

LISTENING: A CASE STUDY OF TEACHER CHANGE

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The data for this study is taken from a current research project [1] looking into the development in year 7 students (aged 11-12) of a 'need for algebra' (Brown and Coles, 1999) in four teacher's secondary classrooms in the UK. For this case study I introduce the notions of evaluative, interpretive and transformative listening, (adapted from Davis, 1996), to analyse three transcripts taken from the lessons of one teacher on the project. The project design and case study were informed by ideas of enactivist research (Varela, 1999, Reid, 1996, Brown and Coles, 1999, 2000). A significant change occurred in Teacher A's classroom, as shown in the transcripts, and the listening of both students and teacher became transformative. There is evidence that specific teaching strategies were linked to this change in listening and that once the change occurred the students started asking their own questions within the mathematics.

BACKGROUND

In the summary of findings (Coles, 2000) from a one year teacher-research grant (awarded by the UK's Teacher Training Agency (TTA)) I identified teaching strategies that were effective in establishing a 'need for algebra' (Brown and Coles 1999) in a year 7 class (students aged 11-12 years) whom I taught. 'Algebraic activity' in this project was interpreted as being synonymous with 'thinking mathematically' (see Brown and Coles, 1999). Evidence for students finding a 'need for algebra' was that they were able to ask their own questions about complex mathematical situations and structure their approach to working on these questions.

The results of the TTA research formed part of the background to a current research project [1], funded by the Economic and Social Research Council (ESRC). This project involved three other teachers, who had all been part of a steering group on the TTA research, and wanted to work at developing a 'need for algebra' in their own year 7 classes (the first year of secondary school in the UK).

Since a 'need for algebra' was linked to students asking their own questions, whole class discussions in which students developed these questions were seen by all the teachers on the project as being a vital component of their lessons. If discussions amongst a whole class (around twenty six students for each teacher) are to be effective in allowing students to develop their own ideas, then the quality of listening of the students is a key factor. Before presenting a case study of the changing practice in Teacher A's classroom in relation to the listening that took place, I need to set out what I mean by listening and by different types of listening.

LISTENING AND HEARING

The dictionary definitions of listening and hearing are as follows:

hearing is; 'the action of the faculty or sense by which sound is perceived ... the action of listening ... knowledge by being told'

listening is; 'the action or act of listening ... to hear attentively ... to give ear to ... to pay attention to ... to make an effort to hear something' (Little et al, 1973)

There is an overlap in these definitions in that both can be used to mean 'the action of listening'. The different aspects of the definitions of listening all share this active component; *'to give ear to'*, *'to pay attention to'* and in each phrase I take listening to involve an act of will or decision on the part of the listener *'to make an effort ...'*. This sense of listening involving the will is echoed both in research in psychology: *'Listening is a process that is triggered by our attention.'* (Rost, 1994 p.2) and in mathematics education: *'The act of listening ... requires a full and conscious effort to tune into the how and the what of the students' idea'* (Wassermann, quoted in Nicol, 1999 p.57).

The definitions of hearing, in contrast, I take to refer to two different phenomena. The *'faculty ... by which sound is received'* (Little et al, 1973) seems to refer to the mechanical aspect of perceiving sound. However, the last definition of hearing in the quotation above: *'knowledge by being told'* (ibid) does not fit with this 'mechanical' meaning. *'Knowledge by being told'* implies that when I hear, something happens internally. I may be attending to whether what was said agreed or conflicted with my previous knowledge or whether what I heard extends the ideas I previously held.

There is an implied distinction here between a listening that is active but where no connection is felt with what is said and times where there is a connection made and where the hearer is changed by what they hear. I have found this distinction useful in thinking about classroom discussions but, in analysing lesson dialogue, I needed a finer grained and observable categorisation. The definitions that follow are based on Davis' (1996) notions of the evaluative, interpretive and hermeneutic listening of teachers, which I adapt for analysing the listening of students as well as teachers.

THREE FORMS OF LISTENING

(1) Evaluative listening

If a teacher is listening in an evaluative manner then they will characteristically have a *'detached, evaluative stance'* (Davis, 1996 p.52) and they will deviate *'little from intended plans'* (ibid). For such a teacher: *student contributions are judged as either right or wrong ... listening is primarily the responsibility of the learner'* (ibid). The teacher makes assumptions based on a supposed *'knowledge of the other's subjectivity'* (ibid) or rather the assumption is the students have knowledge of the teacher's subjectivity - hence it is the student's responsibility to listen and learn from the unproblematic access they will thus have to the teacher's thinking.

