

Using video for mathematics  
teacher development:  
the role of errors and judgment

Dr Alf Coles

University of Bristol, UK



Two birds, close yoked companions,  
Both clasp the self-same tree.  
One eats of the sweet fruit,  
The other looks on without eating.

John Mason

# Introduction

- My aim in this session is to share my own experiences facilitating the learning of other teachers using video.
- I have been using video with teachers for 20 years and hope to share some of this learning and some reflections on the process of learning to facilitate.

# What we know ...

- Using video can be a powerful vehicle for change.
- Robertson's videos in the 1950s changed UK policy around mothers in hospital almost over-night.
- But ... it is hard to use video effectively in the context of learning about teaching!

# And we also know ...

- ‘For facilitators, it is no easy task to decide what to say when, and how much information to provide ... The avenues by which facilitators can acquire this knowledge are by no means clear. This is a serious issue of capacity building’ (Goldman, 2001, p.36-7)

# For example: mimicking

- If we become too explicit about what we want in discussion, there is a danger of teachers mimicking (Gaudin & Chalies, 2015) rather than speaking from their experience.
- In Piaget's analysis of children he made a distinction between 'genuine' reflections and e.g., repetition of the words of others; perhaps this distinction is important in our work with teachers also.

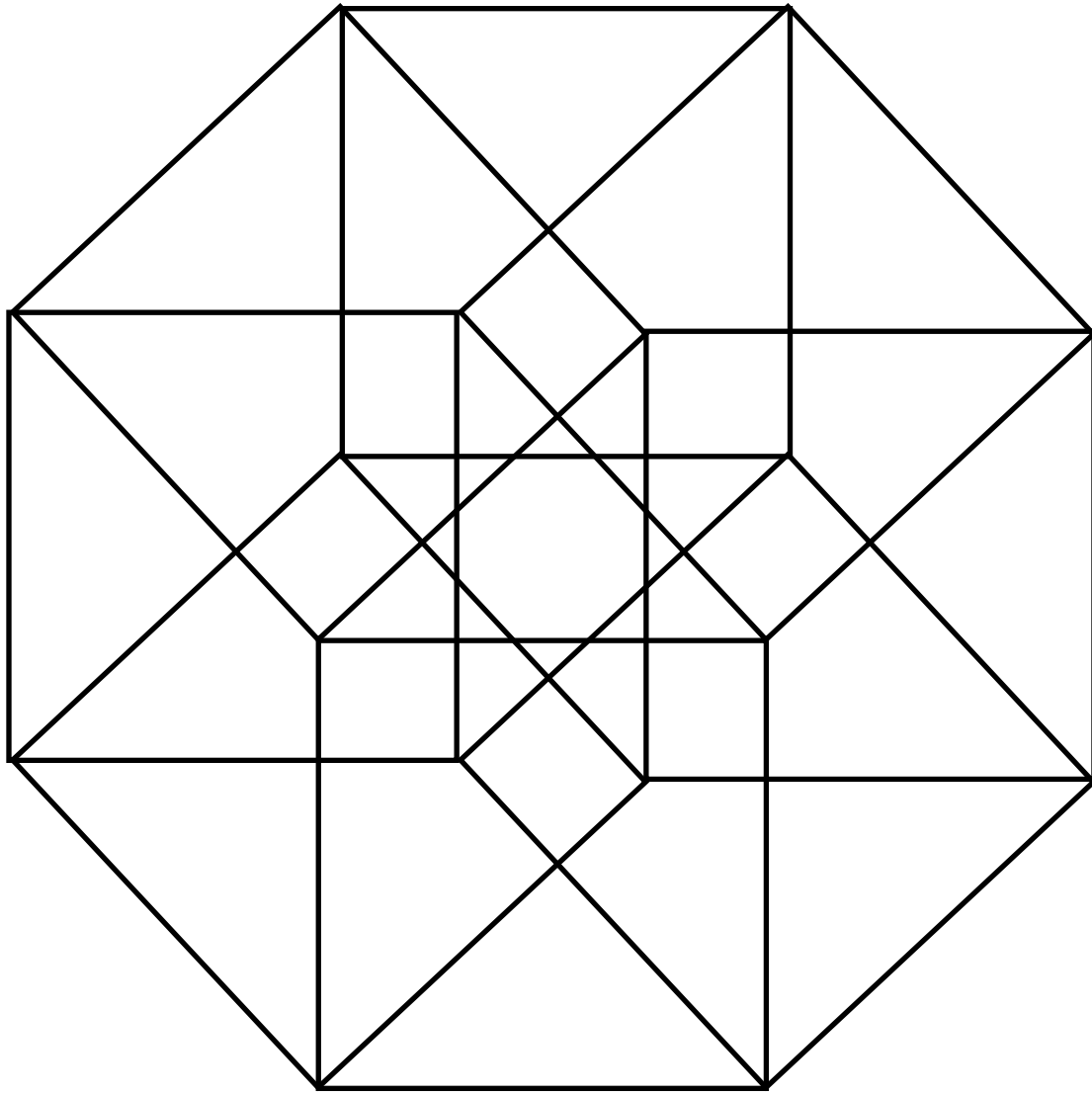
# Nested learnings ...

