the mathematical thinking and learning going on, which takes priority over any research protocol (such as 'not participating'). It is not possible *in situ* to think through how to respond, hence the need for an ethically 'mindful' approach; it has to be in what we do, in our *praxis*, to use Varela's term.

*Alf:* Yes, I have been helped to get at some of my implicit ethical beliefs by writing, recently, about my work with student-teachers. I am aware, in lessons, of trying to notice any judgements that arise in me (taking judgement to mean something that carries a negative evaluation) and using them to track back to where there was a 'difference' compared to what I might have been expecting (as I believe it is always possible to do). This difference, I find, can then be offered to the student-teacher without attachment to the negative evaluation. I have got underneath an unthinking reaction and am able to share professionally in a dialogue about possibilities for action. This, for me, is about an ethical stance of trying to be, as far as possible, alongside the student-teacher. This helped me realise that I bring the same beliefs, to some extent, to my work with students. If someone gives an answer in a class that could be judged as 'wrong' I try and avoid the use of that word in my response. I believe that all 'wrong' means is that, either a slip has been made (*e.g.*, in a calculation) or, more usually, the student has been operating under a different set of assumptions. So, for example, in a first lesson with a class I will often play a name game and get students to try and work out how many names have been said. For the game I play, this involves working out  $1 + 2 + 3 + \dots$  up to, say, 28 if there are that many in the class. Someone almost always gives  $28 \times 28$  as a quick way of calculating this total. I am aware of usually responding to this by asking what would have had to happen if  $28 \times 28$  was the total number of names said (*i.e.*, everyone saying everyone else's name). So  $28 \times 28$  is a helpful answer that, in fact, solves a slightly different problem. 'Wrong' comes down to 'different' again, and I believe that working together as a class to get to where this difference lies both provokes important mathematical thinking and helps cultivate a classroom culture in which students value and respect what each other have to say.

My approach to managing classroom talk is not, I believe, altered by researching it. In fact, if anything, I think I become more aware of avoiding my own evaluative stance. So this isn't so much the ethics of a dialogue about the research but the ethics of the dialogues themselves.

*Richard:* That's a nice distinction you make. I can also see how the ethics of dialogue are related to what you say about listening. The link I am making is that non-evaluative listening is ethical, since it makes space for students to hear each other and to interact with each other's ideas, whereas evaluative listening generally silences students' thinking. I

think this fits with my dimensions example. If I'd responded strictly as a researcher (I'm not participating), that feels evaluative (this is an inappropriate invitation to speak). I could also have been concerned with the 'correctness' or otherwise of the mathematics being discussed. My response, however, was more non-evaluative, in that I offered something to allow the participants to continue to think: I asked the student what he thought about his own question.

Your image, of being alongside a student-teacher, also resonated. In the same research that I've just mentioned, I spent many mornings in the same teacher's mathematics lessons. Sometimes we would discuss the lessons, usually initiated by the teacher. I felt strongly that I should not be evaluating the mathematics lessons that I saw, as much from a sense of how I would feel about having a 'researcher' visiting my own classroom. Indeed I presented myself as being as much a teacher as a researcher. And I would contribute to discussions more by sharing observations – things I had noticed, such as a student counting in Chinese or on her fingers in a particular way or how a student had been particularly engaged by a problem – rather than making evaluative statements. This approach was largely intuitive, but seems to fit with the ethics of dialogue you are talking about. I find this helpful, actually, since I have struggled to find a way to articulate (for myself) a way of doing observational research in mathematics classrooms that is sensitive to and supportive of the teacher.

Are there limits, though? Situations in which you do become evaluative? If, for example, a student laughs at another student's idea? I suspect you would call that out of order.

*Alf:* Ha, a good example, for me. With my year 7 classes at the start of the year I try to be at my most terrifying towards the slightest comment that I perceive to be, for example: personal, rude, vindictive or bullying. I will also make a big deal out of this to the whole class. I know that I will notice personal comments and I know that I will always be motivated to do something about them – it is the one classroom rule that I talk about in my first lesson with a year 7 class. I am reminded of Maturana's (1988) concept of *domains of experience*. I guess that I appear to operate a strict distinction between two *domains of dialogue*. Contributions in one domain receive negative evaluations and in the other one, I hope, contributions are heard non-evaluatively. I know I used to resist establishing such sharp boundaries, but it feels not dissimilar to what I will do in teacher's meetings. For example, if we are watching a video clip from a lesson and the task is initially to reconstruct what happened, I will interrupt and stop anyone who begins on an interpretation. If a student-teacher was rude about students in their class I think I might similarly comment evaluatively.