If students or teacher are listening in an evaluative manner then they would see what others say in terms of right or wrong, and see listening as the others' responsibility. This is indicated by, for example, someone responding immediately to another's suggestion with a judgement that it is incorrect (or correct).

(2) Interpretive listening

Interpretive listening is characterised by an awareness of the '*fallibility of the sense being made*' (Davis, 1996 p.53). If I hear someone while listening in an interpretive manner then along with whatever connection I make, or any idea that arises, or whatever meaning I take from the words, I am aware that this may not be the connection, idea or meaning the speaker intended. There is a recognition that listening requires: '*an active interpretation - a sort of reaching out rather than taking in*' (ibid). A response might offer feedback to the speaker not by evaluating what is said but e.g. by offering an interpretation and asking for clarification.

(3) Transformative listening

What distinguishes transformative listening from the previous category, interpretive listening, is that the interpretive listener is still 'standing back' from the speaker. There is an attempt to interpret and make sense of what the speaker says, but always from the point of view of the listener.

When I listen in a transformative mode, then as well as an awareness that what I hear may not be what the speaker intended (characteristic of the hearing of interpretive listening) I am open to the interrogation of assumptions I am making, e.g. that allow me to believe communication is possible at all.

I have again drawn on Davis' (1996) categories of listening. He defines his third form of listening (which he labelled 'hermeneutic') as:

... an imaginative participation in the formation and the transformation of experience through an ongoing interrogation of the taken-for-granted and the prejudices that frame these perceptions and actions. (Davis, 1996 p.53)

The notion of the '*transformation of experience*' links this form of listening to traditions of Buddhist mindfulness, in which knowledge is seen as '*equivocal*' and '*open to question or revision*' (Claxton, 1997 p.219).

Evidence of transformative listening and mindfulness in a classroom includes a willingness to alter ideas in a discussion, to engage in dialogue, to entertain other points of view, and hold them as valid, independent of whether they are accepted or not. If a student makes a connection to a previous piece of work or links something that has been said before, this would indicate the transformation of experience, the re-structuring of categories. Similarly, if a student creates a new categorisation, this indicates a mindful attention to what is happening: the seeing of '*a new world*' (Thera, 1996 p.32). This sense of re-structuring previous categories or ideas, seeing a '*new world*' is indicative of learning.

CASE STUDY - TEACHER A

With these distinctions I have been able to analyse the listening in teachers' classrooms across the project. After a brief description of the methodology and

methods of the study, I present three transcripts (see Appendix 1) to illustrate how the listening changed in Teacher A's classroom over a period of four months.

Methodology

There are four researchers on the ESRC project (one of whom is myself), each responsible for a different strand of analysis (e.g. teaching strategies, algebra).

The whole project design has been informed by ideas of enactivist research (Varela, 1999, Reid, 1996, Brown and Coles, 1999, 2000) and a key component of the research process has been that we take multiple views of a wide range of data. This is ensured by the different strands of the researchers. We will often look at one piece of data, e.g. a short piece of a videotape of a lesson, and discuss what we see from each of our perspectives.

We also tell stories of the changes that are happening over time for the students, teachers and researchers on the project. The three transcripts that I use in this paper are part of a story about learning and about teacher change. All four researchers have written about an expanded version of the last transcript (Brown et al, 2000) weaving a different story to the one I present here.

There is no sense of there being a 'best' theory for our work or, for example, of the perspective of listening in this paper being 'better' than a previous analysis of the same data. An explicit part of the project is that we see '*research about learning as a form of learning*' (Reid, 1996 p.208). From an enactivist viewpoint learning is the telling of multiple stories and the awareness of ever finer grained distinctions.

Methods used for this case study

There were four teachers on the project who were videotaped in each of the six half-terms that make up an academic year. The camera was fixed at the back of the classroom - focused on the board but with around half the students in view. The data for this study is taken entirely from the videotapes of one teacher, Teacher A (TA). I was looking at times during the lesson of whole class discussion, i.e. when there was a single conversation occurring in the room. I initially watched the videotapes and noted - at 5 second intervals - whether a student or the teacher was speaking. This record helped me identify times when students responded directly to each other or when there was significant interaction between teacher and students. I then transcribed those sections of dialogue from the video recording. I chose Teacher A for the study because, of the four teachers on the project, there was the clearest evidence of a change in listening on the videotapes of his lessons.