- Students learning *about* mathematics
- Teachers learning *about* students' learning *about* mathematics
- Facilitators learning *about* teachers' learning *about* students' learning *about* mathematics
- Us learning *about* facilitators learning *about* teachers' learning *about* students' learning *about* mathematics

# Complexity

- The situation seems highly complex.
- Are there any simplifying insights?
- Is there anything the same about the learning across all those contexts?
- I will be offering three conceptions of learning and suggest each one is applicable at every level.





# Re-seeing

- At moments of insight, we re-see, re-think, re-cognize what we have been attending to.
- ‘all genuine understanding is a form of seeing-as’ (Zwicky, 2014, §3)
- I want to suggest that this movement – of experiencing something *differently to before* – can be observed in moments of insight at each level of the hierarchy.

# What insights are needed as a facilitator?

- Have we experienced the kinds of discussion we want to generate?
- Have we done some work to re-see these discussions, not as a participant, but as a facilitator?
- Do we have any mechanisms for shifting discussion out of places we do not want and into places we do want?

# Re-seeing discussions

- 'I couldn't do that with my pupils, they can't work quietly enough'
- 'I could never do that — I just don't have the right sort of personality' (Jaworski, 1990, p.63)
- 'I couldn't stop watching, thinking of ... all the children who weren't paying attention' (Coles, 2016)

# Listening

- As a facilitator, if I am going to try and develop skills and habits around managing discussion I need to have some categories and distinctions.
- I need to hear the content of what is said AND I need to hear the *kind* of content that is said, in order to develop some responses to particular *kinds* of contribution.

# A way of working

- We have developed mechanisms to help get discussion norms established from the very beginning of working with a group.
- This way of working developed out of Caleb Gattegno's use of film and images in learning mathematics.
- We have developed a website to support facilitators: <http://mathsvideoclubs.ac.uk>

# A way of working – part 1

- We work with volunteer teachers who meet fortnightly for twilight sessions over 3 months.
- Groups are no more than 10.
- Group members vary from new teachers to senior teachers who are there to learn about facilitating.
- Video clips are 3 to 4 minutes long and continuous.
- The way of working is split into two distinct sections: a *reconstruction phase* and an *analysis phase*.

# Distinctions in this first stage

- *Grounded Narrative* aims to articulate descriptions of classroom events
- *Evaluative Discourse* centres on the values, virtues and commitments in play
- The facilitator in the first stage works with the group to keep the talk in a *grounded narrative*.



# “Do as I say but not as I do”?

- Part of a grounded narrative is the avoidance of judgment, in the sense of negative (or positive) evaluations.
- And yet, the facilitator uses explicit judgments (‘that is not what we are doing now’) in order to force discussion into a grounded narrative.
- It appears that judgment is introduced in the dialogue in order to remove judgment from dialogue.

# Theorising learning

- Bateson (1972) distinguished between ‘levels’ of learning and error in animals and humans.
  - Learning I: a change of response to the same stimulus; Pavlovian learning
  - Learning II: a change in approach to Learning I; learning to learn
  - Learning III: a change approach to Learning II; character change
- Learning III is rare in humans and might be seen, for example, in successful therapy.