Whilst at first appearing (to me) at odds with what I said previously about the ethics of how I try to be in a dialogue, writing this makes it seem more consistent. As the chair of the discussion, I have some responsibility towards people's time and experience. I know, from my own experience, that teachers moving to interpretation straight away will minimise what's 'new' that can be seen from a video (if you like, moving straight to interpretation precludes the possibility of being able to draw new and different distinctions from the

ones we are used to); and likewise I have seen the negative effects on classroom culture of personal comments between students becoming an accepted mode of dialogue. Gattegno (1971, p. 64) talks about living in terms of exchanging time for experience and this occasionally weighs heavily on me as a teacher – the (ethical) need to ensure I am doing all I can to make this exchange as transformative as possible.

So, yes, I think I would say that part of my ethics of dialogue would in fact always be to have a clear idea of what is/are acceptable domains of dialogue, being explicit about this to participants and taking responsibility to act to support these distinctions. And this, in fact, links back to a previous part of our conversation. I am ambivalent about the acceptability in my classroom of the domain of dialogue of my research!

*Richard:* Perhaps there are different levels of ethical behaviour. There is a primary level of interaction, in which participants work on what they see and discuss. Being ethical at this level is about listening non-evaluatively so that participants are able to share what they see, whether about a mathematical situation or about an example of someone else's teaching. The teacher or facilitator is also working at a secondary level, prescribing some boundaries around the domains of dialogue that are admissible. To do this, they have to observe the primary level of interaction, and act evaluatively to enforce the boundaries. At this level, the ethics feel different and carry a degree of responsibility. Tim Bond, again in conversation, has argued that ethical behaviour comes down to trust. The students have to trust their teacher to set appropriate boundaries, for example. You imply that, for you, these boundaries arise from distinctions that you make between evaluative and non-evaluative contributions. Presumably, over time, the participants also get used to these boundaries and learn to make similar distinctions. Indeed, to be able to contribute appropriately, they would need a sense of the distinction you are making. Perhaps embarking on researching all of this adds a third level, though I'm not sure if I can articulate that one.

In my example, I did have some such boundaries. From time to time, students would ask me what I was writing or doing, for example, which I would deflect or ignore, being more interested in the mathematics they were doing. Interestingly, when I first visited a class, the teacher would make

some introduction and explain that I was doing research and there was some discussion about what that meant. I don't think it actually made much difference to anything. Given that I visited the class over an extended period and that the first few weeks or months were largely exploratory, students got to know me through what I did and how we interacted, rather than what was said at the start.

*Alf:* I want to pick up on your comment that what was said at the start of your work as a researcher in the classroom probably made little difference, and that what mattered was what you did and how you interacted. This seems absolutely right to me and links to Varela's sense of being open to transformation.

I'm not sure where all this leaves informed consent.

*Richard:* I would trace that part of the conversation back to me throwing in the reference to the BERA guidelines. My intention at that point was to point out that the community of educational researchers in the UK has a position on ethics, and being interested to know how you would respond to it in the light of your earlier comments. It seems to me that there are two rather different ways of thinking about ethics emerging in our conversation, based on two rather different ways of thinking about research in education, indeed on two rather different epistemologies. So the BERA guidelines, for example, talk about participants "understanding the process [of research]", whereas, for you, I suspect that this would involve a poor "exchange of time for experience". I think on reflection that one's approach to the ethics of research is a part of one's epistemological approach. Problems may arise, however, where different approaches bump into each other. How any differences are resolved would depend on the openness and flexibility with which research ethics are overseen.

## References

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- Maturana, H. (1988) 'Reality: the search for objectivity or the quest for a compelling argument', *The Irish Journal of Psychology* 9, 25-82
- Varela, F. (1999) *Ethical know-how: action, wisdom and cognition*, Stanford, CA, Stanford University Press

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My way of working is to let a challenge mold me, take the time the challenge needs to express itself through me, and integrate whatever things I have read or heard that help me understand where I am in my search of the challenge. Of course, I know that one must attribute to previous investigators what they formulated on our behalf. I also know that all this social etiquette is not essential or even of paramount importance when one is working on vital matters – and that there will be scores of critics who love the job of matching investigators and investigations and who are able to perform this job.