Analysis

The dialogue in Transcript 1 shows evidence of evaluative listening. After the comments of both S₁ and S₂, Teacher A says '*they do*' thus evaluating and confirming the students' contributions. S₃'s comment is greeted with a '*thank you*' which the other comments were not, suggesting to me that this is the comment that the teacher

wanted (although the comment is unclear, from Teacher A's response I interpret S₃ as saying something about the first and last digits of the three numbers under consideration). Further evidence for the teacher having a pre-given idea of what he wanted the students to say is that having started with the general question: '*Any comments about those three numbers*', Teacher A then asks: '*what can you tell me about the first and the last?*'. Having started with an open question, since the students were not offering what was wanted, the teacher directs their attention to a specific aspect of the problem.

It seems possible here to pick out sentences and analyse them using the categories of listening. However, in viewing more videotapes this rapidly became problematic. In looking at transcripts of sections of dialogue to decide what type of listening was being displayed I needed, in most cases, to take into account the wider context of what was happening in the lesson. For example, in a different lesson a student said to his neighbour: '*You are wrong*'. On the surface this seems typical of evaluative listening. However if this comment was the start of an interaction in which the students began to explore their differences, the listening would be interpretive or transformative. It therefore made more sense to characterise whole lessons or sections of lessons as evaluative, interpretive, etc.

In fact, when I analysed longer sections of the lesson transcribed above the listening was more interpretive. In general Teacher A does not evaluate the students' contributions as right or wrong. However, the task for the students is to fit their comments and suggestions to the teacher's plan. Teacher A interprets the students' comments and gives feedback in relation to the idea he has chosen to focus upon.

I believe the listening in Transcript 2 moves from interpretive to transformative. A student makes a suggestion: '*It's got six lines of symmetry*', which is dealt with in a different manner to the ones just before. Rather than continuing the interpretive listening pattern of repeating each student's contribution and asking for other comments, Teacher A says: '*Where's your lines of symmetry then?*'. The teacher cannot know where S₁'s lines of symmetry are, hence he is genuinely involved in making meaning of the comment.

Teacher A then asks for the rest of the class' opinion: '*Who thinks it's a line of symmetry? Hands up*'. After S₅'s comment, Teacher A gets an A4 piece of paper and starts folding it the ways S₅ and then other students suggest. The teacher responds directly to suggestions from students. The task for the class (in this case deciding what is a line of symmetry and how many there are on a rectangle) emerges from the interaction of students and teacher. I read Teacher A's comment at the start of the transcript: '*right, we're talking symmetry*' - which was said with a slightly higher tone of voice, as further evidence that he had not anticipated dealing with issues of symmetry. There is a feel of collaboration and participation in the dialogue - characteristic of transformative listening.

The participatory nature of discussion is even more evident in Transcript 3 (taken from later in the same lesson as Transcript 2) in which the listening is also transformative. The teacher here is not running the discussion (e.g. by posing questions for the students to respond to). It is the students who are asking questions: *'What about 100?', 'What would just a straight line be?'*. Students are now talking directly to each other and extending each other's ideas e.g. *'S₃: And a quarter times 48 is twelve'*.

The transcripts provide evidence that there was a significant change in the listening in Teacher A's classroom. The listening in videotapes of lessons up to Transcript 2 was interpretive or evaluative and in all later videotaped discussion the listening was transformative, so the change appears to have been a lasting one.

TEACHING STRATEGIES

It is beyond the scope of this paper to deal with what factors have contributed to the change in listening in Teacher A's classroom, however it is striking that there are a number of teaching strategies in evidence in Transcript 2 (and later discussions) that were not being used in Transcript 1. These strategies include:

- *the teacher asking a question they do not know the answer to*. Teacher A says: *'Where's your line of symmetry then?'* Having made this comment there is immediately the possibility for other students to engage with S₁ in dialogue.
- *responding to students' suggestions*. There is evidence of this particularly in the sequence when Teacher A gets a piece of paper and starts folding it.
- *asking for feedback from the whole class*. Teacher A asks for *'Hands up'* in response to the question *'Who thinks it's a line of symmetry then?'*. Feedback from this response allows the teacher to use the next strategy.
- *asking a student to explain their idea to the class*.