# Types of error

- Bateson's ideas lead to different types of error:
  - Error I: choosing the wrong option from a set of alternatives
  - Error II: choosing from the wrong set of alternatives

# Different kinds of judgment

- In commenting to teachers that what they say is in the realm of interpretation, the facilitator is reporting that they are making an error in learning II – they are choosing from the wrong set of alternatives.
- The teachers' comments are about choices on the video within a set of alternatives (level I).
- The judgment is at a different logical level to the comment – it is *about* the comment – and so does not cause paradox or tension.

# Feedback from our most recent Bristol-based video club

- ‘From that very first session when we watched that video and I think that’s the one thing I’ve picked up most from this club is understanding how you do what you watch unintentionally’ (Teacher N)
- Teacher N also spoke about how her mentoring work had shifted, from sitting in other teachers’ classrooms thinking “I wouldn’t have done that” to noticing what they did do and being curious.

- ‘Just that judgment, being judged and judging ... After we watched that first [video] ... we were making judgments ... but then that wasn’t really reflection’ (Teacher J)
- ‘At the very beginning I found it so difficult just to be objective and I have realised that this is a direct reflection of how I am in the classroom. I listen to children and sometimes I don’t listen to the question for the question’s sake, and I move it on, trying to keep that pace high.’ (Teacher T)

# Implications

- The focusing of talk into the detail of events is an effective mechanism to shift discussion away from emotional responses that can inhibit opportunities for learning.
- Norms can be established in the first session.
- To establish norms, facilitators must develop some distinctions *about* discussions and be prepared to act on them.

# Way of working – part 2

- Having spent time dwelling in the detail of a clip, reconstructing it and re-watching it, there is then a move into interpretation and analysis.
- What we find consistently is that analysis is rich, detailed, nuanced and overwhelmingly positive, i.e., teachers draw out things they can learn from.



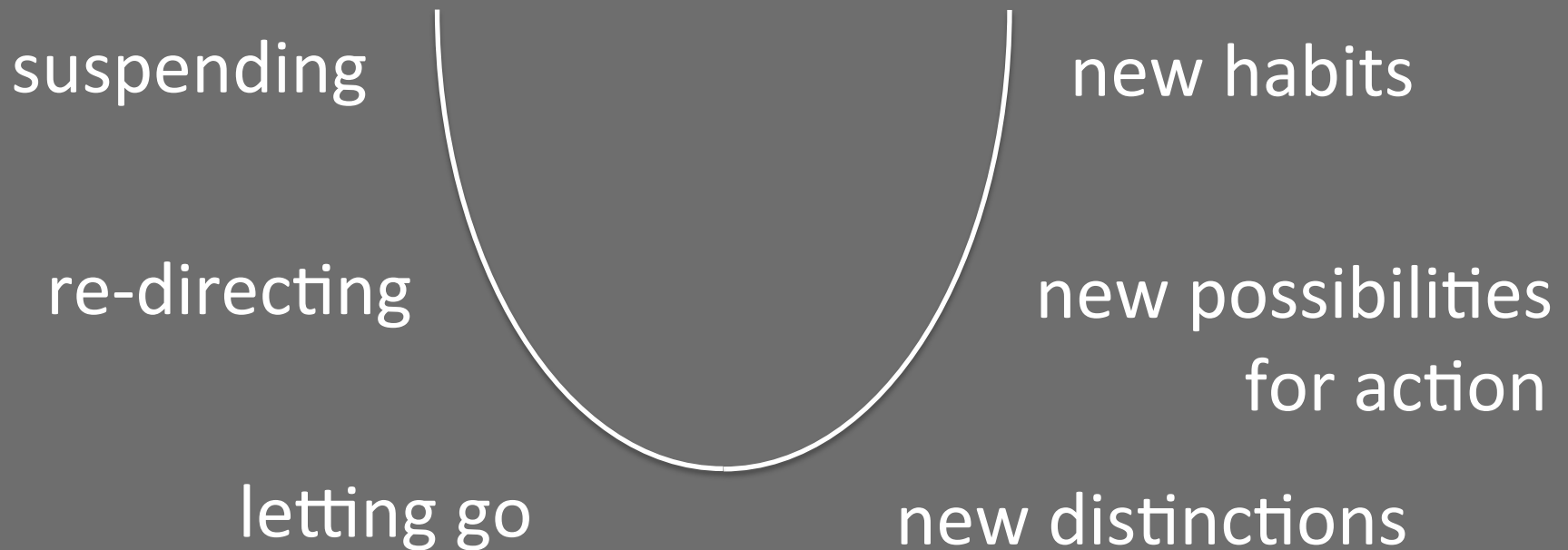
# Drawing out distinctions

- One of the skills of the facilitator is to support teachers, in this analysis phase, to get to new descriptions of events.
- It is from new descriptions that new actions can arise.
- There is a subtle play of getting to a level of generality that can guide actions into the future.