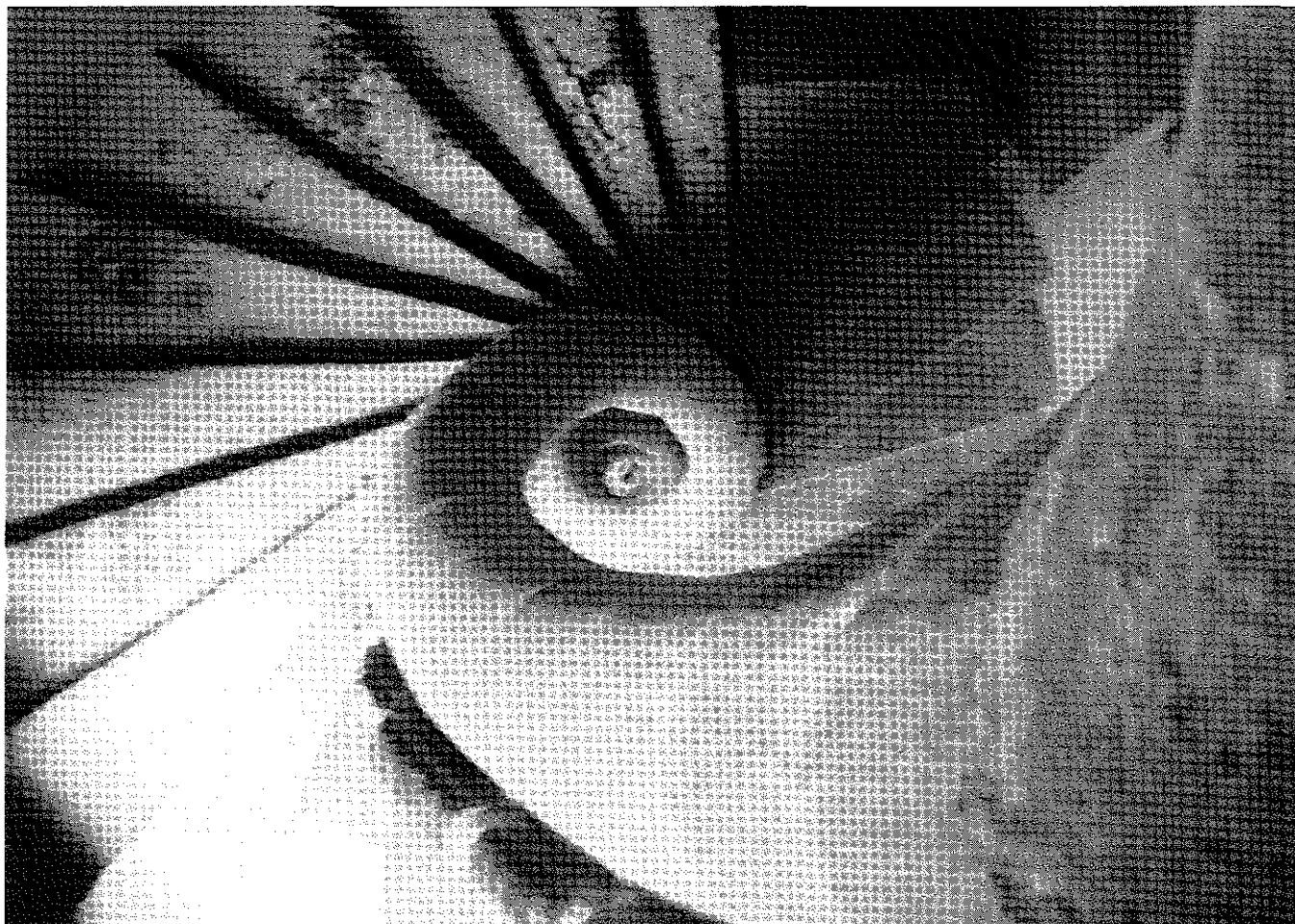
What matters to me is that more light be placed on a question and that the question, after I spend some time intimately related to it, tells me what to say and write.

(Gattegno, C., 1988, *The mind teaches the brain*, p. vii)

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# ATTENDING

DAVID PIMM, LAURINDA BROWN



*Laurinda:* This last issue of my editorship is special, or at least different. On August 3rd, 2006, I sent an e-message to a range of advisory board members, each paired with another, inviting them to have conversations on suggested topics as a stimulus to producing eventual pieces of writing, some of which are included here (crows reporting on new mud) We had such a conversation, *Transforming*, FLM 23(3), which appeared in my first issue as editor having taken over from you.

*David:* I've just re-read that piece, which I find is quite autobiographical, but it also focused on some technical issues about what is involved in editing a journal. Do you have some observations four years later, looking back on your time as editor?

*Laurinda:* On the inside-front cover of FLM, one stated aim is "to generate productive discussion". I was struck when we wrote *Transforming* by the awareness you had of David Wheeler knowing "how little echo there was to be heard". I can remember trying to set up structures so that there would be more potential for responses from readers. Where possible, I have tried to publish articles as pairs, so that they speak to each other in some way. I have also aimed to publish a conversation in each issue of the journal as a response to Barton's comment in 23(3) on why he liked an interview between Ascher and D'Ambrosio in 14(2):

One of the things that we as mathematics educators do not do enough of, it seems to me, is to expose ourselves in the formation of our ideas, theories, [...] two senior