These strategies can all be seen as 'slowing down and opening up discussion'. They are strategies that encourage and allow different students to engage in dialogue with each other. In Transcripts 2 and 3 over a quarter of the class speak in a period of a few minutes. Another way of characterising the strategies is that they all depend on the teacher's contingency upon the responses of the students. It is important to note that this does not imply the teacher will do anything the students suggest but only that students' voices *can* be heard and *can* play a part in the creation of the lesson focus.

There is evidence from other teacher's lessons on the project of the teaching strategies above being used during times of transformative listening.

It is striking that in Transcript 3 it is not the teacher who is 'asking a question they do not know the answer to', or 'responding to students' suggestions', but the students themselves. It seems that students are taking over some of the roles in discussion previously performed by the teacher - a culture of transformative listening is becoming established in the classroom. In Transcript 3, for the first time on any of

Teacher A's videotapes, students raise their own questions, which they could work on, related to the mathematical activity.

CONCLUSION

The description in this paper of different types of listening has provided a tool for analysing classroom dialogue. The evidence of this study is that teaching strategies based on the teacher's contingency to the responses of the students allow the opening up and slowing down of class discussions, which seems necessary for the development of transformative listening. There is evidence that in discussions in which the listening of students and teacher is transformative, students exhibit behaviour associated with these teaching strategies in responding to each other. In such discussions, there is the opportunity for students to ask and work on their own questions, which for the ESRC project is linked to them having a 'need for algebra'.

1 'Developing algebraic activity in a 'community of inquirers'' Economic and Social Research Council (ESRC) project reference R000223044, Laurinda Brown, Rosamund Sutherland, Jan Winter, Alf Coles. Contact: Laurinda.Brown@bris.ac.uk.

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APPENDIX 1

[NB The numbering of students in each transcript is done independently.]

Transcript 1: September 1999

- TA: *Any comments about those three numbers?* [The numbers referred to are: 92101, 29810, 54321]
- S₁: They all have two in them.
- TA: *They all have two in them* [pause] *they do* [pause] *anything else?*
- S₂: They all have one in them.
- TA: *They do* [Two more students offer suggestions, which Teacher A responds to.]
- TA: *Now remember what we were saying ... when we were looking at four digits we were comparing the first and the last, we were comparing the two middle ones. What can you tell me about the first and the last with those ones ... what can you tell me about the first and the last?*
- S₃: [unclear]
- TA: *Thank you S₃: nine is bigger than one, two is bigger than zero, five is bigger than one.*

Transcript 2: March 2000

- S₆: It's got four sides
- TA: *It's got four sides, okay, very good, anything else?*
- S₇: It's got four equal angles
- TA: *Four equal angles, yes*
- S₁: It's got six lines of symmetry
- TA: *Six lines of symmetry, right, we're talking symmetry. Where's your lines of symmetry then?*
- ...
- S₁: Across the right hand top corner to the bottom left hand corner
- TA: *This is a line of symmetry?* [TA holds up a ruler along a diagonal of the rectangle] [pause] *he's unsure. Who thinks it's a line of symmetry? Hands up* [pause] *a couple of you.* [pause] *Who thinks it's not a line of symmetry?* [lots of hands go up] *Oooh, okay, S₃, convince those that think it is why is it not a line of symmetry do you think?*
- S₃: You can only have diagonals in a square
- TA: *Oh right, okay*
- S₄: Or a circle
- TA: *Why is that one not a line of symmetry though? S₅*

- S₅: Well, if you get like a A4 paper, that's a rectangle, you can fold it diagonally so that it goes all [unclear]

Transcript 3: March 2000

- TA: *Excellent. Oh, lovely. Well done.* [Students applaud] *So, 3 times 4 is 12, 2 times 6 is twelve, 1 times 12 is twelve and a half times 24 is also 12..*
- S₃: And a quarter times 48 is twelve
- TA: *And a quarter times 48 ...*
- S₃: And an eighth times ...
- S₄: Three quarters.
- TA: *And an eighth times ...*
- S: I'm not saying.
- S: You can actually go on.
- TA: *... We could carry on forever couldn't we?*
- Ss: What about 100? How could you draw it though?
- TA: *Well, it would be a sixth of a unit. Very small.*
- S: If you drew it really big so one square was 6
- S: Sir, what would just a straight line be?