# Listening again

- The facilitator having some distinctions is again crucial in this analysis phase.
- In the audio clip “a good lesson in eliciting” was a potentially general description, you could work on “eliciting” in a range of contexts, but need strategies for *how*.
- “Plan for a difference in response” is an action you could try out / could become habit.

# Change and learning about complex problems



# Implications 1/2

- Gaining new insight, as a teacher or a facilitator, requires descending the 'U'.
- There are many mechanisms to do this – focusing on the detail of events is one of them.
- Working with teachers or facilitators we need to be able to judge when this kind of descent is happening or not and act accordingly.

# Implications 2/2

- Developing new ways of acting (as a teacher or facilitator) involves ascending the 'U'.
- Again, there are many mechanisms to support this – focusing on general labels (or 'purposes') and associated actions is one.
- Working with teachers or facilitators we need to be able to judge when this kind of ascent is happening or not and act accordingly.

# A question for Video LM

- To what extent is there (or would you want) a shared view of when discussions are productive (amongst teachers or amongst facilitators)?
  - might it be useful to work with facilitators to identify and label moments from a video they value?
  - and then to trace what the facilitator on the video had done that seemed to allow or support this?

# Critical professionalism

- Skovsmose (2016), in the context of writing about the need for critical awareness of the use of mathematics for social justice, distinguishes between:
  - professionalism *in doing*
  - professionalism *about doing*

# Double professionalism

- Professionalism *in* teaching mathematics requires professionalism *about* mathematics
- Professionalism *in* facilitating teachers requires professionalism *about* teaching
- Professionalism *in* facilitating facilitators requires professionalism *about* facilitating.





Two birds, close yoked companions,  
Both clasp the self-same tree.  
One eats of the sweet fruit,  
The other looks on without eating.

The image suggests the importance of developing an inner witness which looks on without engaging, but which makes being awake to the world possible.



# References

- Bateson, G. (1972). *Steps to an ecology of mind*. Chicago: University of Chicago Press, 2000.
- Coles, A. (2013). Using video for professional development: The role of the discussion facilitator. *Journal of Mathematics Teacher Education*, 16(3), 165-184.
- Coles, A. (2016). Facilitating discussion of video with teachers of mathematics: the paradox of judgment. In *Proceedings of PME 40*. Hungary: PME.
- Goldman, S. (2001). Professional development in a digital age: Issues and challenges for standards-based reforms. *Interactive Educational Multimedia*, 2, 19–46.
- Gaudin, C., Chalies, S., (2015). Video viewing in teacher education and professional development: a literature review, *Educational Research Review*, doi: 10.1016/j.edurev.2015.06.001
- Jaworski, B. (1990). Video as a tool for teachers' professional development. *Professional development in education*, 16(1), 60-65.
- Nemirovsky, R., Dimattia, C., Ribeiro, B., & Lara-Meloy, T. (2005). Talking about teaching episodes. *Journal of Mathematics Teacher Education*, 8(5), 363–392.
- Piaget, J. (1974). *The grasp of consciousness: action and concept in the young child*. London: Psychology Press, 2015.
- Skovsmose, O. (2016). What could critical mathematics education mean for different groups of students? *For the Learning of Mathematics*, 36(1), 2-7.
- Tahta, D. (1989). Is there a geometric imperative? *Mathematics Teaching*, 129, 20-29.
- Varela, F. & Scharmer, O. (2000). Three gestures of becoming aware. Available at: <https://www.presencing.com/sites/default/files/page-files/Varela-2000.pdf>
- Zwicky, J. (2014). *Wisdom and metaphor*. Edmonton & Calgary: Brush Education.